



September 3, 2018
Bank of Japan

Post-crisis Futures Markets

*Keynote speech at the symposium commemorating
the 30th anniversary of stock index futures*

Haruhiko Kuroda

Governor of the Bank of Japan

(English translation based on the Japanese original)

Introduction

It is a great honor to be invited to speak at this symposium commemorating the 30th anniversary of stock index futures in Japan.

A decade has passed since the collapse of Lehman Brothers, which triggered the global financial crisis. During the last 10 years since that time, global financial markets have faced and have been affected by various negative political and economic shocks such as the European debt problem in the first half of the 2010s. Japanese stock and futures markets have not been immune and the turnover of cash stocks and the trading volume of stock futures were sluggish for some time after the global financial crisis (Chart 1). Thereafter, however, against the background of the recovery of the global economy and solid corporate performance, global financial markets have rebounded to pre-crisis levels.

This year also marks the 5th anniversary of the business integration of the Tokyo Stock Exchange Group and the Osaka Securities Exchange. Even following the global financial crisis, various initiatives aimed at enhancing user-friendliness have been taken to meet the diverse needs of investors and firms including the introduction of new products, extension of trading hours, and IT system reform. Those initiatives have been vital for maintaining and enhancing the functions of the Japanese exchanges since the crisis, and I would like to pay tribute to all of those who have worked so hard to carry out those initiatives.

Moving on, as it has been 30 years since stock index futures first appeared in Japan, let us take this opportunity to return to the basics and re-clarify the function of futures contracts; futures contracts, in principle, are used to "transfer risks," namely to hedge risks or speculate on price changes by trading assets on a future date at a predetermined price. In this regard, derivatives contracts such as forwards also have the same function. However, the two contracts differ in that forwards are derivatives contracts based on bilateral agreements between two parties, while futures are derivatives contracts that are traded on "exchanges," including clearing houses.

Futures contracts traded on exchanges are standardized and offer the benefits of low transaction costs, fair and transparent price formation, risk management measures such as

margin requirements and the marking to market of assets, and safe central clearing; thanks to these features, futures contracts are expected to attract more market participants and thereby realize enhanced market liquidity. Such enhanced market liquidity is in turn expected to strengthen the basic function of futures contracts, which, as I just mentioned, is to "transfer risks."

Skepticism about the function of futures contracts sometimes emerges, especially when markets experience significant asset price fluctuations in the wake of a financial crisis. The typical assertion is that the existence of futures contracts amplifies spot price changes in the underlying assets. However, as long as futures markets offer enhanced market liquidity supported by the functions of exchanges, it is expected that the price discovery function inherent in futures would remain somewhat resilient even during a crisis, and this will thereby help the spot market to swiftly return to a price formation process that properly reflects the supply and demand conditions of the underlying assets and market participants' views.

Given the role of exchanges and their relation to market liquidity, it is impressive that the world's first organized futures contracts -- which are similar to those currently traded on exchanges -- were already established in the 18th century at the Dojima Rice Exchange in Osaka. The fact that futures contracts in their long history have supported the development of the market economy and have overcome numerous crises by undergoing appropriate changes shows just how valuable they are.

Also, it should be noted that various ongoing changes in the market environment since the global financial crisis have necessitated futures markets such as stock futures and commodity futures to undergo new transformations. Let me elaborate on new trends in futures markets and the challenges brought about by those trends.

Post-crisis Trends in Futures Markets

Tightening of Financial Regulations

First, I would like to talk about the effects of the tightening of financial regulations. The

global financial crisis following the collapse of Lehman Brothers adversely affected market liquidity in various financial transactions. The decline in market liquidity was particularly evident in bilateral over-the-counter (OTC) derivatives. Before the financial crisis, OTC derivatives were very popular among customers seeking higher profits because the bilateral flexibility of OTC derivatives enabled various customized structures to achieve higher yields. However, once the financial crisis occurred, there was suddenly a great deal of concern about the counterparty credit risks of financial institutions, particularly in the United States and Europe, and the flexible but complex structures of OTC derivatives made it difficult to pinpoint and specify the size of those risks. As a result, market liquidity of OTC derivatives declined significantly in a short period and there was a run on OTC derivatives markets, including a rapid reversal of investment positions.

On the other hand, futures contracts traded on exchanges were processed in a generally stable manner even amid the financial crisis, as the risk management of exchanges and clearing through central counterparties (CCPs) proved somewhat effective.

Thus, the functions of exchanges fostered over many years contributed to avoiding disruption of futures markets during the global financial crisis. It was therefore decided to incorporate the essence of those functions in the plan for OTC market reform. Specifically, in order to improve the transparency and robustness of contracts, standardized OTC derivatives contracts were obliged to be traded on exchanges or electronic trading platforms, and cleared through CCPs.¹ Furthermore, the exchange of margins based on associated risks became mandatory for non-centrally cleared tailor-made OTC derivatives contracts. In view of those regulatory trends, there has been an increase overseas in the "futuresization of OTC derivatives," which refers to the clearing of transactions through CCPs by listing futures contracts on exchanges in advance, mirroring the contractual conditions of OTC derivatives deals made with a certain frequency.

¹ In autumn 2009, the following agreements were reached at the Group of Twenty (G-20) Pittsburgh Summit: (1) all standardized OTC derivatives contracts should be traded on exchanges or electronic trading platforms and (2) cleared through CCPs; (3) OTC derivatives contracts should be reported to trade repositories; and (4) non-centrally cleared contracts should be subject to higher capital requirements.

Accordingly, many OTC derivatives contracts have shifted to exchange trades and clearing through CCPs (Chart 2). However, this could give rise to several issues. For example, there are concerns that this change might increase moral hazard among market participants given that they do not directly bear counterparty credit risks and have less incentive to monitor credit risks. What is more, and perhaps the most crucial point, is that exchanges and clearing houses would face concentrated risks as they accommodate more OTC derivatives contracts reflecting the needs of market participants to mitigate counterparty credit risks. Accordingly, exchanges and clearing houses must appropriately manage and mitigate those concentrated risks so that futures and derivatives contracts traded on exchanges would be processed in a stable manner if there is another global financial crisis. To this end, it is also important for exchanges and clearing houses to ensure that they have appropriate levels of loss-absorbing capacity through assessments based on stress testing.²

Technological Innovation

Second, I would like to mention the effects of innovation in the field of financial technology. The remarkable development in information technology in recent years has dramatically accelerated order processing. For example, in the stock market of the Tokyo Stock Exchange, the new "Arrowhead" trading system, which launched in January 2010, has enabled orders to be processed in milliseconds -- a speed which could never be matched by human ability. Against the background of this technological innovation, there has been a growing presence in financial markets of so-called high-frequency trading (HFT) players, who use automated algorithms to repeatedly execute small orders at extremely high speed and frequency. The prevalence of HFT might differ somewhat geographically, but for example, there is a view that the share of HFT in stock markets has reached around 50 percent in the United States and around 40 percent in Europe. That share has also increased in Japan, and the number of contracts executed from the co-location areas of the stock

² For details on global discussions regarding concentrated risks in financial market infrastructures due to the tightening of financial regulations, see "*Seisankikan wo meguru global na taiou ni tsuite* (Global Approach to Central Counterparties)," *Payment and Settlement Systems Report Annex Series*, August 2017 (available in Japanese only).

market of the Tokyo Stock Exchange has reached around 40 percent (Chart 3).³ Equally, there is a view that the share of HFT in Japanese stock futures has reached a somewhat high level due to the introduction of IT systems designed for high-speed order processing.

Positive assessments of HFT can be summarized as follows. First, there is a view that HFT has improved market liquidity as HFT players engage in "passive market making" against other investors by simultaneously placing a vast amount of "buy" and "sell" orders in order to exploit arbitrage opportunities on bid-ask spreads. Second, HFT in theory is expected to constrain stock price fluctuations and thereby reduce volatility as sell orders are placed when prices rise even slightly and buy orders are placed when prices decline. In fact, some empirical analyses have verified such an improvement in market liquidity and a decline in volatility.⁴

At the same time, some argue that HFT could reduce market liquidity and contribute to volatility in the event of a sudden shock that has a greater impact than forecasted by its algorithms.⁵ Some also voice concern over the risk that a large volume of irrational orders could be placed as a result of human error unintentionally embedded in an algorithm.⁶

³ It is believed that HFT players, who require faster access for transactions in milliseconds, usually place orders from co-location areas (special areas in the same building that hosts the primary systems of the exchanges where market participants can install their own servers containing trading algorithms).

⁴ See, for example, "*Kabushiki shijyou ni okeru kousoku kouhindo torihiki he no eikyou* (Effects of High Speed and Frequency Trading on the Stock Market)," Bank of Japan Review, No. 13-J-2, January 2013 (available in Japanese only), which provides a theoretical summary of HFT and analysis of the effects on the Japanese stock market.

⁵ In spite of the popular view at one time that attributed the "flash crash" in the U.S. stock market in May 2010 to HFT, a joint report by the U.S. Securities and Exchange Commission (SEC) and the U.S. Commodity Futures Trading Commission (CFTC) concluded that the crash was not directly caused by HFT, but rather by a complex combination of factors. However, the report also pointed out that HFT players accelerated price fluctuations by rapidly withdrawing liquidity during the propagation of market turmoil.

⁶ In August 2012, many stocks on the New York Stock Exchange experienced a "mini flash crash" due to a massive number of erroneous orders. The erroneous orders have been attributed to system issues caused by human error.

As I mentioned, assessments of HFT have not been entirely positive. It is therefore important to consider measures and initiatives to ensure that the growing presence of HFT players contribute to enhancing market efficiency and liquidity through appropriate arbitrage and market-making activities and does not result only in transaction speed competition. For example, if the risks of high speed and frequency trading amplifying price changes due to one-sided algorithmic trades or a malfunction in programs and servers are left unattended, they might impair financial market stability, and in turn weaken the risk transfer and price discovery functions of futures markets. Tackling those issues is by no means an easy task, but it is critical to properly consider measures to prevent them.

The specific measures to deal with those issues are not to be implemented by exchanges alone because they also rest on regulations on HFT and other factors. That said, with the advent of HFT and the growing presence of HFT players in financial markets, various self-imposed requirements for exchange trades associated with financial technological innovation and the role of exchanges in risk management and monitoring are becoming increasingly important.

Increased Use of Futures for Asset Management

Third, I would like to briefly touch on the effects of the widespread movement to use futures for asset management. Participants in futures markets are broadly divided into three classical categories: (1) hedgers, who hedge against price risks in underlying assets; (2) speculators, who take on such price risks; and (3) arbitrageurs, who seek arbitrage between spot and futures markets. However, during the last 10 years since the global financial crisis, futures markets have witnessed the growing presence of new investment players that take long positions in the medium to long term, such as investment trusts and exchange-traded funds (ETFs).

The increased use of futures for asset management, in addition to hedging and speculation, can be viewed favorably because it provides households with more options for portfolio selection. Furthermore, the growing presence of new buyers with medium- to long-term investment horizons could increase the market depth of futures markets. It can be expected that this would enhance market liquidity, and thereby improve the risk transfer and price

discovery functions of futures markets.

However, if the diversity of market participants is impaired due to the growing presence of a particular investor type, prices might cease to appropriately reflect the fundamentals behind the transactions because they might be excessively affected by trading strategies employed by those investors.

In fact, the growing share of investment trusts and ETFs in futures markets has affected the correlation between different asset types. A typical example is the effects observed in price formation of overseas commodity futures such as crude oil. Since the global financial crisis, a large amount of investment funds has flowed to commodity futures markets in pursuit of higher yield against the background of global monetary relaxation. In this process, commodities became embedded in the global portfolios of large investors extending across multiple regions and assets. In general, in the event of an exogenous shock, global portfolio rebalancing moves multiple risky asset prices in the same direction. In this regard, for example, returns on commodity index futures showed little sign of correlation with those on global stock indices at least until the middle of the 2000s. However, as a wide range of investors have started to incorporate commodities in their asset portfolios since the financial crisis, the correlation between returns on commodity index futures and those on stock indices has structurally increased (Chart 4). In the long run, the impact on futures prices stemming from price fluctuations in other asset classes, in addition to the correlation between futures prices and the prices of underlying assets, could affect the risk transfer and price discovery functions of futures markets. In this sense as well, it is important to not only increase the number of market players but also gather a diverse set of investors with various investing styles and investment horizons. I hope an increasingly wider range of investors and greater investor diversity would continue to be observed.

Concluding Remarks

I have so far elaborated on new trends in futures markets brought about by significant environmental changes since the global financial crisis and the challenges brought by those trends, focusing on three perspectives: (1) tightening of financial regulations; (2) technological innovation; and (3) increased use of futures for asset management. None of

the challenges I mentioned today would be easy to tackle, but I believe that the functions of futures markets, which have offered benefits to financial markets for many years, would develop and be maintained if market participants take on these challenges and adapt to the new environment, just as they have done over the last 30 years. The Bank of Japan obtains information from futures markets that is valuable in understanding the markets' views and sentiment toward the economy and corporate performance. The Bank, as the central bank of Japan, would provide support through research studies and participation in discussions at home and abroad so that Japanese futures markets would develop in a more efficient and stable manner.

Thank you for your attention.



Post-crisis Futures Markets

*Keynote speech at the symposium commemorating
the 30th anniversary of stock index futures*

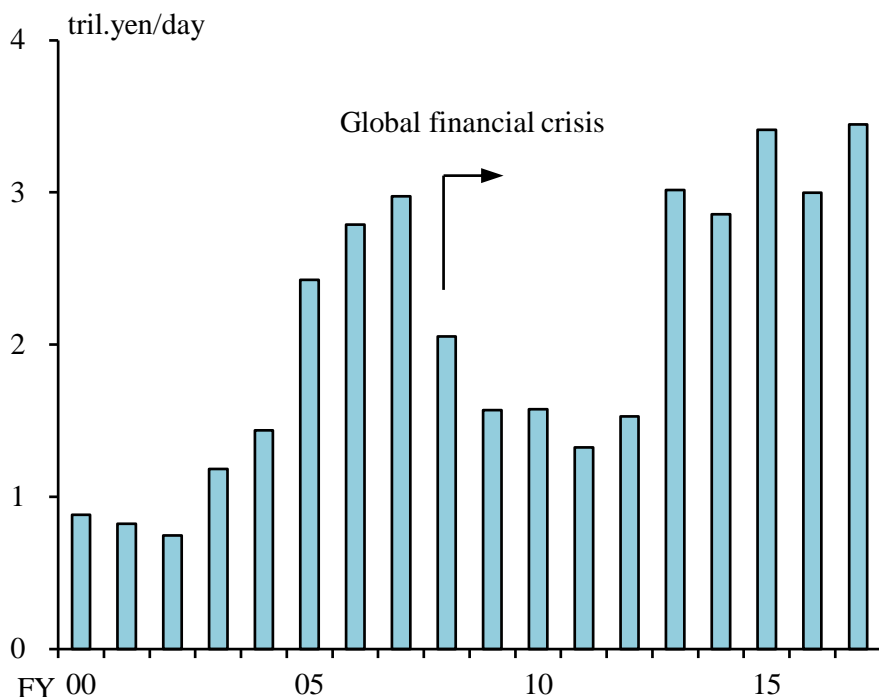
September 3, 2018

Haruhiko Kuroda

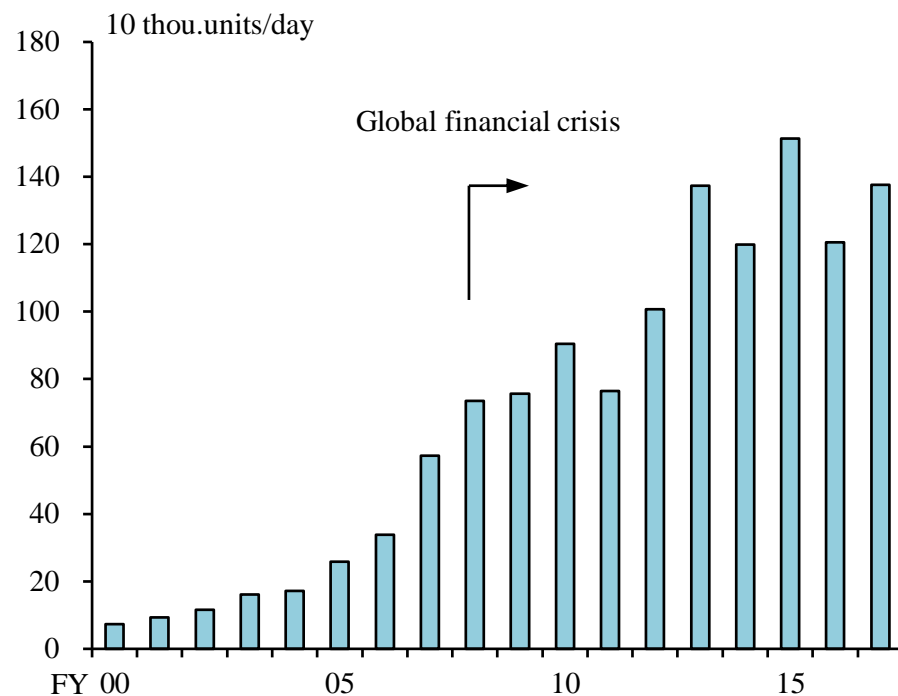
Governor of the Bank of Japan

Japanese Stock Market

Average Turnover of Cash Stocks



Average Trading Volume of Stock Futures and Options



Notes: 1. In the left-hand chart, the figures indicate the total average turnover of stocks in the first and second sections of the Tokyo Stock Exchange, as well as that in Mothers, exchange-traded funds (ETFs) and exchange-traded notes (ETNs), real-estate investment trusts (REITs), etc.

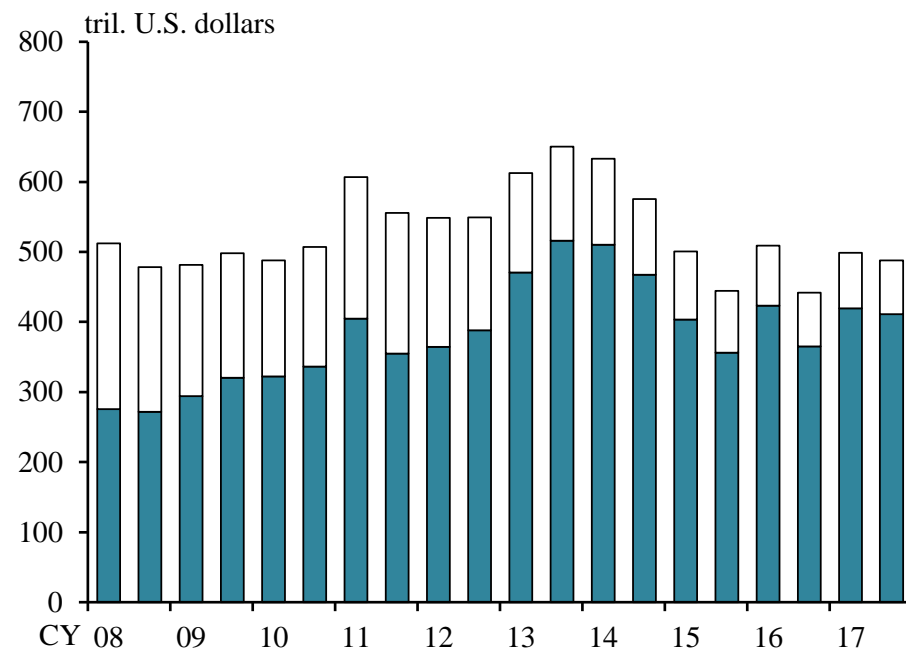
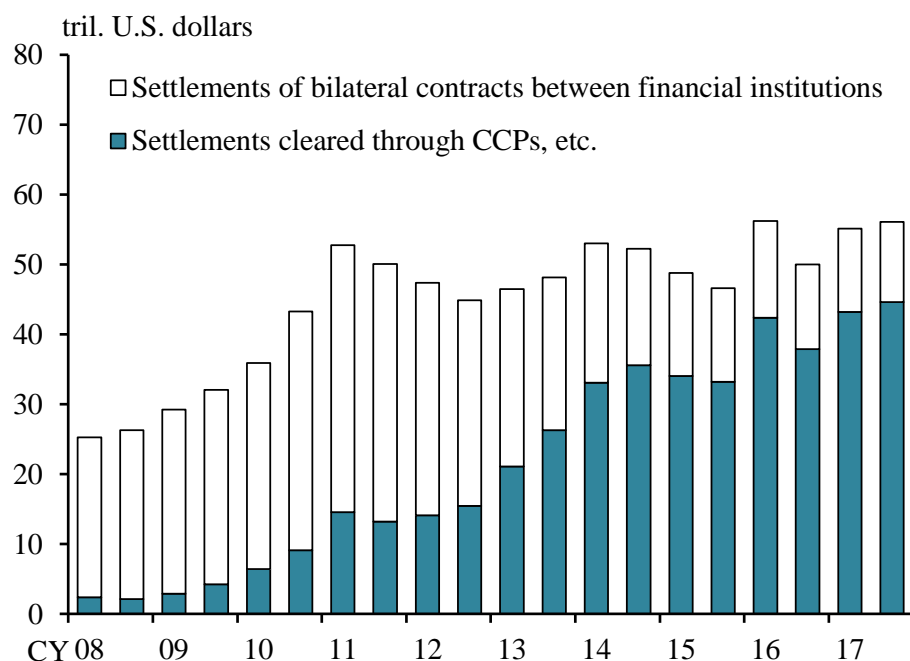
2. In the right-hand chart, the figures indicate the total average trading volume of Nikkei 225 mini, Nikkei 225 options, Nikkei 225 futures, TOPIX futures, and JPX-Nikkei Index 400 Futures.

Sources: Osaka Exchange; Tokyo Stock Exchange.

Notional Amounts Outstanding of OTC Derivatives

Japanese Dealers' Total

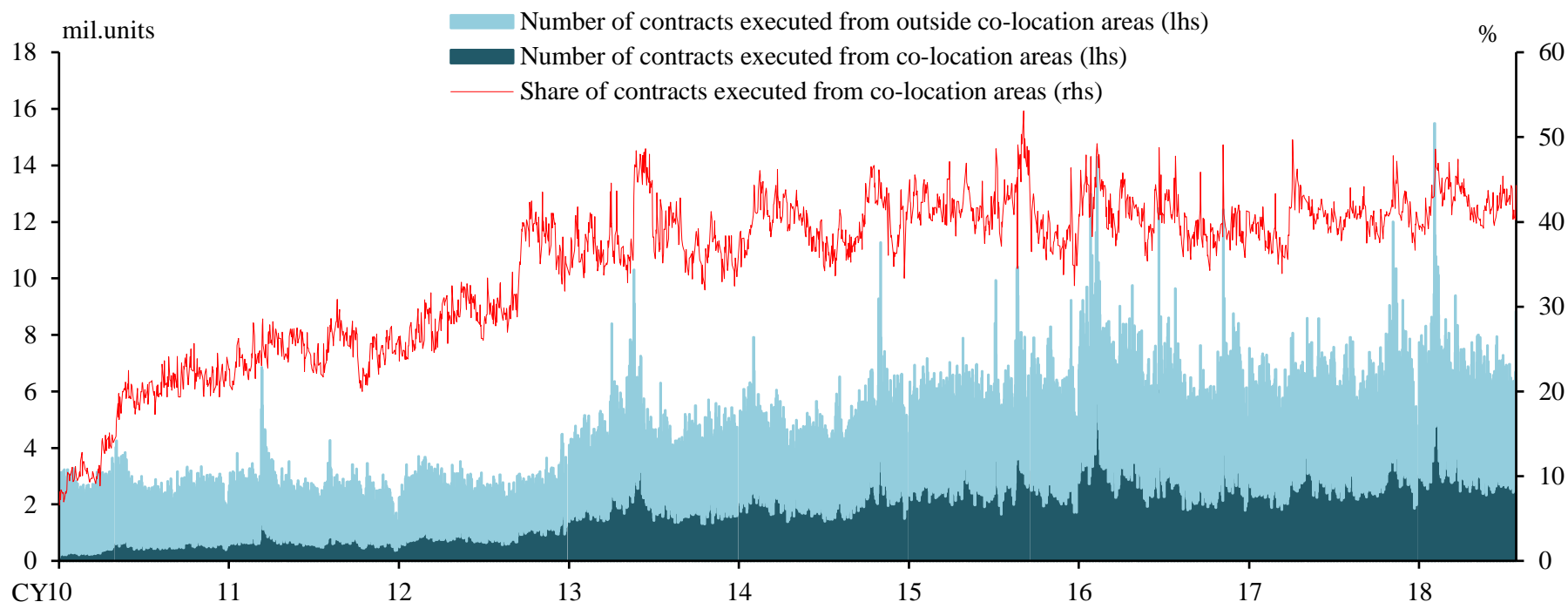
Global Dealers' Total



- Notes: 1. Notional amounts outstanding of interest rate and foreign exchange derivatives at the end of June and the end of December of each year.
 2. "Settlements of bilateral contracts between financial institutions" indicate the amounts outstanding of derivatives held by reporting dealers of the *Regular Derivatives Market Statistics* released by the Bank for International Settlements (BIS).
 3. "Settlements cleared through CCPs, etc." indicate the amounts outstanding of derivatives held by other financial institutions of the above statistics (at present, the majority are central counterparties [CCPs]).

Sources: BIS; Bank of Japan.

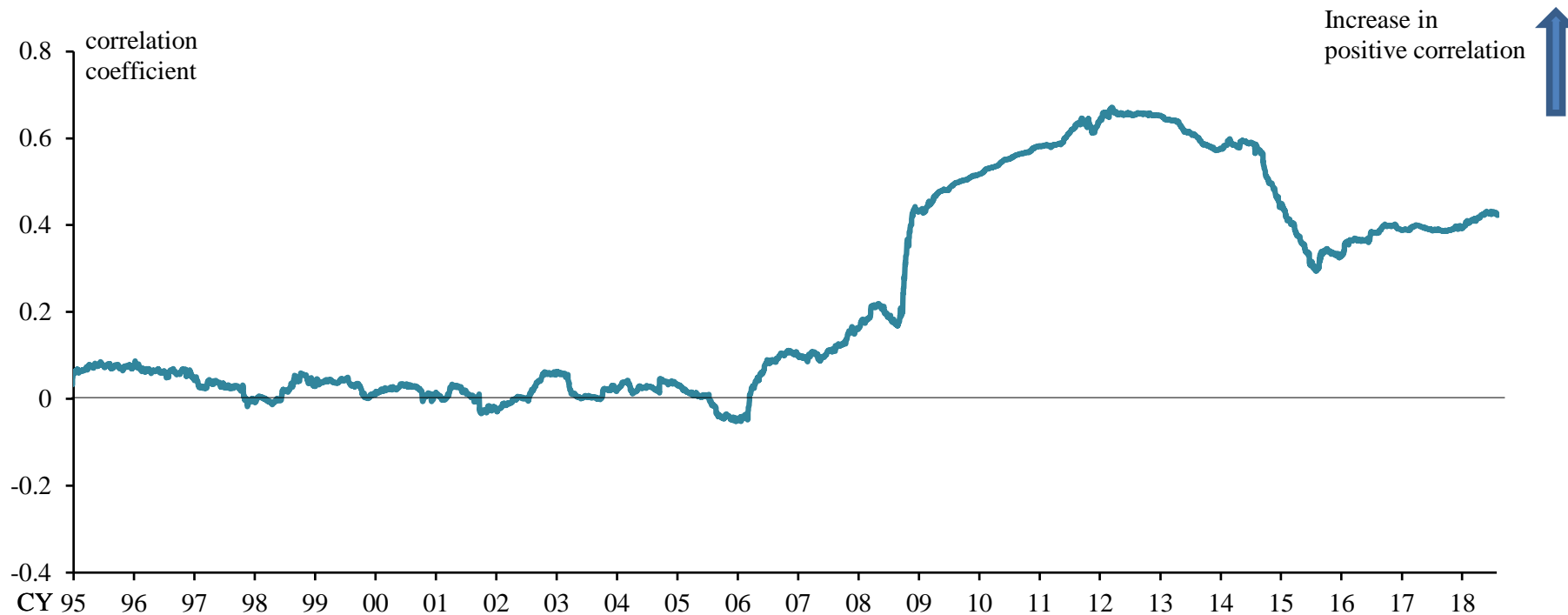
Share of Contracts Executed from Co-location Areas of Japanese Stock Exchanges



Note: "Number of contracts executed from co-location areas" indicates the number of contracts executed by market participants' trading programs installed in the co-location areas of exchanges.

Source: Tokyo Stock Exchange.

Correlation between Commodity Index Futures and Stock Index



Note: Correlation coefficients are calculated based on a 3-year (750 business days) rolling window of daily returns on commodity index futures (S&P GSCI) and stock index (MSCI AC-World).

Source: Bloomberg.