Changes in repo markets and the necessity for CCPs in Korea

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Abstract

In 2022, US financial regulators proposed to mandate a single central clearing mechanism for treasury bonds and repo transactions to stabilize financial markets. The systemic risks inherent in repo markets were first highlighted by the global financial crisis and, as a response, global financial authorities such as the Financial Stability Board (FSB) and Bank for International Settlements (BIS) have advocated for the introduction of a central counterparty (CCP). This study examines the structural characteristics of Korean repo markets and proposes the introduction of CCPs as a way to mitigate systemic risk. To this end, the author analyzes the structural differences between US and European repo markets and estimates the potential consequences of introducing CCP clearing in local repo markets. In general, CCPs offer two benefits: they can reduce required capital through netting in multilateral transactions, and they can mitigate the effects of risk transfer by isolating counterparty risk during periods of turbulence. In Korea, the latter effect is expected to play a pivotal role in mitigating potential risks.

Keywords Repo (repurchase agreement), CCP (central counterparty), Systemic risk

Paper type Research paper

1. Introduction

> Until recently, short-term repos had always been regarded as virtually risk-free instruments and thus largely immune to the type of rollover or withdrawal risks associated with short-term unsecured obligations. In March, rapidly unfolding events demonstrated that even repo markets could be severely disrupted when investors believe they might need to sell the underlying collateral in illiquid markets. –Bernanke (May 2008)

Before the global financial crisis (GFC), both market participants and financial authorities held a strong conviction that repo transactions provided a stable funding source and would exhibit resilience in times of crisis, as emphasized by Bernanke's address as Fed chairman (Bernanke, 2012). However, the GFC revealed a swift collapse of the US repo market, underscoring that repos played a significant role in the crisis, including the downfall of Bear Stearns and Lehman Brothers, which employed repo transactions for financing their highly leveraged activities (Bernanke, 2009). [1] Bernanke (2009) identified the US repo market as the most substantial risk to the US financial system and a catalyst for intensifying the crisis. Large non-bank financial institutions in the US raised large amounts of leveraged funding, primarily through the overnight repo market (tri-party repo), and used these funds to invest in short-term securities or to fund smaller securities firms. In a situation where collateral is intertwined, the failure of one financial institution leads to the failure of another through the liquidity risk of the collateral. In other words, if the value of collateral in the repo market plummets and the haircut on the collateral grows, risk transmission in the repo market increases and systemic risk is amplified.

JEL Classification — G13, G18, G23, G28

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To address these issues, international financial authorities and governments have established various regulatory frameworks to mitigate market instability [2].

In the summer of 2022, the US Securities and Exchange Commission (SEC) issued a proposal to implement mandatory central counterparty (CCP) clearing through FICC for US Treasury and repos (SEC, 2022). Given the market volatility experienced in the 2014 flash crash, the September 2019 Treasury repo market crisis and the March 2020 COVID-19 outbreak, US financial regulators are actively promoting the adoption of CCPs in the US Treasury and repo markets to prevent disruptions during crises. The SEC's proposal aligns with the US Treasury's Policy Suggestion, "additional post-trade transparency in the Treasury securities market," in the spring of 2022. This recognition is driven by the belief that trading through a single CCP during times of crisis can reduce counterparty risk and enhance market resilience. The introduction of CCP clearing will not only enhance the transparency of repo transactions but will also improve firms' capital management efficiency through balance sheet provisioning, which, in turn, will facilitate increased trading volumes (US Department of the Treasury, 2022; Federal Reserve Bank of New York, 2022; DTCC & FICC, 2022) [3].

The role of CCPs in mitigating risk transmission within repo markets is evident in the contrasting behavior of the US and European repo markets during the GFC. The US repo market, which relied heavily on non-centrally cleared tri-party repos for funding, faced structural problems – increased haircuts and capital withdrawals, even though trades were collateralized. The European repo market, on the other hand, benefited from CCP clearing and sophisticated collateral management systems and, as a result, recovered quickly after the crisis. In particular, the risk insulation of CCP and anonymous electronic trading platforms prevented counterparty risk from being transferred [4].

Improving the infrastructure for repos is of great importance in the Korean financial market environment. First, the repo market has played a pivotal role in the Korean short-term financial market since 2010, effectively replacing the unsecured call market. For instance, non-bank financial institutions, with the exception of a few large securities firms, have been prohibited from call trading since March 2015. This policy change had led to a significant increase in repo trading volume [5]. Despite the quantitative advancements, the Korean repo infrastructure trails behind more developed countries, particularly in Europe. The absence of a CCP and automated collateral management services contributes to this lag. Introducing a CCP becomes essential not only to align with international standards within the repo market but also to curtail the transmission of systemic risk.

Second, compared to major countries such as the US and Europe, the Korean repo market is characterized by the existence of a retail repo market. In Korea, repo transactions are divided into BoK (Bank of Korea) repo, inter-institutional repo and retail repo. Here, retail repo refers to repo transactions conducted by securities companies with individual/retail investors for the purpose of raising funds. In general, any security can be used as collateral, but retail repo is limited to securities that are marketable and rated investment grade by a rating agency, including government, municipal, agency and corporate bonds. However, the overwhelming majority of collateral used is financial corporate bonds. The balance of retail repo is over KRW 80 trillion as of the end of May 2023, which is not small compared to the others' volume of KRW 165 trillion. Retail repo is characterized by the direct participation of individual investors, and, as a result, it is highly influenced by investment sentiment. As in the Silicon Valley Bank (SVB) case, bank runs can occur when investors lack confidence in financial companies (securities firms), and repos utilized by securities firms for leverage and short-term funding can be subject to similar run risks depending on investor sentiment [6].

Finally, the stability of the Korean repo market is also important in that it is an underlying market for the KOFR (the Korean reference risk-free rate). Due to the LIBOR scandal that erupted during the GFC, the calculation of the LIBOR rate will be discontinued after 2023, and major countries such as the US, UK and Japan have recently introduced new risk-free

reference rates to replace the LIBOR rate. Europe and Japan have chosen an unsecured rate equivalent to the Korean call rate, while the US, Canada and Switzerland have chosen the repo rate as their RFR. In Korea, the repo rate backed by Treasury bonds and monetary stabilization bond was selected as the risk-free reference rate, the Korean Overnight Funding Rate (KOFR), at the end of 2021, and the KOFR rate has been calculated and published by the Korea Security Depository since early 2022 (kofr.kr) [7] The KOFR rate will serve as a benchmark for contracts, such as interest rate swaps and floating rate bonds. It is also expected to be utilized as a fallback rate for CD rates (Baek and Yoon, 2020).

For these reasons, this study examines the necessity, effectiveness and considerations for introducing a CCP to mitigate potential risks in the Korean repo market. Section 2 examines the repo markets in the US and Europe and analyzes the main factors that affected the stability of the European repo market during the GFC. Section 3 examines the infrastructure and market characteristics of the Korean repo market. Section 4 examines the expected economic effects of establishing a CCP, and issues to be considered in its implementation. Section 5 concludes.

2. Repo markets and country-specific features

This section examines the repo market infrastructure in the US and Europe to understand the risks that may arise from repo transactions and compares how different types of infrastructure affect the stability during the crisis. The experiences of the US and Europe during the financial crisis can be used as a benchmark for improving the quality and stability of Korean repo markets.

2.1 Structure of repo markets

A repo transaction is a typical short-term funding contract in which a repo seller sells collateralized securities to a repo buyer and promises in advance to repurchase the sold securities at the agreed maturity. Repo transactions can be categorized according to how the collateral is specified, who manages the collateral and the liquidation process.

First, repo transactions are divided into general collateral (GC) repo and special collateral (SC) repo, depending on how the collateral is specified. In a GC repo, the parties agree on the terms of the eligible collateral, allowing the repo seller (borrower) to pledge any security within the terms. SC repo, on the other hand, is a repo transaction for specific securities that the repo buyer wants. Second, repo transactions are categorized into tri-party repo and bilateral repo, depending on the collateral management method. In bilateral repo, the counterparty directly underwrites the collateral and manages the haircut, while in tri-party repo, a third-party collateral management organization other than the counterparty is responsible for the settlement and collateral management of the repo transaction. Third, repo transactions are divided into non-centrally cleared repo and CCP cleared repo according to the clearing method between the repo buyer and seller. In the latter case, the contract between the buyer and seller is replaced by a contract between the seller and the CCP, and the buyer and the CCP, with the CCP becoming the legal counterparty to the original contractors, thus isolating counterparty risk.

Repo transactions are primarily over-the-counter and marketed by dealers. In the US, government securities primary dealers (PDs) act as repo dealers, and in Europe, large banks that participate in capital markets through universal banking act as dealers [8]. Dealers make markets between borrowers and lenders of funds. In general, money lenders (buyers) include money market funds (MMFs), pension funds, insurance companies and general corporations that need to manage cash, while money borrowers (sellers) include hedge funds, asset management companies and small and medium-sized financial companies that have difficulty borrowing funds independently. In addition, commercial banks become

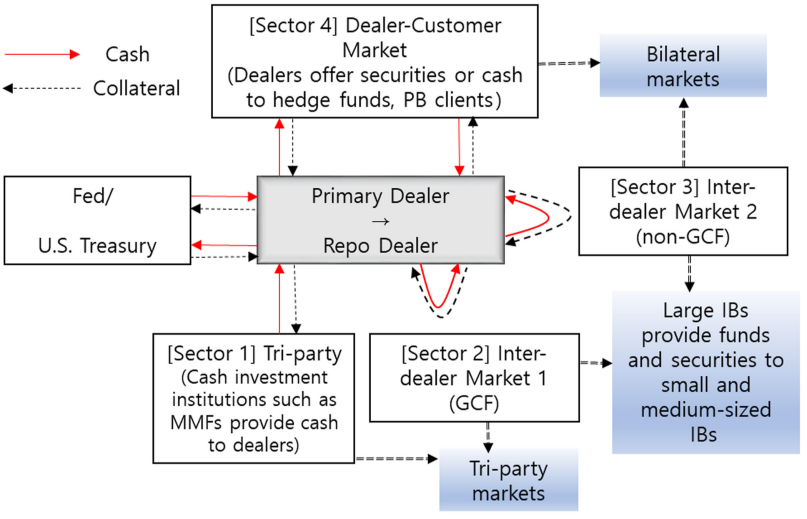
participants in the repo market in both directions, both for procuring reserves and for short-term liquidity investment.

In repo markets, dealers monetize through collateral haircuts, repo rate differentials and maturity transformation. Maturity transformation means that dealers raise funds through overnight repos with MMFs and supply funds to hedge funds and asset management companies through term repos. The GFC served as an important example of how a liquidity/maturity transformation can be transmitted when short-term repo borrowing is disrupted (Stein, 2013).

2.2 Features of the US and European repo markets

The US and Europe have the most active repo markets, which play an important role in the short-term financing and operations of securities firms (investment banks). However, there are differences between the US and Europe, such as the use of CCPs and collateral utilization systems (Baklanova *et al.*, 2017; Boissel *et al.*, 2018). First, let us take a look at repo transactions in the US. Baek (2017) categorizes the repo market in the US as shown in Figure 1.

"Tri-party repo" in sector 1 of Figure 1 is a market where repo dealers, mainly large securities firms, raise funds from money lenders such as MMFs. In the tri-party market, a clearing bank performs settlement and collateral management. This market is a funding channel for US investment banks, and only large, creditworthy investment banks can participate. According to FRB NY (2010), prior to the financial crisis, large dealers raised $100 to $200 billion daily in the tri-party repo market. Sectors 2 and 3 are also interdealer markets, but are differentiated by the type of collateral they accept. Sector 2 is the GC financing market, where only US Treasuries and government guaranteed bonds are used as collateral, and is used when a large securities firm provides funding to a small securities firm (Copeland *et al.*, 2015). Sector 3 uses only US Treasury securities as collateral, and small and medium-sized securities firms participate in the financing process. Both markets have in common that they are used as a funding channel for SMEs from PDs, and both are cleared through CCPs. In sector 3, however, small securities firms raise funds from large repo dealers not only because they are anonymous but also because the transmission of credit risk through the CCP is cut



Source(s): Baek (2017)

Figure 1.
Structure of repo markets in the US

off in the event of crisis. Sector 4 is the market where large repo dealers provide prime brokerage services (PBS). In the GFC, the crisis started in the market between dealers and hedge funds of sector 4 [9].

The primary distinction between the European repo market and the US repo market lies in the evolution of their respective structures. Notably, the European repo market has predominantly transformed into a bilateral repo market, deviating from the tri-party repo market structure. Consequently, while in the US, repo dealers occupy a pivotal role within the tri-party repo market, engaging in leveraged investment and brokerage, the European repo market has not used significant leveraging through repo due to prudential regulations. In Europe, tri-party repo transactions are utilized only when the collateral is difficult to value, such as corporate bonds or structured securities (ECB, 2006) [10].

Repo trading in Europe is considered to have a more advanced infrastructure than in the US, including automated collateral management systems and CCP clearing. Before the financial crisis, Clearstream and Euroclear were in charge of collateral management in major European countries, and the entire process was automated. The process of selecting, allocating and substituting collateral has automatically been streamlined through advanced infrastructure. Notably, collateral securities that align with the eligibility criteria mutually agreed upon by counterparties are automatically chosen and allotted from the repo seller's account. Collateral can be automatically substituted at any time upon the repo seller's request, and the buyer is guaranteed that the collateral provided always meets the eligibility criteria. This automation contributes to heightened operational efficiency, facilitating smoother collateral management processes. In addition, Europe places a stronger emphasis on CCP clearing, which is accompanied by a well-established efficient collateral management. CCP clearing not only diminishes direct credit risk exposure to counterparties but also addresses information asymmetries linked to interbank credit risk.

Since the GFC, the US repo market has promoted infrastructure improvements based on the European repo market. As mentioned in the introduction, in the summer of 2022, the SEC announced a proposal to require all repo transactions to be cleared through a CCP provided by FICC. This move is part of an effort to build on the resilience and stability of repo infrastructure using CCPs and anonymous platforms [11].

Structural differences between the US and European repo markets led to significant differences in the recovery of trading after the financial crisis. Tri-party repo in the US continued to decline after the financial crisis, peaking at $2,261.4 billion in November 2012, before rebounding since April 2016. European repo markets, on the other hand, have experienced a rapid recovery since the financial crisis. Characteristically, Europe has seen a rapid increase in repo trades cleared through CCPs, with repo balances standing at $5.65 trillion as of December 2016. Of course, in Europe, the repo market experienced the same disruption as the unsecured market (trading only with high-quality counterparties and high-quality collateral) in the early stages of the financial crisis as in the US, but quickly recovered to pre-crisis volumes shortly after 2010 (Comotto, 2012). Notably, Spanish and Italian banks highlight that, in conjunction with CCPs, the adoption of anonymous trading through electronic platforms has significantly contributed to the resurgence of repo volumes (BIS, 2013). Moreover, the European Central Bank's decision to broaden the spectrum of collateral for monetary policy execution is also believed to have played a role in revitalizing the European repo market (Kim, 2021).

3. Korean repo market and the need for CCP

3.1 Structure of the Korean repo market

The Korean repo market has undergone a substantial expansion in terms of trading volume, stepping in to replace the call market as part of the government's overhaul of the short-term

financial market. Prior to the financial crisis, short-term funding transactions among domestic financial institutions primarily relied on call transactions. However, post-crisis, the prominence of call transactions dwindled, giving way to a notable surge in repo transactions. This transformation was catalyzed by the systemic reform endeavors aimed at enhancing stability within the short-term financial market [12]. Prior to regulating non-banks' call market borrowing, the average trading balance of the call reached KRW 30–35 trillion, but as of April 2023, the average trading balance fell to less than KRW 10 trillion. On the other hand, the inter-institutional repo trading balance is over KRW 150 trillion as of April 2023.

Following the reshaping of the short-term financial market in 2015, it was anticipated that the repo rate, which represents secured borrowing, would converge to a level lower than or equal to the call rate, which represents unsecured borrowing. However, contrary to this expectation, since the reform, the repo rate has consistently maintained a premium over the interbank call rate, ranging from 0.05% to 0.2%. This means that although the repo market is a collateralized borrowing, the credit risk of the counterparty plays the most important role in the interest rate determination. In the US repo market, as well, the interest rate of repo transactions with small and medium-sized companies is higher than that of tri-party repo, which is a transaction between large IBs, even with the same collateral. Even if there is collateral, the credit risk of the counterparty is the most important factor in determining the interest rate.

The Korean repo market is divided into inter-institutional repo and retail repo. The former is a market for financing (lending) funds through repo among financial companies. In the inter-institutional repo market, money lenders are mainly MMFs and trust account of banks and securities companies, while money borrowers are securities companies, asset management companies and banks. Currently, more than 90% of inter-institutional repo transactions in Korea are in the form of tri-party repo, which is managed by the Korea Securities Depository. The retail repo market is a market where securities companies borrow funds from individual investors using government bonds, financial corporate bonds and other bonds as collateral as a means of financing bond investments. If there is a repurchase request in the retail repo market, the securities company responds to the repurchase request by selling the bonds in the inter-institutional repo market. Financial corporate bonds are the dominant form of collateral used in retail repo, and these securities present potential risks due to their tendency to become illiquid in times of crisis.

The Korean inter-institutional repo market is dominated by tri-party repos, which designate a financial firm as the clearing agent. In terms of collateral fungibility, GC repos allow for collateral substitution, but active collateral substitution is rarely utilized. A repo trade is similar to a specific collateral repo at the time of initiation, and after initiation, the collateral can be substituted with the consent of the counterparty. In addition, PvD (payment versus delivery) is adopted for each transaction instead of aggregating intraday transactions, making it difficult to arbitrage using repo.

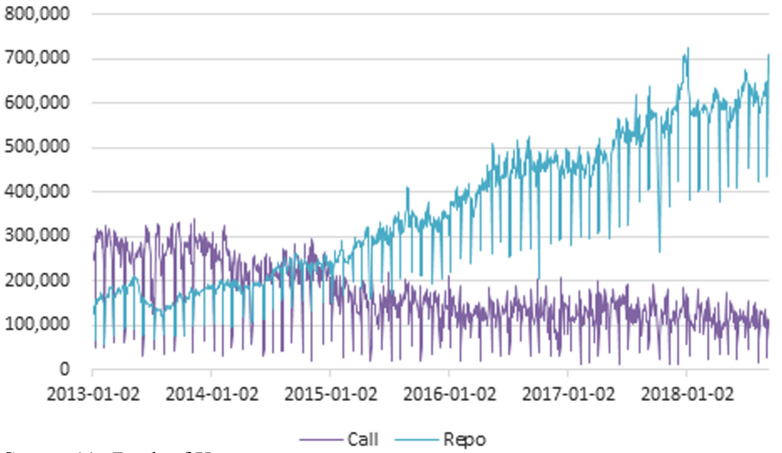
In terms of the role of market makers, the Korean repo market is characterized by the absence of market makers. While repo dealers in the US and Europe borrow funds from lenders such as MMFs, and supply funds to borrowers such as hedge funds, in Korea, net suppliers and net demanders are direct counterparties. This is likely due to the small size of domestic hedge funds and the small size of Korean securities firms that provide PBS services to hedge funds. Given this environment, the introduction of a CCP has both positive and negative effects. On the negative side, when only net demanders/suppliers participate in repo, there is no multilateral netting of positions, and therefore the amount of risk netted may not be large. This means that the scale of balance-sheet provisioning is not large, and the actual reduction in capital required may be small [13]. In addition, the introduction of CCPs may have a negative impact on market-wide liquidity as it is expected to increase the complexity of the clearing and settlement process and increase costs for market participants.

One the positive side, if a repo dealer is absent, the repo market is vulnerable to counterparty risk as it involves direct participation of net demanders and suppliers with large credit quality differences. The failure of a small or medium-sized securities firm or hedge fund can directly affect the entire market. The collapse of the US repo market in the GFC was also triggered by the impairment of the collateral value of the subprime mortgage market in repo transactions between repo dealers (high credit quality) and hedge funds (low credit quality), leading to the bankruptcy of large securities companies. Therefore, the need for a CCP that can isolate risk contagion is even more necessary in the Korean repo market, where demanders and suppliers with different creditworthiness participate in direct transactions.

3.2 The current status of the Korean repo market

As mentioned earlier, the Korean repo market has grown rapidly following the government's reorganization of the short-term money market (Yoon and Kim, 2020). Figure 2 shows the average daily trading volume of the call market and the repo market. Until around January 2015, the call market had a larger trading volume, but since then, the average daily trading volume of the repo market has increased significantly. According to Table 1, the yearly trading volume more than doubled from 2016 to 2022, and the average daily volume tripled, reaching KRW 150 trillion by the end of 2022.

Table 2 shows the participation of financial firms in the inter-institutional repo by types of institutions. Domestic securities firms are the largest participants in the repo market (selling



Source(s): Bank of Korea

Figure 2.
Daily average trading volume of call and repo contracts

Year	Trading volume	Daily average balance
2016	11,276.56	51.95
2017	13,331.35	61.45
2018	16,223.44	75.35
2019	20,108.96	92.62
2020	22,148.08	106.42
2021	23,318.16	126.42
2022	25,438.50	149.2

Source(s): Korea Securities Depository (2023)

Table 1.
Inter-institution repo volume by year (unit: KRW trillion)

Balance of sell position	Percentage (%)	Type of institutions	Percentage (%)	Balance of buy position
4.65	2.80%	Domestic banks	5.10%	8.45
–	0.00%	Domestic bank (trust)	26.50%	43.99
2.87	1.70%	Foreign bank branches	2.10%	3.42
82.04	49.50%	Domestic securities companies	6.30%	10.42
16.67	10.10%	Domestic securities companies (trusts)	4.10%	6.72
41.18	24.80%	Asset management companies	39.20%	64.94
3.41	2.10%	Insurance company	0.80%	1.27
2.71	1.60%	Other credit companies	6.20%	10.22
0.75	0.50%	General finance company	0.00%	–
11.43	6.90%	Non-residents	9.60%	15.98
0.05	0.00%	Others	0.20%	0.36

Source(s): Korea Securities Depository (2023.4)

Table 2. Inter-institutional repo volume by type of financial firms (unit: KRW trillion)

repos) with a share of about 49.5%, followed by asset management firms with a share of 24.8%. In terms of amount, domestic securities firms raise an average of KRW 82 trillion per day in the repo market, while asset management companies raise half of that amount, KRW 41 trillion. The data show that domestic securities firms have very short maturities and may be vulnerable in the event of a run due to a liquidity crisis. In the case of asset management firms, the data show a significant increase in funding through the repo market for leverage funds and hedge funds. Compared to the past, the proportion of repo sales by asset management firms has increased significantly, both in terms of percentage and amount. On the other hand, it is mainly MMFs of asset management firms that supply funds to the market. Asset management companies accounted for 39.2% of the total, while 26.5% were trust accounts of domestic banks. The recent growth of MMFs and ETFs has resulted in a significant increase in the supply of funds to the domestic repo market.

Table 3 shows the types of collateral used in the repo market. The collateral used in the repo market differs significantly between inter-institutional repo and retail repo. In the former, more than 70% of the total is collateralized by treasury bonds and monetary stabilization bonds, while in the latter, the share is lower, around 15%. On the other hand, in the retail repo market, financial bonds and agency bonds are mainly utilized as collateral, as they offer high yields. These bonds suffer from low liquidity in times of crisis, which could trigger a wider financial crisis in the event of a run.

	Inter-institutional repo		Retail repo	
Type of collateral	Amount	Percentage	Amount	Percentage
Treasury bond	120.35	67.54	7.66	8.96
Monetary stabilization bond	7.40	4.15	5.19	6.07
Financial corporate bond	28.21	15.83	57.52	67.29
Government sponsored bond	12.76	7.16	8.00	9.35
Corporate bond	6.37	3.58	6.60	7.72
Municipal bond	0.28	0.16	0.51	0.6
ETF	2.80	1.57	0.00	0
Others	0.04	0.02	0.02	0.02
Total	178.20	100	85.48	100

Source(s): Korea financial Investment Association, Korea Securities Depository (as of April 30, 2023)

Table 3. Collateral composition of the domestic repo market by average daily balance (unit: KRW trillion, %)

On the other hand, the share of treasury bonds used in overseas repo transactions has reportedly increased to 70–80% since the financial crisis. This is due to the increased use of treasury bonds due to stricter regulation after the financial crisis, which is not much different from domestic inter-institutional repo. Table 4 shows the evolution of trading volumes (gross annualized volumes) of collateral used from 2016 to the most recent year, and shows that the volume of government bonds has increased by about KRW 1000 trillion over the seven-year period.

The potential systemic risk in the repo market is amplified by the interaction between the illiquidity of the collateral and the maturity of the repo transaction, that is, overnight repo or open repo exacerbates the crisis because the lenders can stop funding immediately in case of market stress. Table 5 shows the proposition of maturities in the inter-institutional repo market by year. While the share of open repos has remained unchanged over the years at around 2%, the share of overnight repos has decreased from 82% in 2019 to 62% in 2023. However, in terms of amount, it has increased from KRW 76 trillion to KRW 104 trillion, so it is difficult to conclude that liquidity risk has decreased.

Of course, the risk transfer effect may not be significant even if the overnight exposure is high, depending on the characteristics of the participants. If commercial banks with relatively low credit risk and with low leverage have a high proportion of overnight repos, the risk transfer effect may be small. According to the ratio by types of firms in Table 6, domestic securities firms and asset management companies, which mainly borrow funds, have a relatively high proportion of overnight repos at 61.7% and 83.9%, respectively. Leveraged funds that borrow money in the short term often use overnight repo to reduce borrowing costs. On the other hand, there is a difference between asset management companies and domestic banks (trusts) that borrow money, as the share of overnight repos is less than 60% for MMFs, while the share of overnight repos is over 96% for trust accounts of domestic banks.

As shown in Table 7, most of the retail repos are short-term repos with less than a week, and the share of transactions with a maturity of more than 7 days is very low. In other words, retail repos are characterized by low liquidity of the target collateral and short maturity, which is one of the biggest characteristics of the domestic retail repo market. This can be a potential risk in times of stress.

The characteristics of the Korean repo market can be summarized as follows. First, the domestic inter-institutional repo market is highly dependent on overnight transactions. Although the ratio of overnight transactions has been declining slightly recently, the amount of overnight repos has continued to increase, with the average daily balance exceeding KRW 100 trillion as of April 2023. Repos are being actively utilized as a means of financing for financial companies, and the use of short-term products has increased significantly. Second, in the domestic repo market, it is understood that the dealer function of large securities companies is absent. In the US and Europe, large securities firms and banks with high creditworthiness play the role of repo dealers. By borrowing funds from repo buyers such as MMFs and providing funds to small and medium-sized securities companies, they enhance the risk management and evaluation capabilities of the repo market and serve as a safety net against market shocks. On the other hand, in Korea, MMFs, large securities firms and small and medium-sized securities firms all enter into repo transactions as direct counterparties, which can cause major disruptions to the entire market if the supply of funds is interrupted due to short-term shocks.

4. Implementation and considerations for repo CCP

4.1 The economic impact of CCP

In the wake of the GFC, global financial authorities have recognized the need to improve the transparency and stability of OTC derivatives markets. In particular, the establishment of infrastructure related to OTC derivatives trading, such as CCPs and trade repositories (TRs),

Table 4.
Annualized volume of repo contracts by collateral and by year (unit: KRW trillion)

Year	Treasury bond	Monetary stabilization bond	Commercial bank bond	Other financial corporate bond	Municipal bond	Government sponsored bond	Corporate bond	Commercial Paper	Equity and ETF	Foreign currency denominated bond
2016	5110.15	2661.24	2227.62	275.45	18.66	1391.15	198.07	0.00	16.63	0.00
2017	5872.03	2646.90	3612.03	470.98	52.47	1205.82	202.35	0.00	21.07	0.00
2018	7695.07	2325.85	4845.89	865.92	64.73	976.30	292.54	1.18	53.04	0.00
2019	11232.23	1666.47	5157.48	1495.68	53.85	1149.25	434.98	24.75	62.69	0.00
2020	12518.70	1421.42	5401.98	2031.13	77.88	1336.99	633.95	0.74	26.48	0.00
2021	13219.52	877.82	5756.51	2466.84	96.01	1511.06	797.84	1.62	11.67	0.10
2022	15427.73	883.66	4963.73	2618.88	92.88	2000.79	1041.60	8.28	30.17	0.14

Source(s): Korea Securities Depository (2023)

Table 5.
Daily average balance of inter-institutional repo by maturity (unit: KRW trillion, %)

	Overnight repo		Term repo											
			2~3 Days		Open		4~6 Days		7~10 Days		ETC		Total	
Year	Amount	Percentage	Amount	Percentage	Amount	Percentage	Amount	Percentage	Amount	Percentage	Amount	Percentage	Amount	Percentage
2019	76.3	82%	3.59	4%	2.13	2%	3.04	3%	1.77	2%	5.72	6%	92.55	100%
2020	82.96	78%	3.27	3%	2.32	2%	3.19	3%	8.55	8%	6	6%	106.28	100%
2021	86.41	68%	2.85	2%	2.47	2%	1.79	1%	18.71	15%	14.35	11%	126.57	100%
2022	93.43	63%	3.34	2%	2.94	2%	2.13	1%	25.69	17%	21.94	15%	149.48	100%
2023	104.81	62%	3.16	2%	3.27	2%	2.19	1%	30.09	18%	25.95	15%	169.46	100%

Source(s): Korea Securities Depository (2023), as of April 30, 2023

Overnight–amount	Overnight–percentage	Balance of sell position	Type of institutions	Balance of buy position	Overnight–amount	Overnight–percentage
4.66	61.50%	7.58	Domestic banks	8.54	4.62	54.10%
–	–	–	Domestic bank (trust)	44.63	43.08	96.50%
0.1	4.10%	2.32	Foreign bank branches	3.06	1.49	48.70%
49.51	61.70%	80.22	Domestic securities companies	10.4	5	48.10%
15.25	91.30%	16.71	Domestic securities companies (trusts)	6.79	5.17	76.10%
34.03	83.90%	40.57	Asset management companies	65.79	39.27	59.70%
0.88	23.20%	3.81	Insurance company	1.29	1.21	93.30%
0.36	12.50%	2.85	Other credit companies	9.17	4.76	51.90%
0.65	96.90%	0.68	General finance company	0	0	100.00%
–	0.00%	11.33	Non-residents	15.34	–	0.00%
0.01	9.30%	0.16	Others	1.23	0.87	70.50%
105		166	Total	166	105	

Source(s): Korea Securities Depository (2023), as of April 30, 2023

Table 6. Balance of repo contracts by the types of institutions (based on daily average)

	0~6 days	7~15 days	16~30 days	31~60 days	61~90 days	More than 91 days	Total
Securities companies	7,316,804	124,945	174,889	100,260	8,407	11,064	7,736,370
Korea Securities Finance Corporation	–	–	–	–	–	–	–
Others	294	–	–	–	9	655	958
Total	7,317,098	124,945	174,889	100,260	8,416	11,719	7,737,328

Source(s): Korea Financial Investment Association, as of April 30, 2023

Table 7. Trading balance of retail repo by maturity (unit: KRW 100 million)

is still receiving a lot of attention. In general, the post-trade process consists of clearing and settlement, with clearing being the step that finalizes the debts and liabilities between the trading parties. When clearing is done through a CCP, the CCP acts as a legal counterparty, and the counterparty's credit risk is replaced by the CCP's credit risk.

4.1.1 Positive effects of CCPs. CCPs can enhance market stability by reducing counterparty risk through two channels. First, after novation, the CCP monitors the credit risk of the participants by requiring CCP membership, charging initial margin as a stabilizer against fluctuations in the market value and charging additional collateral (variation margin) by

monitoring participants' positions as the market changes. In addition, a loss-sharing system is in place in case of losses beyond the CCP member's collateral, thereby preventing the transfer of credit risk. Relatedly, when the counterparty is a CCP, the participant has less counterparty risk, which reduces the level of equity capital required, and the reduced equity capital burden can lead to higher profitability. Second, CCPs can offer the advantage of anonymizing transactions. Using a CCP eliminates the need to identify counterparties in automated repo transactions, as the CCP assumes counterparty risk. The result is a substantial reduction in transaction costs in the highly liquid OTC repo market. Third, CCPs can use multilateral netting to reduce the funds and collateral required for settlement. In a typical OTC derivatives transaction, if multiple market participants maintain multiple trades, each trade will require collateral or margin requirements. However, if all such transactions are cleared through a CCP, the CCP will take into account the multilateral netting of market participants, thereby reducing the overall level of collateral or margin required [14].

Finally, CCPs can improve market liquidity in the long run. In the US, large, creditworthy PD firms are free to engage in repo transactions without a CCP. However, when large PD securities firms engage in repo transactions with small and medium-sized securities firms, they tend to clear through CCPs to reduce their credit risk to small and medium-sized securities firms. In this way, CCPs can facilitate the market participation of financial companies with low creditworthiness, which can have a positive impact on the long-term market development.

4.1.2 Negative effects of CCPs. The main concern with the introduction of CCPs in the repo market is the increase in transaction costs. To manage counterparty risk, CCPs have requirements for members that can be cleared by the CCP. CCP members are required to establish a default fund in case of a member's bankruptcy. Of course, the relative increase in transaction costs of repo may be small compared to other OTC derivatives due to the presence of collateral.

Another concern is the expansion of CCP concentration risk. Of course, concentration risk can be interpreted as an advantage, given that transparency of OTC derivatives transactions and concentration of trade information has been a major topic of discussion since the financial crisis. However, the concern is that if a CCP fails to manage risk, the impact on the entire market can be much amplified. CCPs can amplify the contagion effect, which can lead to systemic risk. In particular, if the CCP is operated by a private entity for profit, the socialization of risk occurs, where the entire society has to bear the responsibility or damage of risk management failures [15].

As described before, repo CCPs provide many economic benefits, but there are some concerns. Therefore, the introduction of repo CCPs should be comprehensively judged in light of the Korean financial market environment to maximize benefits and minimize costs. However, given the weak dealer function in the repo market, the introduction of a CCP is essential. Unlike overseas repo markets, Korean repo markets are not segregated according to the creditworthiness of market participants, which is due to the lack of dealer functions in the repo market. As a result, the market is centered on broker trades, resulting in a lack of liquidity, and even small internal and external shocks can cause large fluctuations in market liquidity and prices. If some participants default on their contracts, the ripple effect can disrupt the entire market. This is why CCPs are needed in OTC derivatives markets, and the same applies to repo markets.

4.2 International examples

Most major countries introduced CCPs for repo trading around 2000. In the US and UK, existing clearing organizations launched CCP services at the request of market participants, while Japan established a stat-led clearing house. The US, Switzerland and Canada, which,

like Korea, adopted repo rate as RFRs, all introduced CCPs for repo. In the overseas cases, CCPs were often established voluntarily by market participants, presumably for the purpose of balance sheet netting for repo transactions.

In major countries, even if CCPs have been voluntarily adopted by market participants, actual participation is not mandatory and is based on the market participant's choice. Repo trades are categorized into direct trades between parties, electronic trades using electronic platforms and brokered trades using brokerage firms, and depending on the type of trade, market participants can choose whether or not they want to be cleared by a CCP [16]. However, since the financial crisis, the proportion of CCP clearing for repo trades has been steadily increasing in most countries. This is due to the expectation that CCPs can mitigate systemic risk by hedging credit risk and preventing risk contagion. This is indirectly evidenced by the fact that even for repo trades with short maturities, the majority are cleared through CCPs.

As discussed earlier, the resilience of European repo markets during the financial crisis was due to the comprehensive infrastructure that had been in place since the early 2000s, including CCP clearing, automated collateral management systems and anonymous trading through electronic trading platforms. In order to reduce potential risks in the Korean repo market, it is necessary to provide electronic platforms that allow clearing through CCPs and anonymous trading. However, in the Korean repo market where only one-way trading exists, it may not be feasible for a private entity to establish a CCP on a voluntary basis. Therefore, it is recommended that the entity that establishes a CCP for the Korean repo market should be an entity that plays a public role in the financial market, such as an exchange or a depository.

In the US, in particular, the FICC, a bond clearing organization, was introduced in 1998 at the request of market participants. FICC is a wholly owned subsidiary of DTCC, a clearing and settlement company, and consists of GSD, which clears Treasuries, and MBSD, which clears mortgage-backed securities. Specifically, in 1998, GC repo was created by the Government Securities Clearing Corporation (GSCC), the predecessor of FICC, with the Bank of New York, Mellon and Chase banks, to lower repo transaction costs and increase liquidity. This repo market does not settle via delivery versus payment (DvP), but instead consolidates all GC repo positions of each dealer at the end of the day and utilizes collateral substitution using general collateral. This reduces transaction costs and reduces the cost of intraday collateral substitution.

In GC financing repo, large financial companies participate by becoming members of FICC, and if they are not members of FICC, they can use it indirectly through members. GC repo is available for Treasury securities, conforming mortgage-backed securities and obligations originated by government-sponsored entities. In the US, GC repo allows for multiple clearing banks to be designated, so a repo CCP can be used even if different clearing banks are used. The repo market in the US can be divided into FICC CCP repo market and non-CCP market. Among them, FICC CCPs are divided into inter-dealer transactions and broker transactions: inter-dealer transactions are mainly GC repos, while broker transactions are non-GC transactions using specific collateral.

In the UK repo market, repo trades cleared by LCH.Clearnet include Term £ GC and €GC Repo plus. The repo consists of a collateral basket of UK government bonds (Term £ GC) and ECB eligible bonds (€GC Repo plus). In €GC Repo plus, the collateral baskets are categorized by creditworthiness: Basket 1 (LCR equivalent) consists of bonds that meet ECB liquidity classes L1A, L1B, L1C and ratings higher than A- for government bonds and AA- for other debt, and Basket 2 (ECB restricted) consists of ECB liquidity classes (L1A, L1B, L1C, L1D) and ratings higher than BBB [17].

Similarly, Euro GC Pooling in Europe is a basket repo product, with associated infrastructure including automated collateral selection and substitution capabilities. Euro GC Pooling is a platform product based on basket trading jointly developed by Eurex Repo,

Eurex Clearing and Clearstream, all wholly owned subsidiaries of Deutsche Borse. Even for GC repo transactions, the specific collateral securities must be identified between the two parties at the trade stage, which is said to be the biggest inconvenience for unsecured market borrowers when participating in the repo market. With Euro GC Pooling, a pre-defined basket of eligible collateral is assigned an ISIN code and the basket is traded and cleared by Eurex Clearing. When trades are executed anonymously via Eurex Repo's electronic trading platform, Eurex Clearing automatically becomes counterparty to the original counterparty and is responsible for post-trade risk management, including haircut calculation and margin management. In this transaction, Clearstream performs the settlement and collateral management functions, that is, the repo trader deposits some of the basket components in a Clearstream account, and the selection, allocation and substitution of the securities in the basket to be provided by the repo seller to Eurex Clearing are all automated.

The repo CCPs in Japan, an Asian country like South Korea, are the overwhelming majority of the repo market in Asia, although the European repo market also trades in yen, due to the nature of the yen as an international currency (ASIFMA & ICMA, 2021). As of the 2021 survey, the majority of repo transactions in Japan are executed between parties via telephone or e-mail, with only limited electronic trading. Of these, CCP-clearing is less prevalent than in Europe, but has been increasing significantly in recent years. In Japan, most of the collateral used is Japanese government bonds, with some US Treasuries also being utilized.

In Canada, a repo CCP has been in operation since 2012. Since 1970, the Canadian Derivatives Clearing Corporation (CDCC) and the Canadian Depository for Securities (CDS) have operated as CCPs for repo transactions. CDCC is the only integrated CCP in North America that clears and settles bonds, futures and options, while CDS deposits more than $5 trillion in securities and processes 2 million trades per day. According to CDS' analysis, the Canadian securities collateralized transactions market totaled C$446 billion in 2018, with CCP repo transactions worth approximately C$275 billion, representing 62% of the market.

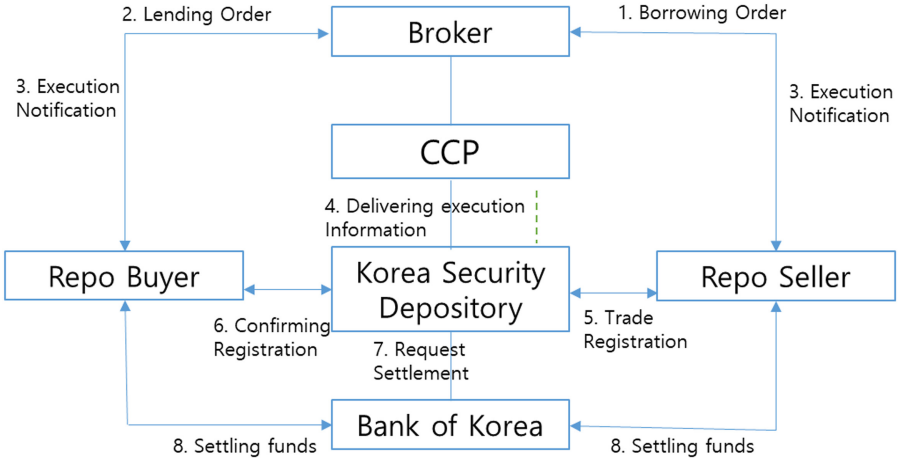
4.3 CCP for repo contracts in Korea

Currently, repo transactions are executed in the following order. First, when a repo seller and a repo buyer execute a transaction through the intermediation of a money broker, the money broker sends the execution information to the Korea Securities Depository (KSD), and the seller and buyer check the transaction details registered with the KSD. If there is no problem with the transaction details, KDS applies to the Bank of Korea to settle the funds and proceeds with simultaneous settlement (DvP). The buyer receives the collateralized asset in the account of the depository, and the seller receives the funds through the Bank of Korea.

As shown in Figure 3, if a repo CCP is introduced, the counterparties of the buyer and seller will be divided into CCPs through novation. As a result, the process of trading with a CCP will change as follows. If a CCP is included, even if the CCP does not intervene in the execution of the trading series, it can indirectly limit it by having pre-risk control measures such as initial margin and participation constraints (Kim, 2021).

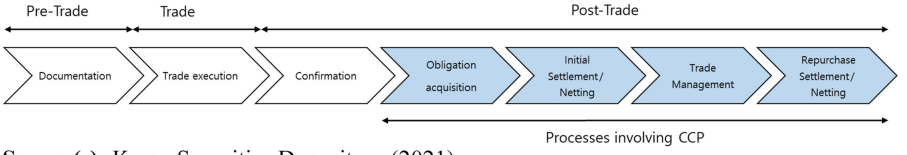
As shown in Figure 4, the introduction of a CCP in repo transactions adds the steps of novation, netting and contractual guarantee to the existing workflow. Through novation, the CCP becomes the counterparty and assumes the obligation, and settlement is made on a per-participant basis, taking into account netting.

The introduction of a repo CCP should be accompanied by the introduction of an electronic trading platform. In the European repo experience, resilience and stability have been the result of the anonymity of trade execution through electronic trading platforms and automated collateral management systems. In other words, having an automated system that determines the pool of general collateral and replaces collateral within the collateral pool is very important for the development of the repo market, and automation of the collateral



Source(s): Kim (2021)

Figure 3.
Procedure of repo contract after the introduction of CCPs



Source(s): Korea Securities Depository (2021)

Figure 4.
Flowchart of repo transactions with CCPs

management system is a basic requirement for the emergence of various repo trading platforms. Therefore, it is necessary to refer to the GC financing repo in the United States and GC pooling repo in Europe to develop the domestic repo market infrastructure. However, while in Europe, voice brokers broker repo transactions through electronic trading platforms, in Korea, it is necessary to make a policy decision on who will introduce electronic trading platforms. In the case of Korea, if the introduction of CCPs is promoted mainly by public institutions such as the Korea Exchange and the Korea Securities Depository, the development of electronic trading platforms will need to be prepared together with private market participants.

4.4 Other considerations

There are a number of other considerations when adopting a repo CCP. For example, in the US, the SEC recently proposed to mandate the clearing of OTC Treasury and repo trades to a single CCP provided by FICC. As shown in a survey by SIAPARTNERS (2023), mandatory CCP clearing could be a significant burden for small and medium-sized participants, and could eventually lead to a reduction in market liquidity. In Korea, where there is currently no CCP trading, mandating CCP clearing of all trades upon the establishment of a repo CCP could cause a significant market shock. In most of the cases described in Table 8, CCP clearing for repo was left to the discretion of market participants. However, the idea behind mandating CCPs is to improve resilience by cutting off risk transmission channels in times of market stress, and mandatory clearing may be introduced from this perspective. In addition, if it is difficult to mandate the clearing of repo CCPs, introducing a minimum collateral haircut

	CCP Operator	Engagement type	Year of introduction	Market	Execution
US	FICC	Optional	1995	OTC	Direct E-platform Voice broker
UK	LCH.Clearnet Ltd	Optional	1999	Centered on OTC	Direct E-platform Voice broker
France	LCH.Clearnet SA	Optional	1998	Centered on OTC	Direct E-platform Voice broker
Germany	Eurex Clearing AG	Optional	2000	Centered on OTC	Centered on E-platform
Italia	CC&G (Cassa di Compensazione et Garanzia SPA)	Optional	2005	OTC	Centered on E-platform
Japan	JSCC (Japan Securities Clearing Corporation)	Optional	2005	OTC	Direct Voice broker
Canada	CDCC (Canadian Derivatives Clearing Corporation)	Optional	2012	OTC	Direct E-platform Voice broker

Source(s): Kim (2021)

Table 8.
Status of repo CCPs in major countries

for securities used as collateral may reduce the risk transmission effect in case of market instability.

Next, sufficient research on the risk management system of CCPs is needed. While CCP clearing is necessary to prevent risk transfer in the event of a crisis, the failure of CCPs to manage risk can have disastrous consequences for financial markets. For this reason, the establishment of a CCP should include a provision that the CCP may be subject to emergency liquidity support from financial authorities or central banks. In addition, the operation of the CCP's resolution fund should be discussed beforehand [18]. A CCP's resolution fund is a fund set up to compensate for losses resulting from the failure of the CCP and is funded by margin contributed by the CCP's members and used to compensate members for their losses in the event of the CCP's failure. The size of the CCP's resolution fund is determined by the size of the CCP and the risk level of its members, and market participants cannot set the size of the fund arbitrarily because it is recognized as a cost of trading.

In addition, objective standards should be established for the calculation of initial and variation margin by CCPs. It is necessary to establish a margin system with international consistency by referring to the cases of advanced CCPs abroad. An appropriate margin system is an important key to revitalizing repo transactions. For example, in the United States, the main concern of market participants for the mandatory clearing of CPPs was whether an appropriate margin calculation system was available (SIAPARTNERS, 2023).

5. Conclusion

The GFC and a series of financial market turbulences proved the myth that repo markets, which are secured financing, are absolutely stable compared to unsecured markets, wrong. It also showed how differences in the infrastructure design of repo markets in the US and Europe can make a difference in the ability of regulators to respond to crises and the resilience of markets. If cash investors refuse to accept collateral in a crisis, the run risk is realized, and the secured market is also plunged into crisis. The collapse of the repo market was not caused

by the proliferation of illiquid collateral, as treasury securities collateral accounted for more than 80% of the repo market in Europe and the US at the time. The resilience of the European repo market, which introduced electronic trading platforms, automated collateral management systems and CCPs, explains the rationale for the introduction of CCPs in Korea. In 2012, ECB Vice President Constancio mentioned CCP clearing as a means to prevent instability in the repo market, and the SEC in the US is now moving to mandate a single CCP clearing for repo transactions.

The introduction of CCPs is expected to trigger positive effects in various aspects. First, the introduction of CCP clearing can increase liquidity by allowing new participants holding government bonds to participate in the market. For example, foreign investors holding large amounts of Korean government bonds have not been able to actively participate in the repo market due to concerns about payment guarantees. With the introduction of a CCP, counterparty credit risk will be eliminated and foreign investors will be able to participate in the repo market, which is expected to increase liquidity. Second, according to an analysis by the Kim (2021), the introduction of a CCP in the repo market reduces exposure by about 15–20% compared to the pre-introduction period through multilateral netting effects. Furthermore, as the repo market is currently experiencing settlement concentration at the settlement deadline, the introduction of a CCP is expected to reduce the repo exposure by reducing the settlement position by deducting the initial settlement and repurchase settlement. In addition, the introduction of CCPs is expected to ease the burden on market participants when calculating margin rates (haircuts). An analysis by the Kim (2021) reports that the margin requirement for treasury collateral will be sufficient to cover the risk within 2%. Furthermore, banks that are participants in the repo market can expect a positive effect of lower risk weighting in the calculation of the BIS capital ratio for collateralized transactions with eligible CCPs if the CCPs are recognized as eligible CCPs.

However, as emphasized before, the introduction of CCPs may lead to an increase in the cost of clearing members for repo transactions. Therefore, public institutions such as the KRX and the KSD should preemptively invest in facilities to prevent transaction costs for their members from rising rapidly. In addition, for financial companies that do not meet the requirements for CCP membership, financial authorities should prepare to provide indirect CCP clearing services by strengthening dealer-type intermediation functions. Finally, CCP establishment organizations should provide transparent disclosure of the operating model and margin calculation methodology of repo CCPs in Korea. According to SIAPARTNERS (2023), when SEC announced the policy of mandatory clearing of FICC CCPs, market participants reacted against the policy by raising strong doubts about the reliability of CCPs' margin calculation methods. Only a thorough discussion with market participants will minimize the obstacles to establishing a CCP in a repo market.

Notes

1. The following studies describe the evolution of the repo market and risk transmission during the financial crisis: Acharya and Oncu (2013), Begalle *et al.* (2015), Gorton and Metrick (2009, 2010, 2012), Copeland *et al.* (2014) and Baek (2017).
2. Regarded as a step toward managing the inherent risks of the repo market, Basel III introduced the liquidity coverage ratio (LCR) and NSFR.
3. Market participants have opposed mandatory CCP clearing for all repo transactions, arguing that it could have the negative effect of increasing transaction costs and causing smaller repo traders to exit the market, ultimately reducing liquidity (SIAPARTNERS, 2023).
4. In addition, general collateral (GC) pooling service platforms based on the collateral management systems of central securities depositories (ICSDs) such as Euroclear and Clearstream seem to have played a major role.

5. The average daily trading balance of inter-institutional repo increased from KRW 15 trillion in January 2013 to KRW 150 trillion in April 2023. On the other hand, unsecured call transactions have fallen to KRW 10 trillion from KRW 30 trillion in 2013.
6. On June 10, 2023, Silicon Valley Bank (SVB) became the first bank to go live with online banking. Founded in 1983, SVB, a bank specializing in startup technology companies, was the 16th largest bank in the United States, with total assets of $209 million at the end of 22. However, its losses began to increase sharply when the US Fed began raising interest rates in late 2022. SVB's depositors withdrew their deposits, fearing that SVB would fail, and SVB had difficulty obtaining financing, which led to a liquidity crisis and eventual bankruptcy.
7. The KOFR index is calculated using 1,000 as the base index as of January 2, 2018, and is posted on the website for your convenience.
8. US government securities PDs are financial firms that trade on behalf of the Fed to implement monetary policy, and are primarily comprised of large US brokerage firms and US subsidiaries of large European banks. Before the financial crisis, large independent securities firms centered on the five largest investment banks played a major role, but after the financial crisis, investment banks were transformed into subsidiaries of bank holding companies (Baek, 2017).
9. Currently, there are four main types: (1) non-centrally cleared, settled bilaterally, (2) centrally cleared, settled bilaterally, (3) non-centrally cleared, settled on a tri-party platform and (4) centrally cleared, settled on a tri-party platform. If central clearing is mandated, non-centrally cleared repos (tri-party and bilateral) will disappear from the US repo market.
10. In Europe, as in the United States, MMFs and other money lenders do not provide funds directly to hedge funds or small and medium-sized securities firms and asset management companies.
11. In some respects, the US repo market was more advanced. Before the GFC, collateral haircuts in the US tri-party repo market have been differentiated based on the liquidity of the collateral and the credit risk of the counterparty. Even in the bilateral market with repo dealers, haircuts were applied differently, depending on the collateral and the creditworthiness of the dealer. In Europe, however, where CCPs were more prevalent, haircuts were less common. In Europe, haircut differentiation was implemented after the GFC, taking into account collateral characteristics and counterparty risk.
12. In July 2010, the financial authorities announced a plan to improve the short-term financial market by strengthening the call market, limiting securities companies' daily call borrowing to no more than 100% of their equity capital. Subsequently, in November 2011, the financial authorities announced a plan for structural improvement of the interbank short-term funding market, which tightened the call borrowing limit of securities companies to no more than 25% of equity capital on a monthly average basis, and prohibited non-bank financial companies from participating in the call market in principle from 2015 (Baek *et al.*, 2015).
13. Kim (2021) reports that the expected amount of multilateral netting increases with the introduction of CCPs, but the overall percentage remains insignificant.
14. However, the effect may be relatively low as financial institutions in the Korean repo market mostly participate in one-way transactions.
15. Regarding concentration risk, Fabio Panetta, member of the Executive Board of the ECB, stated in a speech in June 2023 as follows: "Given the increasing importance and complexity of EU CCPs and the interconnectedness of the major clearing members, there is a need to strengthen the supervision of CCPs at EU level. Second, in response to the argument that taxpayers in the country in which the CCP is domiciled will bear the burden if the CCP exhausts its pre-arranged buffer (insolvency/resolution fund), comprehensive rules should be put in place to ensure that losses are borne by the participants in the clearing house, even with temporary central bank support" (https://www.ecb.europa.eu/press/key/date/2023/html/ecb.sp230622~e1a8c64758.en.html).
16. In Korea, six organizations (Korea Money Brokerage, KIDB Money Brokerage, Seoul Foreign Exchange Brokerage, Korea Securities Finance, Tradition Korea and BCG Korea) are licensed as bond brokerage firms pursuant to Article 179 of the Enforcement Decree of the Capital Markets Act

(OTC Transactions through Bond Brokerage Firms) and Schedule 1 (Investment Brokerage Business, Debt Securities and Professional Investor Licensing).

17. Most CCPs in Europe, including the UK, trade primarily through automated electronic trading platforms (ATMS: approved trade matching systems; ATS: automated trading system).

18. In Korean law, CCP clearing obligations for OTC transactions in financial investment products are stipulated in Article 166(3) of the Capital Markets Act, Article 186(3) of the Enforcement Decree of the Capital Markets Act and Article 5–50(5) of the Financial Investment Business Regulation.

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