

**Recent Trends in OTC Derivatives Markets
--Highlights Observed through OTC Derivatives Statistics--**Financial Markets Department
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Various regulatory reforms have been implemented internationally on over-the-counter (OTC) derivatives contracts, drawing on the lessons learned from the 2008 international financial crisis. Utilizing OTC derivatives statistics compiled by the Bank for International Settlement and central banks worldwide, this paper analyzes trends in OTC derivatives markets, which developed during a series of in-progress regulatory reforms, through a comparison of Japanese statistical results with global results. As a result, recent highlights as follows were clarified: (1) amounts outstanding of interest rate and foreign exchange derivatives denominated in USD have been increasing, reflecting the investment activities of Japanese institutional investors; (2) clearing through central counterparties (CCPs) has been advancing, mainly in interest rate derivatives, due to commencement of clearing obligations; and (3) movements to reduce notional amounts outstanding of OTC derivatives by utilizing compression have been expanding.

Introduction

Derivatives are very useful financial instruments for risk taking and effective risk management of financial institutions' trades and are therefore essential to today's financial services activities. Derivatives contracts can either be traded on a regulated exchange ("exchange-traded derivatives") or agreed over-the-counter (OTC), i.e., bilaterally agreed between counterparties according to tailor-made conditions ("OTC derivatives"). OTC derivatives markets,¹ which are relatively large in terms of notional amounts outstanding, increased rapidly following considerable efforts to develop new financial products, such as credit default swaps (CDS) and commodity derivatives,² changes that were supported by the financial globalization and technology improvements occurring in the 2000s. During the 2008 international financial crisis, however, such OTC derivatives contracts intensified the interconnectedness of the large financial institutions involved. Under such conditions, an OTC derivatives dealer incurred a substantial valuation loss due to a worsening credit condition, leading to disruptions across the entire financial market.

Drawing on the lessons learned from the international financial crisis, policymakers worldwide have recently been promoting various regulatory

reforms for OTC derivatives markets. For example, a new capital charge for risks of loss caused by changes in the counterparty's credit spread due to changes in credit quality was added to the international regulatory frameworks for banks. Moreover, a new requirement has taken effect for OTC derivatives contracts that are sufficiently standardized to be cleared at CCPs to avoid market risk contagion to the entire financial market.

Referring to "Semiannual OTC derivatives statistics" (OTCD statistics) is helpful for capturing the impacts of a series of regulatory reforms in OTC derivatives markets. This article provides an overview of the OTCD statistics, briefly explaining recent enhancements to the statistics. We further present recent trends in Japanese dealers' OTC derivatives notional amounts outstanding as revealed by the OTCD statistics, where we mainly focus on interest rate derivatives after the recent financial crisis.

Overview of OTCD statistics

The OTCD statistics are compiled by the Bank of International Settlements (BIS) and central banks worldwide. They provide data on OTC derivatives amounts outstanding (consolidated basis) held by 73 major dealers headquartered in 13 reporting countries³ that contribute in the statistics,⁴ with breakdowns including factors such as instrument and counterparty.

With a view to increasing market transparency through monitoring by central banks and contributing to stabilize financial markets, compilation of the OTCD statistics started based on recommendations⁵ from one working group in the former Euro Currency Standing Committee (currently, Committee on the Global Financial System). Since first collecting these statistics, the Bank of Japan (BOJ), with cooperation from reporting dealers⁶ headquartered in Japan, has been providing figures for the reporting dealers to the BIS semi-annually and publishing⁷ them as statistics pertaining to Japan (OTCD statistics in Japan) in both Japanese and English. Meanwhile, OTCD statistics in Japan have also been shown as “Yoshikuni statistics” until June 2007 in tribute to the fact that the working group was chaired by Advisor Shinichi Yoshikuni of the BOJ.

The statistics present three types of outstanding amounts: notional amounts outstanding, gross market values, and net market values. Notional amounts outstanding are defined as the gross notional values of all deals concluded but not yet settled at the reporting date, which are a reference for calculating cash flows under individual contracts. Gross market values are the sum of absolute values of all open contracts with either positive or negative replacement values evaluated at market prices prevailing at the reporting date. Net market values are the sum of market values after taking into account legally enforceable bilateral netting agreements.

Notional amounts outstanding and gross market values provide several types of breakdowns as seen in Chart 1.

【Chart 1】 Published items in the OTCD statistics in Japan

| Risk factors Breakdowns | IR | FX | EQ | Commodity | Credit | CDS | | Other (See note 1) |
|------------------------------------------|-----|-----|------------|-----------|--------|---------------------|----|-----------------------|
| | | | | | | Yes (See note 2) | No | |
| By instrument | Yes | Yes | Yes | Yes | Yes | Yes (See note 2) | No | Yes |
| By counterparty | Yes | Yes | Yes | No | No | Yes | No | Yes |
| By maturity | Yes | Yes | Yes | No | No | Yes | No | No |
| By currency | Yes | Yes | See note 3 | No | No | No | No | No |
| By rating category of reference entities | No | No | No | No | No | Yes | No | No |
| By sector of reference entities | No | No | No | No | No | Yes | No | No |
| By location of counterparty | NO | No | No | No | No | Yes | No | No |

Notes: 1. The BIS publishes only the total of notional amounts outstanding.
2. "Single-name CDS," "multi-name CDS," and "index products" as an "of which" item of "multi-name CDS" are published.
3. It represents regions where underlying stocks are listed.

First, based on risk factors that mainly affect the market value of individual derivatives contracts, the derivatives positions are categorized into six risk factors: “Interest Rate (IR),” “Foreign Exchange

(FX),” “Equity (EQ),” “Commodity,” “Credit,” and “Other.”

Second, most risk factors provide figures by instrument (forwards, swaps, options, and other products), by counterparty (reporting dealers, other financial institutions, and non-financial customers), and by maturity (one year or less, over one year up to five years, and over five years). Of these, IR and FX derivatives also provide a currency breakdown.

Third, CDS, which covers almost all amounts outstanding of credit derivatives, is also broken down by rating category and sector of reference entities.

In June 2016, a new counterparty sector of “CCP” was added as a sub-item of “other financial institutions” in IR, FX, and EQ derivatives. In addition, some other items that the BIS and central banks worldwide had only collected in the “Triennial Central Bank Survey”⁸ have also been added. Specifically, a new risk factor of “other derivatives,” which involves exposure to non-standard underlying risk factors, was added. Other derivatives include inflation swaps, weather derivatives, and earthquake derivatives. At the same time, a new instrument of “other products” was added for IR and FX derivatives. Other products are derivatives where a decomposition of cash flow into individual plain vanilla instruments such as forwards, swaps, or options is impractical or impossible.⁹

Trends in the OTC derivatives markets

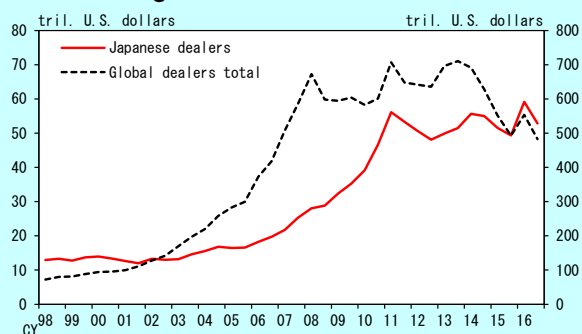
The OTC derivatives notional amounts outstanding of Japanese dealers from OTCD statistics in Japan stood at 53 trillion USD as of December 2016, whereas those of the global reporting dealers aggregated by the BIS stood at 483 trillion USD.

The notional amounts outstanding of OTC derivatives held by both Japanese and global dealers had been increasing in a long-term trend. Due to strong demand for OTC derivatives, these grew rapidly until June 2008. After that, the position of global dealers turned out to exhibit a decreasing trend until the end of 2010, whereas those of Japanese dealers continued to increase until June 2011 (Chart 2). Such trends in amounts outstanding are mainly attributable to the fact that the US and euro area financial institutions downsized or sold out their derivatives businesses after the international financial crisis, whereas Japanese dealers stepped into these gaps, with some Japanese dealers expanding their businesses through acquisition.

Focusing on the 2010s, when OTC derivatives regulatory reforms took place worldwide, notional

amounts outstanding of OTC derivatives held by Japanese dealers were in the range of 50 to 60 trillion USD, albeit with some fluctuations. Similar to the situation in Japan, global dealers' positions were more or less flat until the end of 2013. However, strong demand for "compression" (discussed later) has reversed this trend, helping to significantly undercut OTC derivatives notional amounts outstanding since 2014.

【Chart 2】 Trends in notional amounts outstanding of OTC derivatives transactions

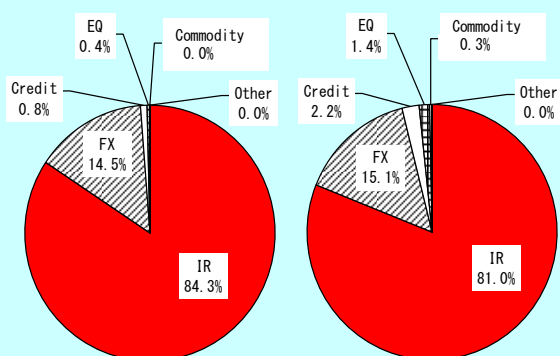


Note: The figures are end-of-June and end-of-December values in each year.

Second, the composition of notional amounts in terms of risk factors shows that IR derivatives comprise approximately 80% of the total for both Japanese and global dealers, and FX derivatives hold the second largest share (Chart 3). Credit, EQ, and commodity derivatives possess minute shares.

【Chart 3】 Structure of the OTC derivatives markets (end of December 2016)

1. Japanese dealers 2. Global dealers' total



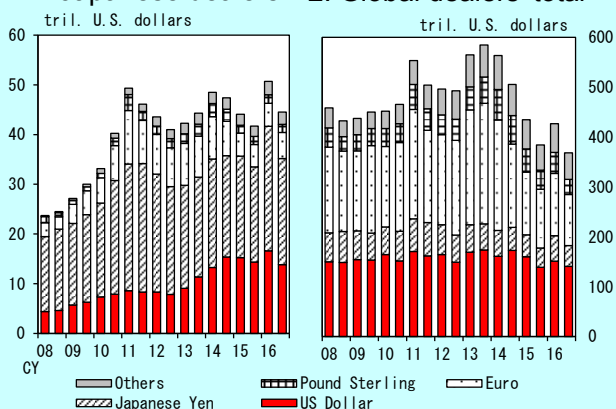
Based on this understanding, trends in terms of Japanese dealers' OTC derivatives contracts in recent years, with a main focus on development of IR derivatives, are elaborated with breakdowns in the OTCD statistics.

Increase in hedging transactions against USD-denominated investments

The first recent trend in Japanese dealers' OTC derivatives contracts is the increased amounts outstanding related to hedging for investments denominated in USD. First, IR derivatives' notional amounts outstanding, which hold a large share of the total by currency, indicate that although the share of Japanese yen as a domestic currency is large, a significant increase in the USD-denominated IR segment from 2013 to the first half of 2016 (Chart 4) occurred when compared to global dealers.¹⁰

【Chart 4】 Trends in notional amounts outstanding of IR derivatives by currency

1. Japanese dealers 2. Global dealers' total



Note: The figures are end-of-June and end-of-December values in each year.

This pattern reflects the fact that due to the decline in domestic interest rates, Japanese investors had increased investments in USD IR assets, and their needs surged for USD IR swaps as a hedging instrument for IR risks associated with investments in USD IR assets.

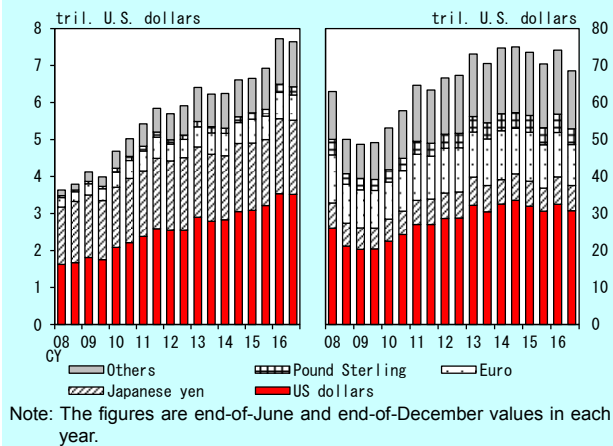
Second, FX derivatives notional amounts outstanding by currency also show that a sharp increase in the US dollar led to the increase in FX derivatives amounts outstanding total. Recent increases in USD FX derivatives amounts outstanding also can be seen in global dealers' positions. Global dealers' USD FX derivatives amounts outstanding, however, remained almost constant after 2014, whereas those of Japanese dealers continued to grow (Chart 5).

FX derivatives, such as FX forwards, FX swaps, and cross-currency swaps, are often used as hedging instruments for FX risks associated with foreign currency-denominated investments. In particular, many Japanese institutional investors invest in assets denominated in foreign currencies with hedging of FX

risks. As a result, recent increases in USD-denominated investments by Japanese dealers have boosted their demand for FX derivatives.

【Chart 5】 Trends in notional amounts outstanding of FX derivatives by currency

1. Japanese dealers 2. Global dealers' total



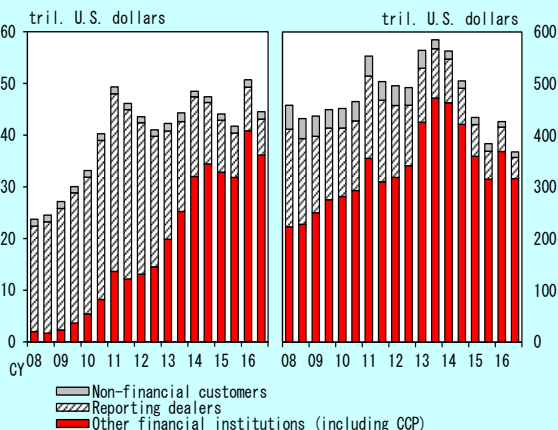
Central clearing through CCPs

The second recent trend in OTC derivatives contracts is that most IR derivatives are now cleared by CCPs.

IR derivatives notional amounts outstanding by counterparty sector indicates that the share of “other financial institutions” in the total OTC derivatives amounts outstanding has increased significantly since 2013 (Chart 6). This pattern reflects the fact that amounts outstanding of trades cleared by CCPs are included in the definition of “other financial institutions,” which refers to all financial institutions other than reporting dealers.¹¹

【Chart 6】 Trends in notional amounts outstanding of IR derivatives by counterparty

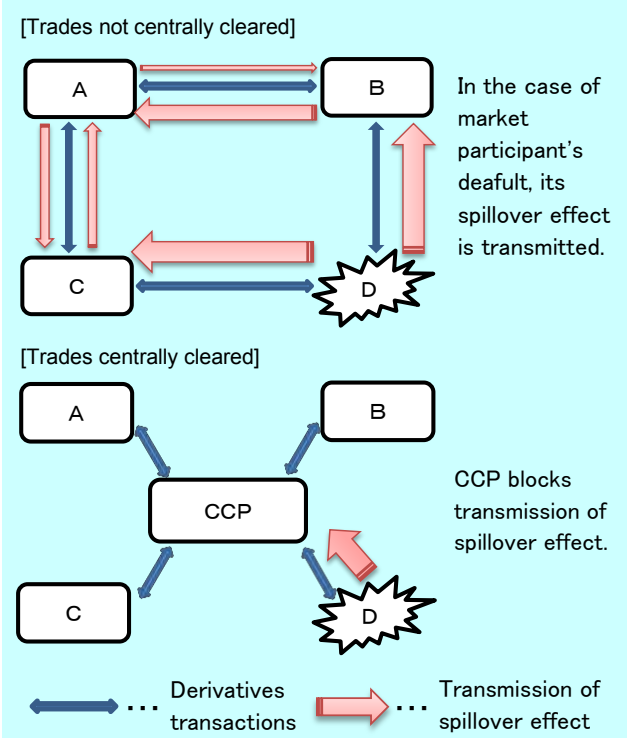
1. Japanese dealers 2. Global dealers' total



A CCP interposes itself between counterparties' trades in financial contracts agreed between the counterparties and guarantees settlements of obligations as the sole counterparty to the original counterparties.

The shift in OTC derivatives contracts to central clearing can prevent situations such as one where a market participant's failure could result in disruptions to the entire financial market (Chart 7).

【Chart 7】 Central clearing through CCP

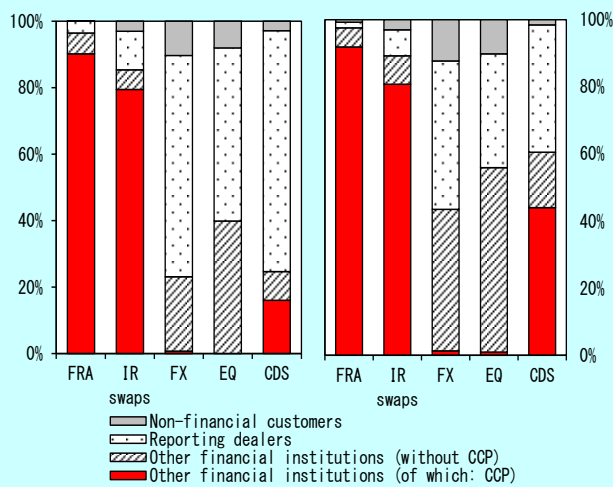


The Pittsburgh G20 summit in September 2009 proposed centralizing the clearing of standardized OTC derivatives contracts. In response, Japan has implemented a “clearing obligation”¹² that requires standardized derivatives contracts, such as certain interest rate and credit derivatives contracts, to be cleared by CCPs in order from November 2012.

As mentioned above, a new “central counterparties” sector was added as a sub-item to “other financial institutions.” New counterparty sector data show that most amounts outstanding of OTC IR derivatives contracts such as FRA (Forward Rate Agreement) and IR swaps were cleared at CCPs as of the end of December 2016 (Chart 8).

【Chart 8】 Composition of notional amounts outstanding by counterparty (end of December 2016)

1. Japanese dealers 2. Global dealers' total



The proportion of notional amounts outstanding for CDS cleared through CCPs is relatively small, approximately 10% of the CDS total. For FX and EQ derivatives, CCPs' share is negligible due to the fact that most FX and EQ derivatives are not currently offered for clearing by CCPs.

CCPs have been trying to make FX derivatives eligible for clearing, which come after IR derivatives in terms of size in notional amounts outstanding.¹³ These impacts on the use of CCPs will become clear in future data.

Increase in compression activity

Decrease in notional amounts outstanding through the compression

Notably, global dealers' OTC derivatives notional amounts outstanding have been decreasing significantly since 2014 (Chart 2). The BIS attributes this sharp decline to increased compression activity by financial institutions,¹⁴ which is the third recent trend discussed in this paper.

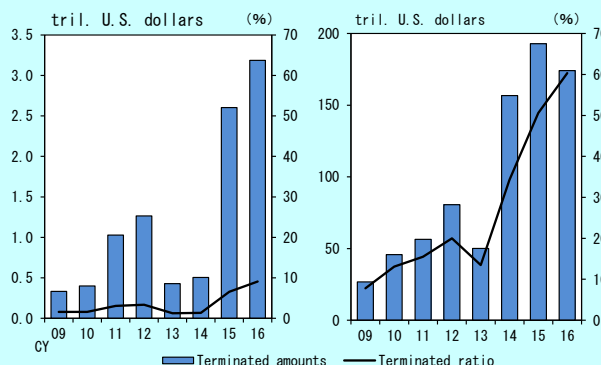
Compression is a mechanism for reducing OTC derivatives notional amounts through simultaneous unwinding of multiple contracts upon participating financial institutions' requests without significantly changing each participant's risk profile.

Compression can be operated on either a bilateral basis between two participants¹⁵ or on a multilateral basis among three or more parties to compress trades together ("multi-compression"). The volume of the multi-compression in IR swaps traded by global dealers (Chart 9), which covers a major part of OTC

derivatives amounts outstanding, increased strongly after 2014, whereas those of Japan increased after 2015, leading to a huge reduction in OTC derivatives amounts outstanding at that time (Chart 2).

【Chart 9】 Notional amounts outstanding terminated as a result of multi compression (IR swaps)

1. Japanese dealers 2. Global dealers' total

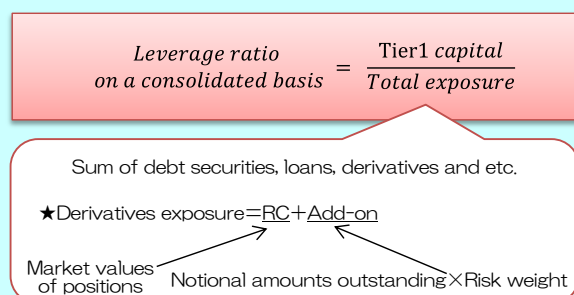


Note: Terminated ratio is calculated by dividing terminated amounts of each year by notional amounts outstanding of IR swaps of previous year. Source: NEXTriOptima

Derivatives positions under the leverage ratio framework

One of the main drivers of the recent increase in compression activity is considered to be the fact that the leverage ratio framework encouraged financial institutions to reduce the size of OTC derivatives portfolios with the aim of reducing the possibility of hitting leverage ratio constraints. The leverage ratio framework requires major financial institutions to have a minimum level of Tier 1 assets according to their total exposure amounts (Chart10).

【Chart 10】 Treatment of derivatives under leverage ratio framework



The total exposure for assets such as securities and lending refers to their amounts outstanding on the balance sheet. The amounts outstanding of derivatives to be included in total exposure is determined as the sum of (1) replacement cost (RC), which can be obtained by marking-to-market when the contract has a positive value and (2) add-on, which is calculated by applying a risk factor to notional amounts of the

derivatives. RC can be reduced by receiving cash collateral when an eligible bilateral netting contract is in place. In contrast, add-on can be reduced only when notional amounts of derivatives are reduced.

The clarification of the leverage ratio exposure method in January 2014 fueled financial institutions' improvements in their leverage ratios and incentivized them to use compression aggressively to shrink derivative portfolios, mainly in IR swaps whose notional amounts outstanding are large.

Introduction of unlinked compression

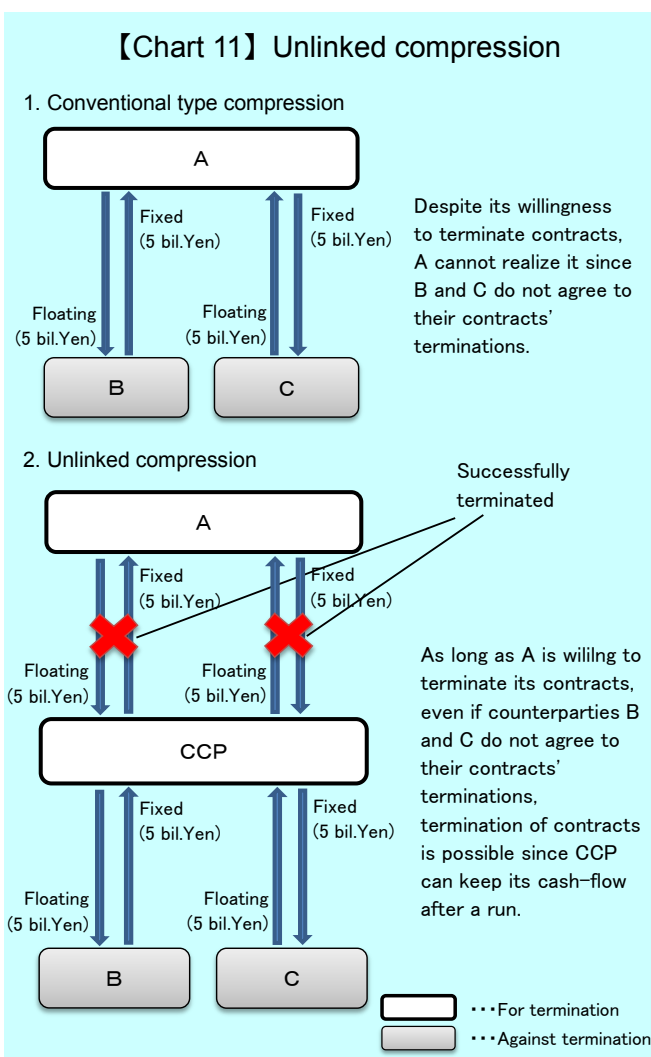
The second driver of recent increases in compression activity is considered to be the introduction of unlinked compression in major CCPs worldwide.

Conventional compression of non-cleared trades took place only when both counterparties had need for and agreed to a trade being compressed, which was not always the case. In other words, when one counterparty disagreed on compressing its position, the trades were not terminated (Chart 11-1).

Unlinked compression¹⁶ allows participating financial institutions to compress centrally cleared trades by unlinking the involvement of the original counterparty. As trades are linked to the CCP, compression takes place as long as CCP can keep its cash flow after a run. Both unlinked compression and clearing obligations have resulted in a much larger pool of trades available for compression, leading to an increase in compression efficiency (Chart 11-2).

Unlinked compression was launched in 2014 at the LCH, which is the largest global supplier of clearing services to OTC derivatives markets.

In Japan, since September 2015, unlinked compression has also been available in Japan Securities Clearing Corporation, which provides clearing services for a wide range of assets such as Japanese yen interest rate swaps. As mentioned above, due to the application of central clearing obligations, the volume of multi-compression increased globally after 2014 and increased in Japan after 2015 (Chart 9).



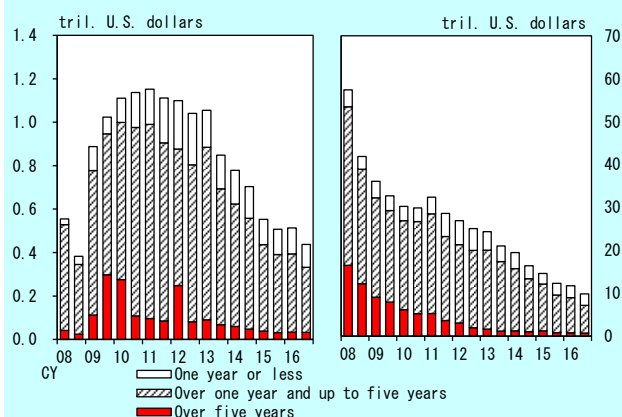
CDS amounts outstanding

Lastly, regarding changes in the amounts outstanding of Japanese dealer's CDS, these amounts have decreased by more than 50% since their peak from the end of June 2011 to the end of December 2016 (Chart 12).

The amounts outstanding of global dealers' CDS decreased earlier than those of Japan, and amounts shrank by about 20% before the financial crisis. In particular, by maturity, outstanding positions with maturity greater than five years disappeared almost entirely. This seems to be affected by a decline in financial institutions' risk appetite. Many financial institutions mainly reduced trades with long term maturity on which higher capital requirement were imposed. In addition, some have pointed out that higher capital charges for CDS have also contributed to the decrease due to the ongoing strengthening of regulations pertaining to capital requirements.¹⁷

【Chart 12】 Trends in notional amounts outstanding of CDS by remaining maturity

1. Japanese dealers 2. Global dealers' total



Note: The figures are end-of-June and end-of-December values in each year.

Concluding remarks

This paper provides highlights from recent trends in OTC derivatives markets after the financial crisis by using OTCD statistics, with the following points in mind: (1) increases in USD IR and FX derivatives due to Japanese investor's activity; (2) greater use of CCPs for centrally cleared transactions, mainly in IR derivatives after implementation of the clearing obligation; (3) increases in compression activity to reduce OTC derivative positions; and (4) decreases in CDS, which require a higher capital charge.

After the financial crisis, considerable progress has been made in OTC derivatives markets, and there are prospects for further changes in OTC markets. For example, in Japan and other key markets, margin requirements, which oblige dealers that engage with non-centrally cleared derivatives to exchange margins with the counterparty, began to be passed in September 2016 and to be fully implemented in order.

The OTC derivatives markets, although not in an expansionary phase like before the financial crisis, will continue to be essential to today's financial activity, and it is therefore still important to capture the impacts of a series of OTC derivatives regulatory reforms.

The BOJ will continue to contribute to reliable compilation and publication of OTCD statistics with cooperation of reporting financial institutions in Japan. We will continue to endeavor to compile and disseminate informative statistics, so that the OTCD statistics in Japan will be used by a wider range of economists, policymakers, and other users.

¹ According to “Triennial Central Bank Survey of foreign exchange and OTC derivatives markets” (amounts outstanding at the end of June 2016), the amounts outstanding of exchange-traded derivatives are approximately 67.7 trillion USD while those of OTC derivatives are 544.1 trillion USD.

² Please see the following for an example:

Tanemura, Suematsu, Yanagi and Mori [2005] “Waga Kuni Gaitame/Derivatives Shijou no Saikin no Doukou” (Recent trends in foreign exchange and derivatives markets in Japan) <available only in Japanese>, Bank of Japan Review Series, 2005-J-1

³ Specifically, Japan, the United States, the United Kingdom, Italy, Australia, the Netherlands, Canada, Switzerland, Sweden, Spain, Germany, France, and Belgium.

(http://www.bis.org/statistics/about_derivatives_stats.htm)

⁴ Please see the following for global results of the OTCD statistics with associated details:

(<http://www.bis.org/statistics/derstats.htm>)

⁵ Bank for International Settlements [1996] “Proposals for improving global derivatives Markets,” *CGFS Publications*, No 4.

⁶ Specifically, reporting dealers are Mizuho Bank, Ltd.; Bank of Tokyo-Mitsubishi UFJ, Ltd.; Sumitomo Mitsui Banking Corporation; Resona Bank, Limited.; Mitsubishi UFJ Trust and Banking Corporation; Mizuho Trust & Banking Co., Ltd.; Sumitomo Mitsui Trust Bank, Limited.; Shinsei Bank, Ltd.; Aozora Bank, Ltd.; Japan Post Bank Co., Ltd.; Nomura Holdings, Inc.; Daiwa Securities Co. Ltd.; Mizuho Securities Co., Ltd.; Mitsubishi UFJ Securities Holdings Co., Ltd.; Shinkin Central Bank; and Norinchukin Bank (as of end December 2016).

⁷ Please see here for the OTCD statistics in Japan with associated details.

(<http://www.boj.or.jp/statistics/bis/yoshi/index.htm/>)

⁸ The survey and the OTCD statistics complement each other, and the survey conducts researches not only on amounts outstanding but also on turnovers with an expanded coverage of 52 countries/economies in 2016.

⁹ “Differential swaps” that have underlying notional principal in one currency and fixed or floating interest rate payments based on interest rates in currencies other than the notional and “index amortizing rate swaps” whose notional principal varies as a function of interest rates can be listed.

¹⁰ As to other currencies, in the middle of 2011, like the global results of the OTCD statistics, the temporary increase in notional amounts outstanding of transactions denominated in euros are notable. At that time, as the European sovereign debt crisis worsened, the heightened hedging needs for short-term interest rate hike in the European short-term financial markets seems to be the underlying reason.

¹¹ Although technical, central clearing through CCPs has been contributing to increases in the global results total. The BIS, when compiling the global results of the OTCD statistics, adjusts double-counting of transactions between transactions of reporting dealers, both of which participate in the statistics. When transactions are centrally cleared through CCPs, they are treated as transactions between non-reporting dealers that are not subject to adjustment of double-counting. Thus, increases in central clearing through CCPs result in increases in notional amounts outstanding. Meanwhile, regarding OTCD statistics in Japan, it is not possible to identify the amounts outstanding of transactions between Japanese reporting dealers. Therefore, double-counting is not adjusted, and increases in central clearing through CCPs do not result in those in notional

amounts outstanding of transactions.

¹² In Japan, when dealing with IR swaps, financial institutions having a certain volume of trades are obliged to clear their positions of yen IR swaps whose reference rate are LIBOR and TIBOR at domestic/foreign CCPs. Moreover, as to CDS, trades referring to iTraxx Japan are obliged to be cleared at domestic CCPs.

¹³ LCH began clearing of non-deliverable forward transactions in 2013 and has been working on central clearing of currency options. In Japan, Japan Securities Clearing Corporation has been working on central clearing of currency swaps.

¹⁴ Bank for International Settlements [2015] “OTC derivatives statistical release at the end of June 2015.”

¹⁵ Termination of contracts through bilateral compression with CCPs also account for a certain volume.

¹⁶ While the compression dealing with trades that are cleared at CCPs has existed conventionally, like the example of compression dealing with trades that are not cleared at CCPs as shown in Chart 11-1, it was necessary for trades to have counterparty consent to be terminated at that time.

¹⁷ For example, under the leverage ratio framework, the weight of add-on referred to when calculating an exposure is decided based on risk factor and remaining maturity. The trades whose risk factor is “credit” have higher capital requirements imposed compared with those imposed on trades whose risk factors are IR and FX. Also, regarding short positions of credit derivatives, the notional amounts outstanding are also counted as exposures.

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