Sales Representatives Manual

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JSDA

Japan Securities Dealers Association

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Chapter 1 Overview of Derivatives Transactions

Introduction

1. History of Derivatives Transactions

The term “derivatives” is used for financial instruments that “derive” from financial assets, meaning those that have securities such as shares or bonds as their underlying assets or financial transactions that use a reference indicator such as interest rates or exchange rates. Today the term “derivative” is used widely throughout society and not just on the financial markets. Although there has been criticism that they amplify financial risks and have a harmful impact on the economy, derivatives are an indispensable requirement in supporting finance in the present age, and have become accepted as the leading edge of financial innovation.

The derivatives market grew steadily until recent years, presenting the question of why there was such a demand for derivatives trades. One reason is that derivatives pass on cash flow, but also facilitate the transfer of risk by restructuring cash flow. This transfer of risks not only consists of hedging risks for traditional assets with futures, but also is more diversified and finely-tuned, extending across various assets and risk factors as well as periods of time.

Corporations as well as financial institutions and investors encounter many different types of risks, and have a strong desire to either hedge these risks or to take these risks by investing in them. It is of course true that using derivatives to shift risk will not reduce the risk in the market as a whole since this is a zero sum game, and there are also opinions that they present an unavoidable risk of excessive supply of money to the financial markets since many of the derivatives are created without being backed by any actuals. Nevertheless, having access to derivative transactions is an important option in management and investment decisions since being able to avoid excess risk concentration and to hedge risks effectively are critical not only to risk management but also to the improvement of capital efficiency.

Derivatives have a long history, and there are even references to them in literature going back to Greek civilization.

Futures transactions first started with agricultural products, metals, and other general commodities. Futures transactions in these commodities are referred to as “commodity futures,” and distinguished from them; futures transactions in financial instruments, including foreign currencies, bonds, interest rates on deposits and share price indices, are referred to as “financial futures.”

This chapter will use the term “financial futures” to refer to the trading of all financial futures products including foreign currency, bonds, interest rates on deposits and share price indices, except where a distinction is particularly required.

The trading of financial futures started in 1972 when the Chicago Mercantile Exchange (CME) launched the International Monetary Market (IMM) on its premises and began trading foreign currency futures. This provided an opening in the late 1970s and early 1980s for the development of futures trading on various other financial instruments in the United States, including bonds, interest rates and share price indices. In particular, the first half of the 1980s saw a steady stream of new and remarkably diverse financial futures products.

Up to the mid-1980s, we also saw the introduction of financial futures trading in other countries such as the United Kingdom, Canada, Holland, Australia and Singapore. During this decade, financial futures trading began to spread across the globe.

Financial futures trading has become a major force in the overall futures market. Since 1985, in the United

States, the value of financial futures trading has surpassed that of commodity futures.

In 1985, 10-year JGBs (JGBs) became the first financial futures product to be traded in Japan. Trading in this instrument grew far more rapidly than most people expected, and within a year after trading started, futures eclipsed the trading value of the actual bond itself. In 1987, JGB futures trading ranked first in the world in terms of sales volume, drawing the attention of futures markets throughout the world.

In 1987, trading in share futures began with the introduction by a securities exchange of the Stock Futures 50, in which fifty brands of shares were packaged together to create a futures product. Trading in share index futures started in 1988, after an amendment to the Securities and Exchange Law. Currency and interest-rate futures were introduced in 1989 with the establishment of the financial futures exchange. In September 2007, the Financial Futures and Exchange Law was abolished and the Financial Instruments and Exchange Act (hereinafter referred to as the "FIEA") came into force amending the Securities and Exchange Law. Under the new Act, "securities exchanges" which deal with securities-related transactions and "financial futures exchanges" which handle only financial futures transactions form one category of "financial instruments exchanges" which handle all kinds of financial instruments.

On the other hand, trading in commodity futures dated back as far to 1730, when Osaka held a dominant position as the market for trading the rice brought in there as annual tax by feudal lords (*daimyō*) nationwide, and the Edo (Tokugawa) Shogunate granted permission for transactions in rice (spot transactions and futures transactions) on the Osaka Dojima Exchange, which was thus born as the world's first organized futures exchange market. In postwar Japan, exchanges for trading various types of commodities, such as cotton yarn, wool, rubber, raw silk, dried cocoon, sugar, agricultural products, and precious metals, were born, but these exchanges have been consolidated or abolished along with industrial development. In 2011, the Commodity Exchange Act was amended and the Commodity Derivatives Transaction Act came into effect as the law that covers domestic commodity exchanges, off-exchange transactions, and international commodity markets.

Subsequently, more steps have been taken to improve the viability of financial futures trading, including improvements in price-discovery methods and the margin system. Since 2000, alliances between Japan's exchanges and overseas exchanges have accelerated, promoting diversification of products.

In January 2013, the Tokyo Stock Exchange, Inc., and the Osaka Securities Exchange, Co., Ltd. integrated their business operations and established Japan Exchange Group, Inc., with the objective of gaining greater advantage in global competition among exchanges. As a result, since March 24, 2014, financial futures and options transactions that had previously been handled by both exchanges have been handled only on the Osaka Exchange, Inc. (formally the Osaka Securities Exchange, Co., Ltd.; the company name changed as of the same day).

In November 2019, in order to realize a "comprehensive exchange" enabling one-stop transactions in a broad range of derivatives products from financial instruments to commodities, Japan Exchange Group, Inc. and Tokyo Commodity Exchange, Inc. integrated their management operations, as a result of which Tokyo Commodity Exchange, Inc. became a subsidiary of Japan Exchange Group. On July 27, 2020, futures on commodities such as precious metal, rubber, and agricultural products listed on the Tokyo Commodity Exchange were transferred to the Osaka Exchange, and a "comprehensive exchange" started operations on a full-fledged scale through the integration of Japan Securities Clearing Corporation, which is a subsidiary of Japan Exchange Group, and Japan Commodity Clearing House Co., Ltd., which is a subsidiary of Tokyo Commodity Exchange, Inc. On September 23, 2022, the Osaka Exchange and the Tokyo Commodity Exchange launched holiday training, for the purpose of further enhancing convenience for investors through the provision of hedging opportunities during national holidays and strengthening the competitiveness of Japan's derivatives market. Derivatives products such as Nikkei 225 Futures

and Platts Dubai Crude Oil Futures can be traded on holidays.

According to some historians, options transactions are said to have been born when a good olive crop was forecast in ancient Greece and people would buy the right (option) to use the olive presses. In the modern era, options were traded on Dutch tulip bulbs at the beginning of the 17th century.

Although an options market appeared in England in the 1690s, it became illegal under the Bernard Law of the Walpole Cabinet in 1733. Despite this, however, option transactions remained popular, and the Bernard Law was abolished in 1860.

In the United States, option transactions began to be traded in the latter half of the 18th century, and the modern era of option transactions began after the Civil War. In the 1920s, the options market gained popularity in the over-the-counter market as a means of speculation. However, the options provided to salesmen as a means of promoting sales became a problem because of their use in market manipulation.

On April 26, 1973, trading of call options on 16 individual shares began on the Chicago Board Options Exchange (CBOE). In 1977, trading of put options also began. However, because there was a lot of unfair activity involved in sales and trading, the Securities and Exchange Commission (SEC) placed a moratorium on the operations, prohibiting new products and an increase in underlying issues.

This measure was abolished in March of 1980, allowing option transactions to become the flourishing activity that it is today.

At this time, financial deregulation under the Reagan Administration and the subsequent stimulus it supplied to the financial markets caused option transactions to expand and then spurred the development of new options products. The repercussions were felt in major stock exchanges throughout the world, giving rise to options on futures trading in Europe and in Japan.

Derivatives markets experienced tremendous growth as financial markets became more globalized and borderless at an increasing speed in the 21st century, and this has led to astounding progress in product development and trading techniques. Most of these have involved negotiated transactions, and consequently, progress has been made in upgrading the infrastructure from a legal perspective with respect to negotiated transactions.

As one example, it would appear that a major contribution to the globalization of negotiated transactions in derivatives has been made by the level of international standardization in swap transactions that has been achieved by using a contract in the form of a **master agreement** which complies with the master agreement that is published by the International Swaps and Derivatives Association (ISDA), an international industry association with participation by professionals engaged in the derivatives business. This flow of standardization is also seen in the areas of accounting, internal control and risk management.

Within the trend towards a switch to mark-to-market accounting as well as liberalization and globalization, a variety of derivatives businesses have become common as a result of the progress and expansion of derivatives transactions and sales activities, the growing complexity and diversification of product design, greater sophistication of and improvements to efficiency in risk managements and back office activities, and the developments in financial engineering using quants and information technology.

It is obviously not possible to say that the growth and development of the derivatives industry until now has been without any problems, as revealed by the subprime problem that became apparent in 2007. And with the subsequent disruption as well as credit contraction in the financial markets, a global consensus has been established in support of the view that the trend towards liberalization under the principle of laissez-faire economics should be

reexamined. Given the huge volumes of outstanding derivatives trades as of the present and with the anticipation of a large volume of new trades, however, it is easy to imagine how difficult a challenge the financial regulatory reform including the reform for Over-the-Counter (OTC) derivatives regulations would be. The business model for derivatives transactions will also have to be reconsidered. Persons who are involved in the finance industry must constantly take the approach of conducting business sincerely and with a thorough understanding of the content thereof, and of handling problems in an appropriate manner.

2. Derivatives Transactions and the Financial Instruments and Exchange Act

The FIEA came into force at the end of September 2007, and with this, financial instruments changed from being those listed on a restrictive list to being handled as part of a comprehensive framework, with a view to ensuring consistency with the global standards at that time. In the past, commodity derivatives transactions in which commodities or commodity indices were underlying assets or reference indicators were considered to be closely related to policies concerning the production and distribution of agricultural products and metal and therefore they were regulated under the Commodity Derivatives Transaction Act. However, as a result of the amendment to the FIEA in 2012, market derivatives transactions in which commodities or financial indicators for commodities are underlying assets or reference indicators may now be handled on financial instruments markets operated by financial instruments exchanges.

The following is a list of several essential points covered by the FIEA. First the following classification is made of financial instruments and financial indicators that constitute the underlying assets of derivatives:

(i) Financial Instruments (FIEA, art. 2, para. 24)

1) **Securities;**
2) **Rights such as claims based on a deposit contract or securities and certificates indicating such rights;**
3) **Currencies;**
4) **Crypto-and other assets (meaning cryptoassets as prescribed in Article 2, Paragraph 14 of the Payment Services Act or what is set forth in Paragraph 5, Item 4 of that Article and is specified by Cabinet Office Ordinance as anything for which it is found to be necessary to ensure the public interest or the protection of investors);**
5) **Commodities;**
6) **Assets of which there are many of the same kind, which have substantial price volatility, and for which it is found necessary to secure the protection of investors with regard to derivatives transactions thereof; and**
7) **Standardized instruments used by a financial instruments exchange for the purpose of facilitating market derivatives transactions by standardizing interest rates, the maturity period, or other conditions.**

(ii) Financial Indicators (FIEA, art. 2, para. 25)

1) **Price or interest rate, etc. of financial instruments;**
2) **Figures in connection with the results of result of meteorological observations announced by the Japan Meteorological Agency or another person;**
3) **Indicators that have a significant impact on business activities, or statistical figures in connection with social or economic conditions; and**

4) Figures that are calculated in connection with those listed in 1) through 3) above.

Weather derivatives are a typical example of category (ii)-2), which also includes earthquakes and tsunami in addition to climate phenomena. Indicators and figures in category (ii)-3) must meet the requirement that "it is impossible or extremely difficult for either party to exert an influence on their fluctuations," which means that they must be immune from the impact of any artificial manipulation. For example, it may be difficult to manipulate GDP statistics arbitrarily, although it depends on the statistical method used.

The scope of derivatives transactions has been expanded from those regulated under the former Securities and Exchange Law and the Financial Futures and Exchange Law (abolished), and the following derivatives transactions newly became subject to regulations under the FIEA:

- **Currency / interest rate swap transactions;**
- **Credit derivatives;**
- **Weather derivatives; and**
- **Those prescribed by a cabinet order in connection with derivatives transactions involving indicators that have a significant impact on business activities or statistical values in connection with social or economic conditions (excluding those related to commodities indices), *i.e.*, disaster (catastrophe) derivatives.**

The following are the main other issues of which it is important to be aware concerning derivatives transactions that are set forth in the FIEA:

- **Capital adequacy regulations apply to businesses that engage in the type I financial instruments business. Registration as a type I financial instruments business operator is required in order to handle OTC derivatives, since they require particularly sophisticated specialization, and also involve substantial risks;**
- **Although a type II financial instruments business operator is allowed to handle market derivatives transactions other than market derivatives transactions involving securities (including foreign market derivatives transactions), this type of dealer is not permitted to handle OTC derivatives;**
- **Although indicators such as economic statistics (GDP, CPI) are covered under the category of financial indicators, those such as commodities indices, earthquakes, emissions rights and real estate will not necessarily constitute financial indicators (though they may be designated individually by a cabinet order);**
- **A distinction is made between a specified investor (professional investor) and a general investor (ordinary investor). OTC derivatives transactions that are conducted with certain specified investors are excluded from the scope of the financial instruments business;**
- **Insider trading regulations apply not only to trading in specified securities, etc., but also to derivatives transactions involving specified securities (credit derivatives such as CDS);**
- **Cash or securities received as margin deposits from customers must be managed separately from the firm's own assets; and**
- **Liability reserves for financial instruments transactions must be accumulated in proportion to**

the trading volume in connection with purchase and sale or other transactions in securities, etc., or derivatives transactions, etc.

The classification of derivatives transactions under the FIEA consist of (i) market derivatives transactions, (ii) OTC derivatives transactions, and (iii) foreign market derivatives transactions, and OTC derivatives transactions are based on negotiated transactions that are similar to (i) and (iii). A transaction that promises the exchange of a certain financial instrument or consideration at a certain time in the future is referred to as a "futures transaction" under (i) and (iii) and a "forward transaction" under (ii), and the same terminology is used for options and swaps.

It may sound somewhat confusing, but the term "market" does not refer to a "transaction on an exchange." In actual trading, foreign exchange markets and bond markets are regarded as markets for OTC transactions. However, the term "market transactions" as used in the FIEA refers to transactions on an exchange.

With the objective of regulating derivatives transactions on an overarching basis, the FIEA covers not only derivatives transactions that have underlying assets consisting of securities or share indices or the like, but also derivatives transactions relating to more broad-based reference indicators (financial indicators). Examples of derivatives referring to values of a financial instrument or a financial indicator would include futures or forwards, options and swaps. The FIEA, however, does not limit these individually, but rather states them in the form of making general expressions of the economic characteristics of their transaction mechanism. Nevertheless, a designation of derivatives is not made in a comprehensive sense of overarching financial services. Moreover, the following are not covered:

- **Options transactions in currencies that are included in deposits;**
- **Cash deposits as prescribed in Article 2, Paragraph 2 of the Deposit Insurance Act as well as cash deposits, etc., as prescribed in Article 2, Paragraph 2 of the Agricultural and Fisheries Cooperative Deposit Insurance Act (those involving trading in currencies);**
- **The insurance business as set forth in Article 2, Paragraph 1 of the Insurance Business Act;**
- **Agreements in connection with guaranteeing debts; and**
- **Compensation of all or a portion of debts that are not paid in connection with loans, etc.**

Those that are "accepted as not presenting an impediment to the protection of investors or the public interest" under existing law are excluded from the application of OTC derivatives transactions. Moreover, if a new derivative does not constitute an OTC derivative under the FIEA, the new derivative can be added by individual designation in a Cabinet Order. For example, although transactions in emissions rights are not included within derivatives trading, the activity of holding a market in connection with transactions in emissions rights has been added to the concurrent business of a financial instruments exchange in connection with approval.

Transactions of futures and listed options are on-exchange transactions, whereas forward, swap and OTC options are OTC transactions. OTC transactions are further divided into those subject to clearing by the Central Counterparty (CCP) and those not subject to central clearing (negotiation transactions). CCP clearing is mandatory for (domestic) business operators dealing with standard yen interest rate swaps. Japan Securities Clearing Corporation (JSCC) is the CCP in Japan (for details, see this Chapter, "Conclusion 2(1) Movement toward Centralized Clearing").

1 Fundamentals of Derivatives Transactions

A major feature of derivatives transactions is that investors can first "sell" a product before they own it, unlike ordinary transactions of shares and bonds in which investors sell the products they own. When investors have sold a derivatives product they do not yet own, such a state is called a "short" or "short position"; and when they have bought and own the derivatives product, such a state is called "long" or "long position." Derivatives transactions also have the following features: they finalize at the present time the results of a future transaction (hedging effect); they enable the achieving of the same economic effect as that which would have been created by conducting a transaction in multiple times the amount of money that is actually to be invested (leveraging effect); and they have an effect of repackaging cash flow (risk-transfer effect).

In derivatives transactions, simply-structured transactions are referred to as "**plain vanilla**" transactions. Over-the-Counter (OTC) derivatives transactions not only use "plain vanilla" but also frequently use derivatives that add special conditions, which are combinations of plain vanilla transactions, or derivatives that refer to multiple assets or multiple indices (hereinafter referred to as "**exotic**"). There are also even more complex derivatives such as compound options or those that will commence at a future date.

Even these complex derivatives, however, are at their core a combination of the three basic factors of **futures or forwards, options and swaps**. The following presents an overview of **futures transactions, forward transactions, options transactions and swap transactions**.

2 Futures Transactions

2 1 What Are Futures Transactions?

Futures transactions are entering into a contract to trade a certain commodity ("underlying commodity") at a price determined at the time of the contract at a predetermined date in the future.

Futures transactions are market derivatives transactions, that is, on-exchange transactions. In the case of negotiation transactions, they are conducted as forward transactions, which are OTC derivatives transactions (the economic functions are almost the same).

A person buying a contract is obligated to buy the underlying commodity at the contract price from the seller on the expiration date. Conversely, a person selling a contract is obligated to sell the underlying commodity at the contract price to the buyer on the expiration date. However, in either case, it is not necessary to wait until the expiration date to close out the contract. The futures position may be offset and closed out at any time before the expiration date by initiating an offsetting (equal and opposite) trade (where a buyer resells a contract or a seller buys back a contract (this function is not available for forward transactions)).

For futures transactions, the underlying products and the expiration dates are standardized and specified.

The month in which the expiration date falls is called the "contract month." The contract months for futures (large contracts) are normally March, June, September and December, and these futures are treated as different

futures with different maturities (in the case of mini futures, options, and commodity futures, the contract month comes every month).

Futures transactions involve trading in actual underlying assets and trading in abstract underlying products such as a share price index. On the expiration date, the actual assets are delivered at the contract price determined at the time of trading in the former type of trading, and a cash settlement of the difference between the contract price determined at the time of trading and the final settlement price is either received or paid ("net cash settlement") in the latter type of trading. **Net cash settlement** is a settlement method whereby only a difference between the "futures price at the time of purchase (or sale)" and the "futures prices at the time of settlement" is delivered. While investors in stock investment pay for the stocks they buy each time, investors in futures transactions only receive or pay a difference in the transaction, that is, they "receive a gain" or "pay a loss" if any gain or loss arises as a result of the settlement. The reason for net cash settlement is that a share price index is an abstract thing for which it is impossible to deliver the actual shares, and thus the underlying product in a share index futures transaction cannot be physically delivered. Prominent examples of underlying products in share index futures transactions include: Nikkei Stock Average Futures (referred to as "Nikkei 225 Futures" in this Chapter), Tokyo Stock Price Index (TOPIX) Futures, and JPX-Nikkei Index 400 Futures.

In the case of share index futures transactions, if a trader does not make a settlement by the final trading day, a settlement is made automatically on the next day (the expiration date) at the special quotation (SQ), and the trader's gain or loss is determined.

On the other hand, some futures transactions are settled through the delivery of the actual underlying assets. In Japanese Government Bonds (JGB) futures transactions such as Long-term JGB Futures (6%, ten years), contracts that have not been settled by cash in difference (net cash settlement) by the expiration date (delivery date) are settled through the exchange of the JGB issues designated by the Osaka Exchange as "deliverable bonds" and the payment for the issues. This settlement method is referred to as "delivery settlement." The futures contract seller may choose the bond to be delivered to the futures contract buyer. The prices of JGBs depend on the shape of the yield curve but deliverable bonds with a maturity of 7 to 11 years are highly linked with each other. Therefore, they can be used to hedge the interest rate risk. As there are multiple issues that fall within deliverable bonds, it is possible to avoid abnormal price fluctuations caused by a squeeze (transactions are concentrated in a specific issue of deliverable bonds).

Also, in the case of some issues of commodity futures transactions in which the underlying products are precious metal and agricultural products (commodity-related market derivatives transactions), delivery settlement can be chosen on the expiration date; however, in actual transactions, few investors choose this settlement method and most transactions are concluded through net cash settlement. In the case of issues for which delivery settlement cannot be chosen, net cash settlement is made on the basis of the final settlement price.

For details of the respective settlement methods, please refer to the descriptions relating to the settlement of each product in "Chapter 2 Products of Derivatives Transactions, 1-2 Futures Transactions."

Investors can conduct futures transactions by depositing a "margin," which is cash or securities furnished as collateral by calculating risks that may arise in futures and options markets (estimated amount of losses) to secure the fulfillment of the contract concluded (in the case of commodity-related market derivatives transactions, certificates and bills issued by warehouse companies that take custody of the commodities, such as warehouse receipts, can also be used as such collateral).

A futures transaction has the characteristics described below.

(1) An Offsetting (Equal and Opposite) Trade Can Be Executed at Any Time

If the price of the underlying products rises, a person who has bought the futures (is "long") will make money, and the person who has sold the futures (is "short") will lose money. If the price falls, the person who is long will lose money and the person who is short will make money. In either case, if the market moves in the opposite direction from that envisioned by the futures contract holder, that person can execute an offsetting trade and close out the original position thereby limiting losses.

Methods of Settling Futures Transactions

Futures transactions are settled using the following two methods:

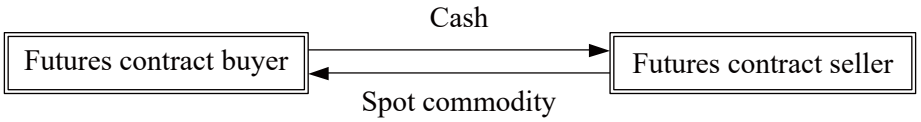
(1) Offsetting Trades

A futures position can be closed out by initiating the opposite (offsetting) trade by the final trading date. That is, a buy contract can be closed out with a resell contract, and a sell contract can be closed out with a buy back contract.

(2) Settlement

[If the underlying commodity is deliverable]

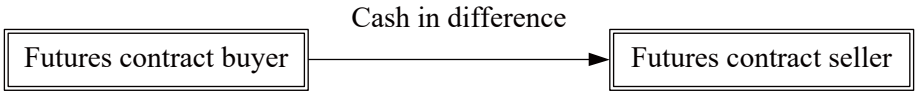
The futures contract buyer will pay the contract price to the seller and the seller will deliver the commodity (in the case of a commodity-related market derivatives transaction, including a certificate or bill issued in regard to the commodity, such as a warehouse receipt) to the buyer (delivery settlement).



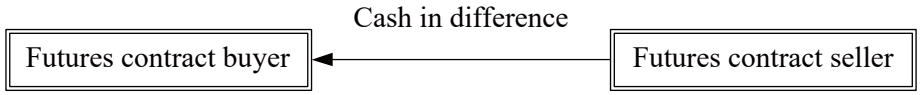
[If the underlying commodity is not deliverable]

Cash will be used to settle the difference between the contract price and the final settlement price.

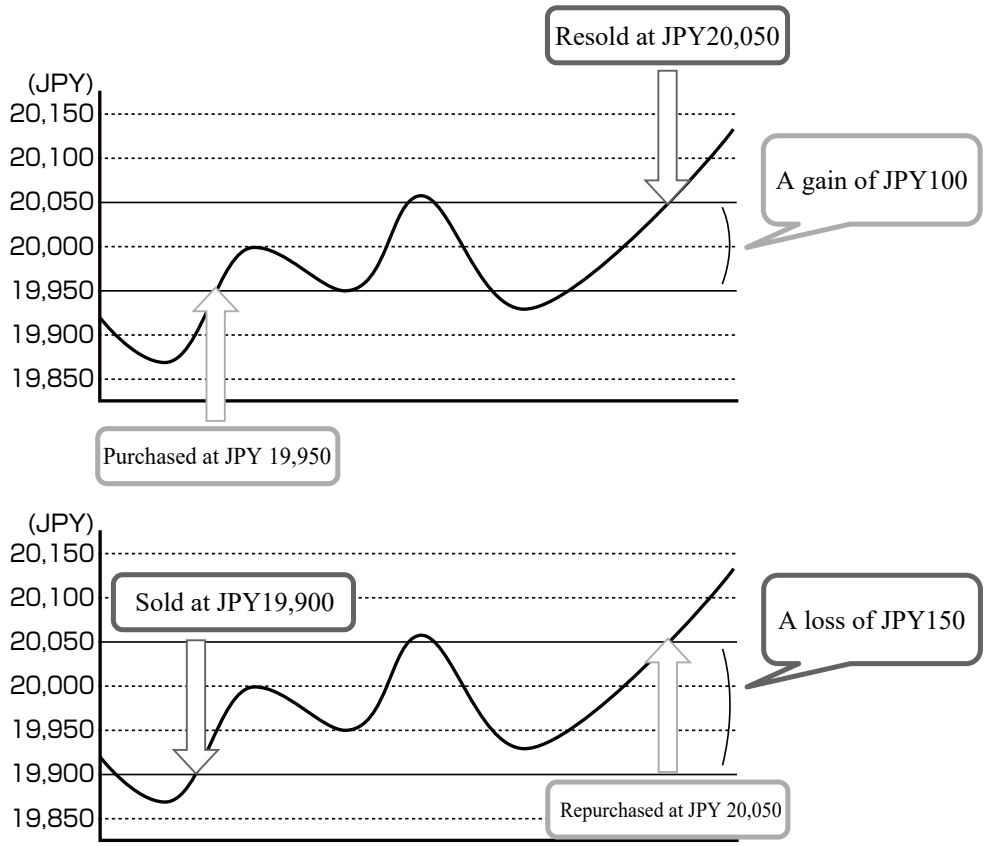
Buyer: contract price＞final settlement price:



Buyer: contract price＜final settlement price:



Gain or loss in offsetting transaction <Nikkei 225 Futures>



(2) Difference from Margin Trading

A comparison between futures transactions and the margin trading that take place in the share market shows that there are similarities in that both require a margin and use a mark-to-market system. Nevertheless, their basic nature is completely different in the following respects:

(i) There Is No Borrowing and Lending Relationship in Futures Transactions

In margin trading, either a securities company or securities finance company will lend money to a share buyer or lend shares to a seller, and these will be used for trading in the spot share market. The borrower returns the shares and pays the loan fees to the lender on another day.

By contrast, in futures transactions there is no borrowing or lending either by buyers or sellers.

(ii) In Futures Transactions, Futures Prices Are Determined Independently from Spot Transactions

In margin trading, the funds or shares which have been borrowed or lent as discussed above are then used to make trades in the spot market in exactly the same manner as any other spot transaction, and the share price is the same whether trading on a margin or in cash.

On the other hand, futures are traded in the futures market, which is distinct from the spot market. Arbitrage occurs between the two markets because different prices are set in each market. Moreover, with futures transactions, the price for the same underlying product will differ depending on the contract month (delivery month). This means transactions of the same underlying product are treated as transactions of different products if their contract month differs. If the price discrepancy becomes larger than the theoretical value, the discrepancy is reduced by arbitrage and the prices converge to a fair price.

2 2 Futures Price Formation

As explained in 2-1, prices in the futures market are different from those in the spot market. This section explains how futures prices are determined.

The futures price is determined on the basis of the spot price.

This is because futures prices converge with spot prices when the expiration date arrives. For index futures such as the Nikkei 225 Futures, when the contract expires, the futures contract is settled in cash at the **special quotation (SQ)**, which is calculated on the basis of the opening price of the issues forming the Nikkei Stock Average Index on the second Friday (expiration date) of each month (this is not the opening price of the Nikkei Stock Average Index). In other words, the futures price is closely tied to the spot price.

However, this alone is insufficient to determine the futures price. In order to know more about the pricing mechanism for futures, it is important to understand the theoretical futures price, which is a theoretical price obtained by calculation but is not the actual price. It should also be noted that the futures price is not a predicted value of the spot or index price as of the expiration date.

Major factors affecting the calculation of the theoretical futures price are short-term interest rates and dividends. In reality, there are no futures or forwards for individual shares, but let us look at the following example.

[Example]

(1) Ms. A and Mr. B want to buy 1,000 shares of Company Z. Company Z is traded in both the spot market and the futures market. Neither Ms. A nor Mr. B has the funds to make the purchase today; however, they both expect to have the funds in three months. The spot and futures prices for Company Z shares are as follows:
Spot: JPY2,000
Futures 3 month hence: JPY2,020
Let us assume that each individual makes a purchase as follows:
Ms. A borrows money at 6% interest rate to purchase the shares in cash today.
Mr. B buys Company Z share futures today and arranges to buy the actual shares in 3 months.

(2) After one month, Company Z pays a JPY3 dividend:
Ms. A receives dividends of JPY3 × 1,000 shares = JPY3,000
Mr. B receives no dividends (since he does not yet own any Company Z shares)

(3) When the futures contract expires 3 months later, both individuals receive the funds they were expecting:
Ms. A paid back her loan plus interest, which totaled JPY2,030,000. JPY2,000 × 1,000 shares × (1 + 0.06 × 3/12) = JPY2,030,000
Mr. B bought 1,000 shares of Company Z shares at the futures contract price of JPY2,020,000. JPY2,020 × 1,000 shares = JPY2,020,000

But what about these results? Aside from the method used to purchase Company Z shares, both Ms. A and Mr. B started out under the same circumstances. Nevertheless, to purchase exactly the same shares, Ms. A spent JPY2,030,000, minus the JPY3,000 dividend, or JPY2,027,000, while Mr. B spent JPY2,020,000. Mr. B bought the futures at a price higher than the spot price in step (1) above, and only Ms. A received dividends in step (2) above. At first glance, we would expect Ms. A to have come out ahead, but in fact the entire transaction cost her more than

it cost Mr. B. In other words, in this case, the better strategy was to buy the futures, not borrow the money to purchase actual shares.

If we change the assumptions, so that that Ms. A and Mr. B both have the funds to buy Company Z shares, and Ms. A buys them immediately while Mr. B buys futures, earning 6% interest (on the money he did not spend) until the contract expires, their relative gains and losses would continue to be the same as described above. In other words, we can expect the futures price to exceed the spot price by the amount given in the following formula and a balance to be achieved:

$$\left(\begin{array}{c}\text{Funds for acquiring}\\ \text{the actuals}\end{array} \times \begin{array}{c}\text{Short-term}\\ \text{interest rate}\end{array} \times \begin{array}{c}\text{Number of days to}\\ \text{futures expiration}\end{array}\right) - \left(\begin{array}{c}\text{Income that would be earned if the}\\ \text{actuals were to be acquired now}\end{array}\right)$$

The second item in the formula above, "income that would be earned if the actuals were to be acquired now," refers to dividends in the case of shares and to interest income in the case of bonds, but it does not apply to commodities (such as precious metals and agricultural products). At stage (1) in the above example, the JPY2,000 spot price of Company Z shares was in balance at the JPY2,027 futures price. This state of price balance is called the **theoretical futures price**. Since the actual futures price was JPY2,020, the theoretical futures price was lower than the spot price. The price indicated by the formula in the box above is the cost of owning the actuals, and is known as the **cost of carry** which is also called "basis."

The futures price is expressed in the following formula:

$$\text{Futures price} = \text{Spot price} + \text{Cost of carry}$$

If the dividend yield is lower than the short-term interest rate, the cost of carry is a positive number. On the other hand, if the dividend yield is greater than the short-term interest rate, the cost of carry becomes negative. Because of this, in the former case, the futures price is higher than the spot price (or the futures sell at a **premium**). In the latter case, the futures price is lower than the spot price (or the futures sell at a **discount**).

In practice, in futures transactions, prices are determined by a complex relationship of issues, such as trading costs and supply and demand of market participants. Thus, if we define these issues as α, the total futures price would be the following:

$$\text{Futures price} = \text{Spot price} + \text{Cost of carry} + \alpha$$

[Calculating the Theoretical Futures Price]

Theoretical futures price

$$= \text{Spot price} \times \left\{1 + (\text{Short-term interest rate} - \text{Dividend yield}) \times \frac{\text{No. of days to maturity}}{365}\right\}$$

* The annual short-term interest rate and dividend yield

(Sample Question)

If the Nikkei Stock Average is JPY20,000, the short-term interest rate is 10%, and the dividend yield is

4%, what is the theoretical price of the Nikkei 225 Futures? Assume the number of days until the contract day of the Nikkei 225 Futures is 73.

(Answer)

Theoretical price = Spot price × {1 + (Short-term interest rate − Dividend yield) × (No. of days to maturity / 365)}
= JPY20,000 × {1 + (0.1 − 0.04) × (73 / 365)}
= JPY20,240

Answer: JPY20,240

Let us assume that Ms. A concurrently holds a position opposite to Mr. B's position, that is, she holds a short position (sell) for futures (cash and carry strategy). Ms. A has no initial funds. Since the futures price will be equal to the spot stock price three months later (on the expiration date), the profit and loss will be netted whatever the stock price becomes, so the profit and loss are determined at the initial stage. If there is a profit, arbitrage occurs because Ms. A had no initial funds and took no risks. If there is a loss, arbitrage occurs as Mr. B holds a position opposite to Ms. A's position (reverse cash and carry strategy).

If there is no arbitrage (no arbitrage opportunity) in the market, the futures price must be the theoretical futures price. The theoretical futures price would be the no-arbitrage price. However, this does not take into consideration the margin deposit or loan fees.

Before creating a short position in actual assets (here, a short position refers to the sale of a security not yet held, *i.e.*, short selling), the seller borrows the assets from the loan market and sells them on the spot market. Therefore, the loan fees should be taken into consideration as part of the cost of carry.

[Theoretical Prices of Bond Futures]

The underlying asset of bond futures is a hypothetical bond called a "notional bond." There are multiple issues of JGBs that are deliverable bonds for futures transactions (in the case of long-term JGB futures, 10-year JGBs with a remaining maturity of 7 to 11 years). Since the coupon and maturity differ among these issues, a **ratio of conversion (conversion factor)** with the notional bond (6% coupon, maturity of 10 years) is given in the following formula.

$$\text{Conversion factor} = \frac{\text{Present value of the bond}}{\text{Present value of the notional bond (JPY 100)}}$$

The discount rate is 6% in the above calculation (the present value of the notional bond = JPY 100).

Normally, the seller selects the least expensive bond, which is most favorable to the seller, from among the deliverable bonds to maximize the profit (it is not the buyer but instead the seller that has the right to select the bond issue).

On the final trading day (five business days prior to the delivery date (expiration date)), the least expensive bond is a bond issue for which the bond price divided by the conversion factor becomes the smallest, and the futures price is determined. This means:

$$\max (\text{Futures price} \times \text{Conversion factor} - \text{Bond price}) = 0$$

As for the least expensive bond, the above equation holds with "max" excluded.

Before the final trading day, based on the cash and carry strategy, (i) the trader buys the cash bond at present (T=0), borrows the bond price P at the interest rate of r, and sells the bond at the futures price F. Then, (ii) on the delivery settlement date T, the trader makes a settlement by receiving coupon C × T and delivering the cash bond.

$$\text{Profit and loss} = F \times \text{Conversion factor} + C \times T - P \times (1 + r \times T) = F \times \text{Conversion factor} - \text{Forward price}$$
$$\text{Forward price} = \text{Cash bond price } P - (\text{Coupon income } C \times T - \text{Repo cost } P \times r \times T)$$

As the futures price converges so that the profit and loss will be zero, the theoretical futures price is determined.

$$\text{Futures price} = \min (\text{Forward price} / \text{conversion factor})$$

Regarding the basis:

$$\text{Basis} = \text{Cash bond price} - \text{Futures price} \times \text{Conversion factor} = \text{Profit and loss of carry} + \text{Delivery price gap}$$
$$\text{Wherein: Carry profit and loss} = \text{Cash bond price} - \text{Forward price}$$
$$\text{Delivery price gap} = \text{Forward price} - \text{Futures price} \times \text{Conversion factor}$$

As for the least expensive bond, the delivery price gap is 0. As the maturity date approaches, the carry profit and loss converge to 0.

The bond futures market and the JGB spot market are each normally created according to their own independent market factors. However, price formation for each is intimately connected through delivery settlement.

In actuality, the bond futures market has more liquidity than the spot market. Due to various supply and demand factors or basis-related factors such as fluctuations of repo cost, the futures price does not always fluctuate in line with the theoretical price obtained by the above formula. In some cases, the futures price fluctuates before the theoretical price. However, understanding the price relationship between bond futures and the least expensive bond is perhaps the most important point in understanding the relationship between the futures and spot price.

This explanation, which pertains to the theoretical relationship between the financial derivatives price and the spot price, does not necessarily hold true for commodity-related market derivatives transactions. In financial derivatives transactions, the theoretical futures price is drawn from the spot price in consideration of interest rates and dividends, whereas in commodity-related market derivatives transactions, there will basically be no cash flow arising from holding the commodity. In addition to interest rates, warehouse fees incurred for the storage of the commodity and lease fees earned by leasing the commodity to another person, as well as the difference in the future supply-demand environments, can be the factors that explain the difference between the futures price and the spot price. It is difficult to theoretically quantify and identify the difference in the future supply-demand environments, which is generally referred to as convenience yield (a benefit that comes from holding the commodity; an example

of convenience yield is often explained as the fact that it is possible to commence production immediately if one holds the commodity, but it is impossible to do so by holding the futures position alone, and thus, holding the commodity is more advantageous in responding to the changing situation). In light of this, the relationship between the commodity futures price and the spot price can be expressed by the following formula:

If the underlying commodity is not leasable:

Commodity futures price = Commodity spot price + Interest rate + Storage fee – Convenience yield

If the underlying commodity is leasable:

Commodity futures price = Commodity spot price + Interest rate - Lease fee – Convenience yield

(Note) In the case of leasable commodities that do not deteriorate, such as precious metals, it is possible to gain a lease fee without paying a storage fee.

As mentioned above, if it is assumed that "Futures price = Spot price + Cost of carry + α," the cost of carry would be a function with the term T, and the futures price would have a term structure. If the annual cost of carry η is constant, the futures price will rise as the contract month becomes later when $\eta > 0$, and will fall when $\eta < 0$. In the case of a commodity, the former condition is called contango and the latter condition is called backwardation (in reality, the cost of carry η is not constant, and the futures price does not always simply rise or fall).

2 3 How to Use Futures Transactions

The critical significance of futures transactions is that they **transfer the risk of price fluctuations**. People who wish to avoid the risk of fluctuations in the prices of spot commodities (the danger of unforeseen price fluctuations) can sell or buy futures on those products as a **hedge** against this type of risk. When people who hold a commodity wish to avoid the risk of fall in the price of the commodity, they sell commodity futures for the same amount as that of the commodity that they hold. On the other hand, if people who plan to purchase a commodity in the future wish to avoid the risk of rise in the price of the commodity before the purchase, they will buy commodity futures for the same amount as that of the commodity to be purchased. The investor would use bond futures to avoid risk if his/her portfolio consisted of bonds. These types of trading are known as **hedge trading**, and a person who engages in hedge trading is known as a **hedger**. The reason that futures can be used as a hedging technique for spot commodities is that, as described above, there is a strong correlation in movements between the futures and spot price (see "2-2 Futures Price Formation" in this Chapter for details). If it is possible to use futures transactions to hedge the risk of price fluctuation in the spot market, this would probably make more people willing to take positions in the spot market. This would apply both to investors as well as to dealers who handle trading in shares and bonds. Thus, the existence of a futures market can be considered to increase the depth of the spot market for the underlying products, thereby raising its liquidity.

In addition to hedgers, other participants in the futures market include those investors who accept the risk of

simply buying and selling futures as they look for high returns on their money, along with those participants who are out to profit from price differentials either between the futures and spot markets or between one futures and another. The first of these two types of participants is called a **speculator**, one who is involved in **speculative trading**. The other type of participant is called an **arbitrager**, and the trading is called **arbitrage trading**.

The function of transferring risks, which is inherent in futures transactions, is the result of trading on a market in which hedgers who hold risks in mutually offsetting directions transfer a portion of that risk to each other, and where hedgers transfer that risk to speculators. Thus, the futures market provides a method for hedgers to avoid risk, opportunities for speculators to obtain risk profits, and arbitrage profits for arbitragers when there are arbitrage opportunities.

(1) Hedging

Hedging means taking a position in the futures market that is opposite to the one taken in the spot market. This is an attempt to avoid the risk of price fluctuation in the spot market. There are two hedge positions: the sell hedge and the buy hedge.

A) Sell Hedge

If an investor anticipates that the actual assets he or she holds will fall in price, that person can take a sell (short) position in the futures market now. If share market prices fall as anticipated, that person can then buy back the futures and make a profit, thereby offsetting the loss suffered in the spot share market.

B) Buy Hedge

If an investor anticipates that the actual assets he or she plans to buy in the future will rise in price, that person can take a buy (long) position in the futures market now. If market prices of the assets rise as anticipated, that person can then sell the futures and make a profit, and use this money to cover the rise in prices between the time the futures were purchased and the time they were sold to buy the actual assets.

JGB futures transactions can be used to prevent losses that result when the bond market falls when one already holds the underlying bonds, or to prevent opportunity losses when the bond market rises before you can make a purchase when you wish to acquire actual government bonds in the future.

However, because the underlying products in a mid-term (5-year) JGB futures transaction, long-term (10-year) JGB futures transaction, and super-long-term (20-year) JGB futures transaction are all standardized products, in order to hedge the underlying individual JGB appropriately, one must learn the required techniques. Moreover, the bond futures that are currently traded in Japan are the 5-year JGBs, 10-year JGBs and 20-year JGBs, and there is no futures transaction on any other bonds.

However, bonds are less idiosyncratic than shares, so it is possible to a great degree to hedge other bonds using JGB futures transactions to hedge the interest volatility risk, except for individual factors such as credit.

If an investor owns one or more actual shares and wishes to avoid a loss from a fall in share market prices, or if an investor intends to buy one or more shares in the future and wishes to avoid losing a share investment opportunity caused by a rise in share market prices, he or she might hedge using index futures.

However, TOPIX futures use TOPIX (the market capitalization index obtained by dividing the float-adjusted market capitalization of all domestic common share issues listed on the First Section of the Tokyo Stock Exchange market (known as the Prime Market on or after April 4, 2022, due to market restructuring) by the base market capitalization), while Nikkei 225 futures use the Nikkei Stock Average (the Dow average stock price obtained by

dividing the simple average of the face values of 225 shares constituting the Nikkei Stock Average by the divisor), as a reference index. For these reasons, the price fluctuations of the reference index of these futures will normally not be the same as the price fluctuations of one or more of the actual shares an investor would want to hedge.

Consequently, when index futures are used to hedge one or more actual shares, it is necessary to first find the sensitivity between the two. More specifically, regression analysis can be used to find market models based on the Capital Asset Pricing Model (CAPM). Using this technique, we can derive the following linear regression equation:

$$R = \alpha + \beta r$$

Here 'R' is the investment earnings ratio on a portfolio of a single actual share or multiple actual shares, while 'r' is the investment earnings ratio for the index portfolio of the reference index which is the underlying product of the futures index. The **β (beta)** value in the formula above indicates how sensitively the earnings of the portfolio react to the behavior of the whole market (sensitivity). If the β value is 1, this means that the price of portfolio moved in the same manner as the market average; if the value is larger than 1, this means greater price movements, and if it is less than 1, smaller movements. In other words, this value represents the percentage by which the price of the individual or multiple actual shares will change when there is a 1% change in the value of the product underlying the futures index.

(2) Arbitrage Trading

Arbitrage trading is a type of trading that aims to make a profit without taking risk when there is a gap between the spot prices of two financial products (trades) that will have an equal value at a certain point in the future, by selling the more expensive product and buying the less expensive. The absence of arbitration means there is no arbitration opportunity (in the strict sense) in the market.

Arbitrage trading in a strict or academic sense mentioned above is a trading strategy for making a profit with certainty even if the prices of the two products (or trades) are more expensive (or less expensive) than a fair price.

A general approach of arbitrage trading is, based on the concept of relative index arbitrage, to sell the more expensive and buy the less expensive product when there is a price gap between the relative indices related to the prices of the financial products (or trades), and then conduct an offsetting transaction when the price gap no longer exists, thereby making a profit.

The section below explains arbitrage trading conducted between the share index futures and the underlying index (referred to as the "underlying product") which have price movements that show a close correlation. The underlying index is not a tradable asset but index portfolios and index ETFs can be traded on spot markets.

In order to determine which of the two prices, the futures price and the spot price, is more expensive, it is necessary to first assume a theoretical futures price (relative index).

As explained in "2-2 Futures Price Formation", the theoretical price can be calculated by the following formula.

$$\text{Theoretical futures price} = \text{Spot price} \times \left\{1 + (\text{Short-term interest rate} - \text{Dividend yield}) \times \frac{\text{No. of days to maturity}}{365}\right\}$$

This formula can be simplified as follows.

Theoretical futures price = Spot price + Interest income for the period until the expiration date – Dividend income for the period until the expiration date

- The future price represents a value (at a certain point) in the future, expressed as: (i) future value = present value (spot price) + earnings ratio (yield).
- Dividends receivable when holding the underlying share cannot be received in arbitrage trading, therefore: (ii) future value = present value (spot price) – dividend income.
- According to (i) + (ii): future value (futures price) = present value (spot price) + interest income – dividend income.
- In some cases, loan fees are included in dividend income.

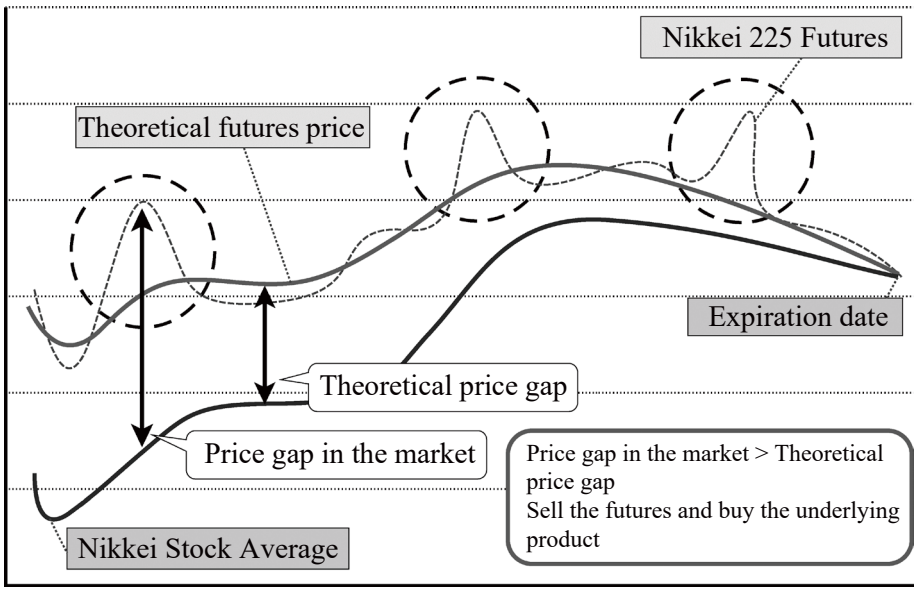
Futures transactions are margin transactions (which require fewer funds than transactions of the underlying shares). Investors consider gaining interest income by investing the remaining funds they possess in other risk-free assets during the period until the date of settlement (expiration date). Therefore, interest income is added to the present price.

However, investors cannot receive dividends that are receivable when holding the underlying shares. Therefore, dividend income is deducted from the spot price.

As the expiration date approaches, the cost of carry until the expiration date decreases (comes close to zero). Accordingly, the gap between the theoretical futures price and the spot price becomes smaller and these prices coincide with each other at the special quotation (SQ) on the expiration date.

Now, in what conditions is the futures price more expensive or less expensive than the spot price?

In actual futures transactions, the futures price changes depending on the supply and demand balance and exceeds (becomes more expensive than) or falls below (becomes less expensive than) the theoretical price. This brings about an opportunity for arbitrage trading.



For example, if the actual futures price exceeds the theoretical price, investors sell the futures (more expensive) and buy the underlying product (less expensive) (buy arbitrage).

On the expiration date, the futures price and the spot price become equal. If investors, taking this opportunity, conduct an offsetting transaction to buy back the futures position and unwind the spot position, they can earn a profit equivalent to the initial price gap. This offsetting transaction is referred to as "arbitrage unwinding sale."

On the other hand, if the actual futures price falls below the theoretical price, investors buy the futures and sell the underlying product (sell arbitrage), and then they conduct an offsetting transaction when the futures price becomes higher than the theoretical price even before the expiration date, aiming to fix the profit from the transaction.

Regarding the actual balance of arbitrage trading, since it is rare for the actual futures price to be constantly below the theoretical futures price, buying arbitrage forms an overwhelmingly majority of arbitrage trading.

Buy Arbitrage: If the futures are trading at a premium (futures price > theoretical futures price): sell the futures and buy the underlying product.

Sell Arbitrage: If the futures are trading at a discount (futures price < theoretical futures price): buy the futures and sell the underlying product.

Furthermore, since arbitrage trading allows investors to reap returns (profits) with very little risk, there are many traders who are watching for the opportunity to make such trades. Timing is important to get the chance to make money. In fact, arbitragers who are capable of conducting index arbitrage as mentioned above are limited to some business operators (who are superior in terms of the ability to execute spot and futures transactions and to loan index constituent issues).

In markets that have inadequate liquidity, performing such trades will have an impact that could cause the markets to move in disadvantageous directions, making it impossible to create the desired arbitrage position. Similarly, when liquidating an arbitrage position, the impact can also cause prices to move in an unfavorable direction, decreasing the level of profit anticipated. In other words, if the market has insufficient depth of liquidity, such trades cannot be conducted sufficiently. When investors are extremely bearish and make fewer buy orders for the spot trading of shares, conducting an arbitrage unwinding sale could result in accelerating the decline in share prices, and in this respect, the arbitrage buying balance (the balance of shares bought through arbitrage trading) is an important indicator for assessing the supply and demand situation in the market. Furthermore, because such trades normalize the price relationship between futures and the underlying commodities, they play an important role in creating appropriate prices in these markets. In other words, the arbitrager is indispensable if the hedger is going to use futures to make the appropriate hedges.

A typical example of arbitrage trading is spread trading. This trading involves taking advantage of the price gap (spread) between two futures. When the spread reaches a certain level or more, the investor will simultaneously sell the higher-priced contract and buy the lower-priced contract.

Later, when the spread returns to a certain level, the investor will close out each contract and earn a profit. There are two types of spread trading: calendar spread trading (inter-month spreads) and intermarket spread trading.

(i) Calendar Spread Trading (Inter-Month Spread Trading)

A calendar spread trading is a transaction that makes use of the fluctuation in the range of a certain level that occurs in the difference in prices between futures with two different contract months (a nearby and distant contract month) of the same underlying product. The investor will take positions when the spread increases or decreases, and then close out these positions when the spread returns to the anticipated level, thereby taking a

profit. In the case of bond futures transactions, if the gap (spread) between the 'nearby contract month price and distant contract month price' of an underlying product is anticipated to increase, a trader can buy the nearby contract and sell the distant contract. This is called **buying the calendar spread**.

Conversely, if a trader anticipates that the gap between the 'nearby contract month price and distant contract month price' will diminish, that person can sell the nearby contract and buy the distant contract. This is called **selling the calendar spread**:

Buying the calendar spread = Buying the nearby month + Selling the distant month
Selling the calendar spread = Selling the nearby month + Buying the distant month

In the case of index futures transactions:

Buying the calendar spread = Buying the distant month + Selling the nearby month
Selling the calendar spread = Selling the distant month + Buying the nearby month

(ii) Intermarket Spread Trading

An intermarket spread trading is a transaction that makes use of the difference in prices between different futures products (such as TOPIX Futures and Nikkei 225 Futures). In this case as well, the assumption is that a deviant price differential will ultimately approach a certain level. Nevertheless, care is necessary because the prices of the different contracts are determined differently, and consequently the spread may not shrink.

(3) Speculative Trading

This is a speculative type of trading that looks only at the profit that can be obtained through changes in the price of the futures. In this type of trading, one purchases the futures if one thinks that the price will go up, and sells the futures if one thinks the price will go down.

While the same types of speculative trading occur in spot markets as well, the distinction in futures transactions is the ability to make large trades with only a small margin deposit. This is known as the **leverage effect**. The leverage effect makes speculative trading in futures higher risk and higher return than speculative trading in the spot market.

There are speculators in both types of markets, adding high levels of liquidity to both. Speculators play the role of the risk takers by accepting the risk transferred to them by the hedgers. This makes them an indispensable element of the futures market.

One benefit of futures transactions is that it allows a large trade to take place with minimal funds (margin), thus providing trading opportunities to speculators who would like to make profit by aggressively taking advantage of price fluctuations. There are two types of speculative trades, those that **follow the trend** and those that are **contrary to the trend**, or **contrarian**.

(i) Trend-Following Approach

The trend-following approach is an approach to trading in which one buys when the market is rising, on the expectation that the market will continue to rise, or when one sells when the market is falling, on the expectation that the market will continue to fall.

(ii) Contrarian Approach

The contrarian approach is an approach to investing in which one sells when the market is rising because

one believes that the market is sure to fall, or buys when the market is falling because one believes that the market will begin to rise again. The contrarian approach is also related to the investment approach in which one buys because one feels that the market is undervalued and sure to rise, or one sells because one feels that the market is overvalued, and is sure to fall.

(iii) Fundamental Analysis and Technical Analysis

Engaging in speculative trading based entirely on intuition is quite risky.

Fundamental analysis is the process of determining the direction the market will take by analyzing things such as economic trends, financial and government policies, international balance of payments, price trends, and supply and demand trends of commodities.

In contrast, technical analysis analyzes past market data, such as prices and volume to discern the direction the market will take in the future.

(4) Adjusting the Expiration Year of Portfolios

When the manager of a bonds portfolio expects the market to fall temporarily, the manager might first liquidate the long-term bonds in the portfolio and replace them with short-term bonds to shorten the portfolio maturation year. Then, after the market has fallen, he/she would switch back to long-term bonds after liquidating the short-term bonds and return the year of expiration of the portfolio to its previous length.

However, it should be noted that the same results can be obtained without moving the actuals in the portfolio by first assuming a short position on Long-term (10-year) JGB Futures and then buying back the Long-term (10-year) JGB Futures after the market has fallen.

Actually, the effect of shorting the Long-term (10-year) JGB Futures while holding on to long-term bonds is, in theory, the same as liquidating the long-term bonds and replacing them with short-term bonds. However, shorting the Long-term (10-year) JGB Futures while holding onto the long-term bonds is not a silver bullet—it does not create a situation where it is possible to enjoy the yield of the long-term bonds while at the same time hedging against a devaluation of the long-term bonds.

Long-term (10-year) JGB Futures are extremely marketable, and generally buying and selling Long-term (10-year) JGB Futures has the benefit of reducing the transaction cost below the transaction costs for buying and selling the large amounts of JGBs held in the portfolio:

Long-term bonds held + Short position in Long-term (10-year) JGB Futures = Short-term bonds held

At the same time, the effect of having a long position in Long-term (10-year) JGB Futures while holding short-term bonds is theoretically equivalent to liquidating the short-term bonds and purchasing long-term bonds:

Short-term bonds held + Long position in Long-term (10-year) JGB Futures = Long-term bonds held

(5) Replacement of Spot Investment

A margin deposit is required for futures transactions but it is far less than the funds necessary for holding a long position in the spot market, so leveraged investment is possible through futures transactions (however, it involves a high market risk based on the leverage ratio (>1)).

As futures transactions normally have more liquidity than spot transactions, flexible investments can be made

through futures transactions by making a timely entry or exit. It is also easy to hedge in and out with futures transactions.

It is a common investment strategy to replace a spot portfolio with a futures portfolio (especially rule-based passive investment). However, in the case of replacing long-term investment in a long position through spot transactions with investment in a long position through futures transactions, it should be noted that the expiration date arrives periodically (every three months) for futures transactions. Normally, futures transactions with the nearest contract month are most active, but liquidity moves to the next contract month as the expiration date approaches. At this point in time, a roll should be executed by selling the nearby contract and buying the distant contract. If the term structure of the current futures price is contango (nearby contract < distant contract), a roll by selling the nearby contract and buying the distant contract means "selling at a lower price and buying at a higher price," in which case the roll return would be negative (the result would be opposite in the case of backwardation). If this condition is maintained, losses by rolls would be accumulated (as there is no maturity for spot transactions, the trading cost would be small, excluding the cost for rebalancing the index portfolio).

3 Forward Transactions

In a forward transaction, a predetermined quantity of a product is traded at a price determined today for delivery at a predetermined future date. In these respects, a forward transaction is similar to a futures transaction; however, the following differences exist. (Note that forward transactions are still used widely for foreign exchange.)

A forward transaction is a negotiation transaction (OTC derivatives transaction) in which the parties to the contract freely decide upon the terms of the contract, *i.e.*, the trading unit, expiration date, and method of settlement. In a futures transaction, however, the futures exchange standardizes all of the terms of the transaction.

Secondly, in a forward transaction, settlement is generally conducted by delivering the "actuals" on the expiration date, and a holder of a forward transaction must negotiate with the other party in order to cancel the position before the expiration date. Transactions adopting net settlement such as so-called forex transactions (FX) or margin trading on share index (CFD) are conducted mainly among individual investors.

In short, if the financial indicator is a physical substance such as securities and commodities, settlement in kind (physical settlement) is used. If the financial indicator is a reference index, settlement is made by cash (cash settlement). Moreover, futures prices will equal forward prices unless the stochastic variation involving the counterparty risk (the risk of the counterparty's default) and carrying of interest, etc. are taken into account.

In the case of a share price index, the value would be a forward price, but in the case of interest this would be a forward rate (forward rate of discount bonds). For example, the six-month forward rate starting six months in the future would be determined by the six-month spot rate and the one-year spot rate. The amount if invested for a year at the interest rate for one year, will be equivalent to the amount after investment at the interest rate for a half-year, followed by investment at the forward rate for the subsequent half-year. If this is not the case then arbitration opportunities will occur (if cash is borrowed at a lower rate and invested at a higher rate, profit can be earned without any risk). Normally, the pricing of a derivative assumes a market free of arbitration (where no arbitration opportunity exists), since the market price in free competition without regulation or transaction costs can be considered to be the fair value, *i.e.*, the non-arbitrated price. To put it simply, the absence of arbitration means that there is no free lunch, and that a risk must be incurred in order to obtain a return that is in excess of a risk-free

interest rate. More specifically, it means that if the net position is 0 yen at the start of the transaction, no positive profit will be generated with probability 1.

4 Option Transactions

4 1 What Are Options Transactions?

An options transaction is a transaction in which one purchases or sells the right to buy or sell a specified financial product (**underlying securities** or **underlying assets**) at a specified price (known as the "**exercise price**" or "**strike price**") by a specified future date, regardless of the market price of that underlying assets at the time. The right to purchase the underlying assets is called a **call option**, whereas the right to sell the underlying assets is called a **put option**. The cost of the option is called the **premium**, or it is also called an upfront premium because it is usually paid at the beginning of the transaction by the seller to the buyer.

The specified date in the future mentioned in the definition above is the deadline for exercising the option, and is known as the **expiration date** or **maturity**. When the purchaser of a call option (option holder) exercises it, that person can buy the underlying assets at the strike price. At this point, the seller of the option (option writer) is obliged to honor the exercise and sell the underlying assets.

Options that can be exercised at any time up to the expiration date are called **American Type**, while those that can be exercised only on the expiration date are called **European Type**.

The following uses some specific examples of call and put options to explain the characteristics of options transactions.

(1) Call Options

Let us study call options using an example.

[Examples of Call Options]

The current price of Stock A is JPY1,000. An investor, Mr. X, expects that the price of Stock A will rise in a short period of time, but unfortunately, he lacks adequate funds to purchase Stock A. Therefore, he decides to buy call options on Stock A. There are three options with expiration dates coming one month from now, with strike prices of JPY1,000; JPY1,100; and JPY1,200. The respective premiums (prices) for these options are JPY40, JPY20, and JPY10 per share (for call options, the higher the strike price, the lower the premium). After considering how strongly he feels about the prospects for Stock A, and considering how tight his current cash position is, he purchases 10,000 shares worth of the call options with the lowest premium (JPY10), where these call options have the highest strike price (at JPY1,200).

One month passes. As Mr. X had foreseen, Stock A rose to JPY1,400. At this point, he exercises his call options to obtain the shares of Company A at JPY1,200, and immediately turns around and resells them.

When he examines the earnings on the trades in which he purchased the options, exercised the options, and then sold the shares, he finds the following:

Initial investment = JPY10 × 10,000 shares = JPY100,000
Profit from exercising the options = (JPY1,400 − JPY1,200) × 10,000 shares
= JPY2 million
Total profit = JPY2 million − JPY100,000 = JPY1.9 million

For an initial outlay of only JPY100,000, he was able to obtain about JPY2 million after one month. On the other hand, when he exercised his call options, the writer of the call options was obliged to sell to him 10,000 shares of Stock A, whose current price is JPY1,400 per share, at the strike price of JPY1,200 per share.

The following are the calculations if Mr. X had purchased the call options at different strike prices with the same JPY100,000 investment:

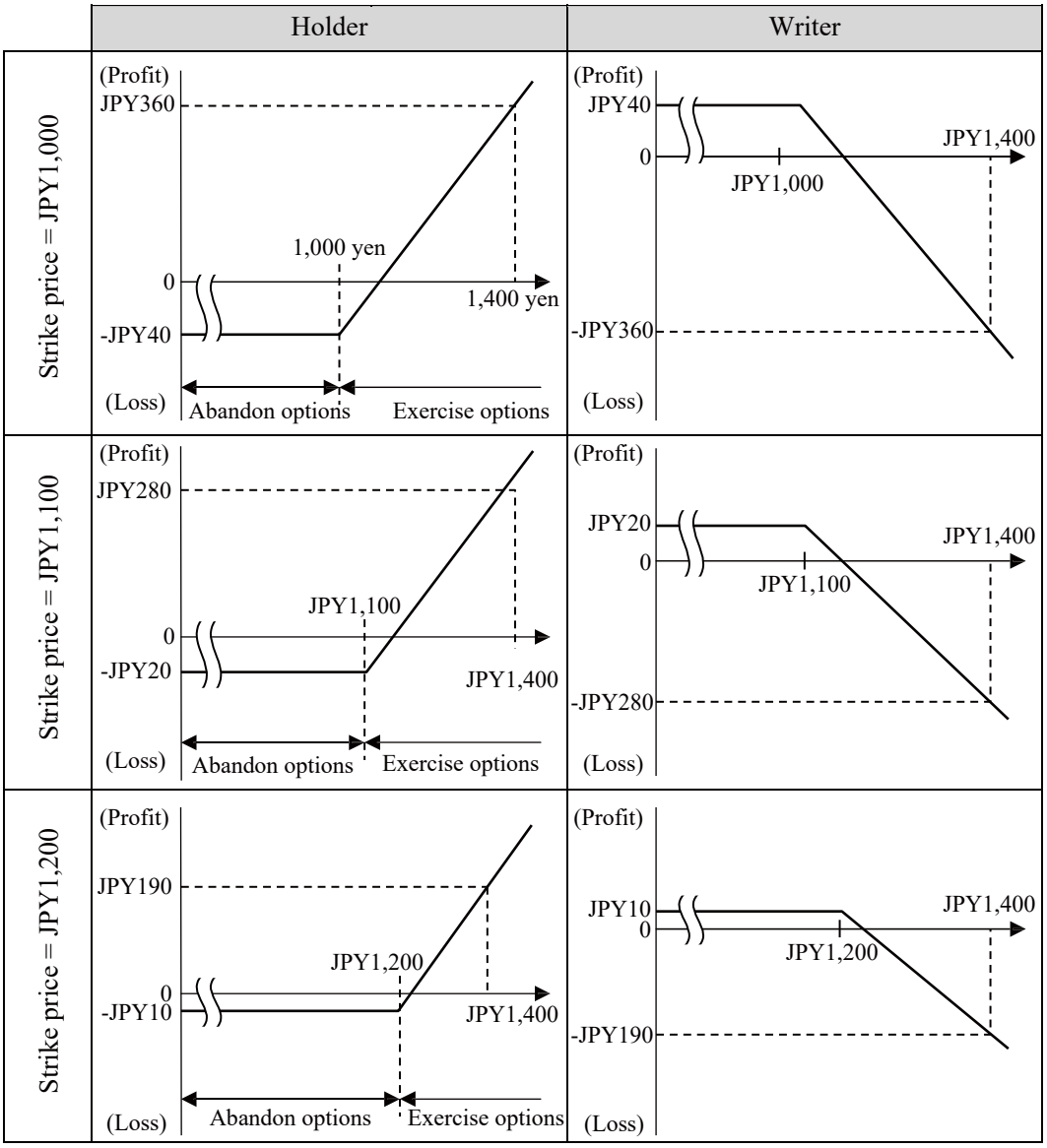
The purchase of JPY1,000 call options: JPY100,000 / JPY40 = 2,500 shares
Profit from exercising the options = (JPY1,400 − JPY1,000) × 2,500 shares
= JPY1 million
Total profit = JPY1 million − JPY100,000 = JPY900,000
The purchase of JPY1,100 call options: JPY100,000 / JPY20 = 5,000 shares
Profit from exercising the options = (JPY1,400 − JPY1,100) × 5,000 shares
= JPY1.5 million
Total profit = JPY1.5 million − JPY100,000 = JPY1.4 million

As seen from the calculations above, the result from purchasing the options varies greatly depending on the strike price of the options, even for the same total investment.

Now, let us assume instead that Stock A did not move as he had anticipated—the share price did not go above the JPY1,100 level. Because the options he purchased had a JPY1,200 strike price, he has no choice but to abandon the options without exercising them. In this case, the loss is limited to the original JPY100,000 premium he paid. In contrast, the writer made a JPY100,000 profit.

The profit and loss curves for the holders and the writers of the call options for each strike price discussed above are shown below in Chart 1-1. In this chart, the horizontal axis shows the market price of the underlying shares while the vertical axis shows profit and loss (please pay attention to the point in time at which the price of the underlying assets is determined). Charts such as these are commonly used in describing profits and losses from options. From this point forward, this Chapter will also use these diagrams.

Chart 1-1 **Profit and Loss Curves for Holders and Writers of Call Options with Different Strike Prices**



(2) Put Options

Let us study put options using an example.

[Examples of Put Options]

The current price for a given Stock B is JPY1,000. An investor, Mr. Y, expects that the price of Stock B will fall in the future, and although he is tempted to sell short, he wants to avoid the risk of loss if he is mistaken.

He wonders if there are any strategies he can pursue to take advantage of the situation, and decides to buy put options on Stock B. There are three options with expiration dates coming one month from now, with strike prices of JPY800, JPY900, and JPY1,000. The respective premiums (prices) for these options are JPY10, JPY20, and JPY40 per share (for put options, the higher the strike price, the higher the premium). After reviewing the expected fall in price of Stock B, and considering how tight his current cash position is, he purchases 10,000 shares worth of the put options at the JPY900 strike price.

Later, as he had foreseen, the price of Stock B fell to JPY600. At this point, he exercises his put options to sell the shares of Stock B at JPY900.

When he examines the earnings on the trades, he finds the following:

Initial investment = JPY20 × 10,000 shares = JPY200,000
Profit from exercising the options = (JPY900 − JPY600) × 10,000 shares
= JPY3 million
Total profit = JPY3 million − JPY200,000 = JPY2.8 million

For an initial expense of only JPY200,000, he was able to obtain JPY2.8 million after one month. On the other hand, when he exercised his put options, the writer of the put options was placed under obligation to buy from him 10,000 shares of Stock B at the strike price of JPY900 each, even though they are currently worth JPY600 each.

The following are the calculations if Mr. Y had purchased the put options at different strike prices with the same JPY200,000 investment:

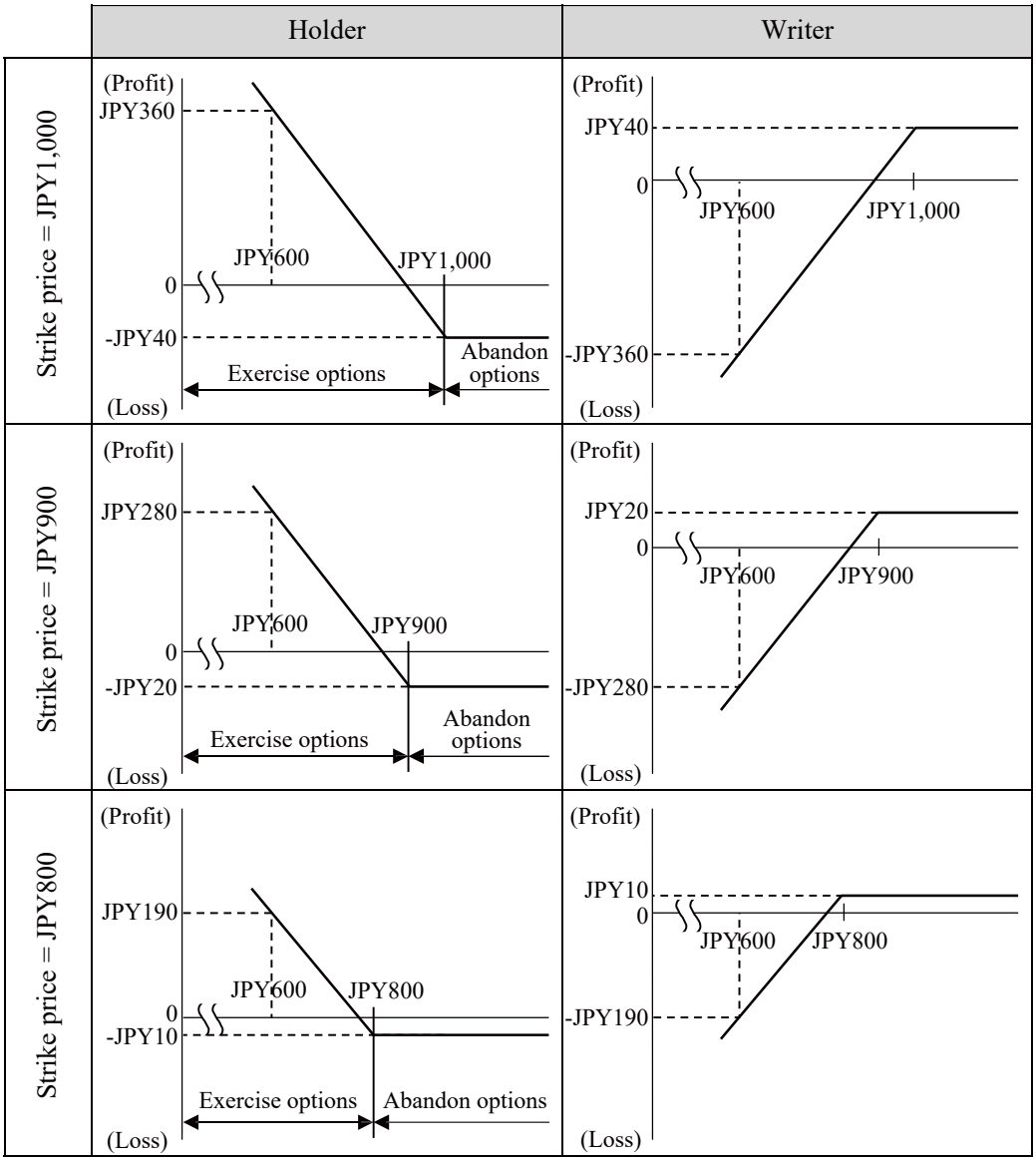
The purchase of JPY1,000 put options: JPY200,000 / JPY40 = 5,000 shares
Profit from exercising the options = (JPY1,000 − JPY600) × 5,000 shares
= JPY2 million
Total profit = JPY2 million − JPY200,000 = JPY1.8 million
The purchase of JPY800 put options: JPY200,000 / JPY10 = 20,000 shares
Profit from exercising the options = (JPY800 − JPY600) × 20,000 shares
= JPY4 million
Total profit = JPY4 million − JPY200,000 = JPY3.8 million

As seen from the calculations above, the final outcome of purchasing options varies greatly depending on the strike price of the options, even given the same total investment.

If Stock B had not behaved as he had anticipated, but instead rose to the JPY1,200 level, he would have had no choice but to abandon the options without exercising them. In this case, the loss would be limited to the original JPY200,000 premium he paid. On the other hand, the writer would make a JPY200,000 profit.

The profit and loss curves for the holders and the writers of the put options for each of the strike prices discussed above are shown below in Chart 1-2. The charts are described in the same way as they were for the call options.

Chart 1-2 Profit and Loss Curves for Holders and Writers of Put Options with Different Strike Prices



(3) Relationships Between the Price of the Underlying Assets and the Strike Price

In both the examples of call and put options, multiple strike prices are assumed. There are some technical terms to be used to represent the relationships between the price of the underlying assets and the strike price. When positive earnings (payoff) are produced by exercising the options (*i.e.*, the price of the underlying assets > strike price for call options: or the price of the underlying assets < the strike price for put options), or in other words, when profit can be gained by exercising the option, the situation is called in-the-money (ITM).

Conversely, the situation in which no profit is made (payoff = 0) even when the option is exercised (*i.e.*, the price of the underlying assets < the strike price for call options; or the price of the underlying assets > the strike price for put options) is called out-of-the-money (OTM) (note that the loss will not exceed the loss of the premium paid). Moreover, if the cost of the underlying assets is equal to the strike price, it is called at-the-money (ATM). Similarly, if the futures prices (forward price) are equal to the strike price, it is called forward at-the-money.

If the position is extremely far from at-the-money in the in-the-money direction, it is called **deep-in-the-money**, and, conversely, if it is extremely far from the at-the-money position in the out-of-the-money direction, it is

called **deep-out-of-the-money**.

The following chart demonstrates the idea above (see Chart 1-3):

Chart 1-3 **In-The-Money (ITM), At-The-Money (ATM), Out-Of-The-Money (OTM)**

	Call	Put
In-the-money (ITM)	Price of underlying assets > strike price	Price of underlying assets < strike price
At-the-money (ATM)	Price of underlying assets = strike price	Price of underlying assets = strike price
Out-of-the-money (OTM)	Price of underlying assets < strike price	Price of underlying assets > strike price

(4) In the Case of Net Cash Settlement

There are two methods of settling options transactions: "physical settlement" by which the seller receives the strike price and delivers the underlying assets; and "net cash settlement" by which only the difference between the price of the underlying assets and the strike price is paid and received between the parties. In European options transactions in which the latter method is used, the buyer pays a premium at the beginning of the transaction and then the seller makes a payoff at the time of maturity. Therefore, a profit or loss in this transaction is expressed as follows:

Buyer's profit or loss = payoff − premium

Seller's profit or loss = premium − payoff

One unique feature of options is that a payoff is always zero or in a positive value and never in a negative value. This can be expressed as follows ("max {A, B}" refers to whichever larger between A and B).

Payoff for a call option = max {the price of the underlying assets − the strike price, 0}

Payoff for a put option = max {the strike price − the price of the underlying assets, 0}

The price of the underlying assets contained in a payoff is the price of underlying assets at the time of maturity. However, in the sections below, the value of a payoff to be generated on the assumption that the option is exercised at the current price of the underlying assets is treated as the "exercise value."

(5) Features of Options

Based on the explanation given above, the meaning of options transactions can be summarized as follows.

(i) Substitutes for Investments in Spot Markets

In the above examples, both Mr. X and Mr. Y lacked the funds to buy actual assets. However, it was possible to engage in trading for a much smaller amount of money through the use of options transactions. From the perspective of the seller (writer), funds were obtained without possessing the actual underlying instruments.

(ii) Leverage Effect

In the above examples, both Mr. X and Mr. Y. were able to obtain large returns with small investments through options transactions. This is something that cannot be done when trading the underlying instruments. This is known as the leverage effect.

(iii) Limiting and Transferring of Risk

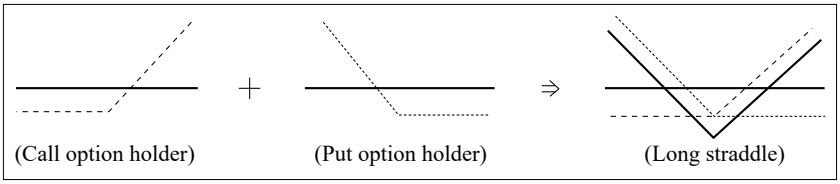
When Mr. X and Mr. Y are on the buying side, even if their forecasts had been incorrect in the examples

above, and even if they had to abandon their options positions without exercising them, their losses would be limited to their original investments paid as a premium at the beginning of the transaction. This is described as taking a limited risk (although they would lose the entire amount of their investment and in this respect the risk they assume is of considerable size). On the other hand, the writer of the options, in exchange for the initial premium received, is under an obligation to honor the agreement if the options are exercised in the future. In other words, the writer accepts the obligation to make a payoff in return for receiving the premium. Therefore, the option writer's losses would not be limited (or more precisely, since the price of the underlying assets would never be negative, losses from selling put options are limited whereas losses from selling call options are not limited).

(iv) Creating Profit and Loss Patterns Not Found in the Underlying Products

It is possible to combine various options to create profit and loss patterns not found in the underlying products. Chart 1-4 shows an example of the final profit and loss curve in which calls and puts are both purchased at the same strike price (this is a strategy known as "long straddle"; see this Chapter, "4-5 How to Use Options" for details). In this example the investor will make a profit if there is a large movement in the price of the underlying product, regardless of the direction of that movement. As it is a long option, its risk is limited.

Chart 1-4 Results of Combining Calls and Puts



(v) Effects of Hedging

Because the earnings on options are linked to changes in the values of the underlying assets, options, like futures, are an important method for hedging against the risk of changes in valuation of the underlying assets. For example, if we were to purchase put options at the same time as purchasing the actual assets, we could focus on gaining profits from a rising market while still limiting the risk of the value of the assets falling. While this transaction is similar to that of buying call options, buying call options is really equivalent to purchasing the underlying asset while hedging against the risk of falling prices. The major difference between this and hedging with futures is that in futures transactions opportunities for profit are eliminated along with eliminating the price fluctuation risk, while the use of options simultaneously pursues both risk hedging and high returns.

(vi) Offsetting Transactions

Investors do not always have to hold the option or maintain a short position until the time of maturity. They can determine their profits or losses by making an offsetting transaction and unwinding their position before maturity because, if they have both short and long positions, they can offset their payoffs to be paid when they exercise the options.

Accordingly, the buyer's profit or loss would be equal to: the change in the option premium = the premium at the time of unwinding of the positions − the premium at the beginning of the transaction (the seller's profit or loss is calculated by putting the minus sign to the former). At the time of maturity, the

premium equals the payoff, which means that the same formula applies even if the investors continue to hold the option until maturity.

4 2 Options' Price Formation

This section explains the pricing process for the options premium.

(1) First Think Intuitively

Let us list intuitive considerations that the option premium (price) must satisfy:

(i) The premium will be higher if there is a strong demand for options regardless of the type of options (call or put) in question. Conversely, the premium will be lower if there is strong pressure to sell (supply of options);

(ii) If people are extremely bullish about the price of the underlying assets, it is highly likely that the price of the underlying assets will exceed the option strike price, and thus the call option premium will be high and the put option premium will be low. If people are extremely bearish (the futures price is low), the call option premium will be low and the put option premium will be high;

(iii) Different relationships between the strike prices and the prices of the underlying assets will be reflected as differing premium prices (see the examples in this Chapter, "4-1. What Are Options Transactions?" for details);

(iv) Generally, the further away the expiration date, the more uncertainty there is about the price movement of the underlying assets, and thus the premium will be high. Conversely, if the expiration date is near, the amount of price movement of the underlying assets will be limited, and the premium will be low; and

(v) The lower people believe the volatility in the prices of the underlying assets to be, the lower the premium (because the less the probability that the price of the underlying assets will exceed the strike price).

Many other intuitive factors can be considered as well.

Of the factors listed above, (i) has to do with demand theory regarding the options themselves while (ii) through (v) have to do with premium theory, which takes into account the direction of movement in the price of underlying assets, the relationship between the price of the underlying assets and the strike price, the length of the expiration period and the size of movement of the price of the underlying assets.

(2) Premium Viewed from the Perspective of the Writer

Next let us look at the characteristics of rational premiums from the perspective of the writer (seller) for call options:

(i) If there is little chance that the price of the underlying asset will exceed the strike price during the execution period, then only a small premium is required (out-of-the-money);

(ii) The greater the probability that the price of the underlying asset will exceed the strike price, the higher the risk of exercising, and thus the premium will be higher (at-the-money to in-the-money); and

(iii) There are two cases in which there is a high likelihood that the price of the underlying asset will exceed the strike price:

a) When the execution period is long; and

b) When there is a high probability that the price of the underlying assets will change dramatically.

This same way of thinking applies to put options as well.

The thought process described above is as illustrated below (see Charts 1-5 and 1-6).

Chart 1-5 Call Option Premium

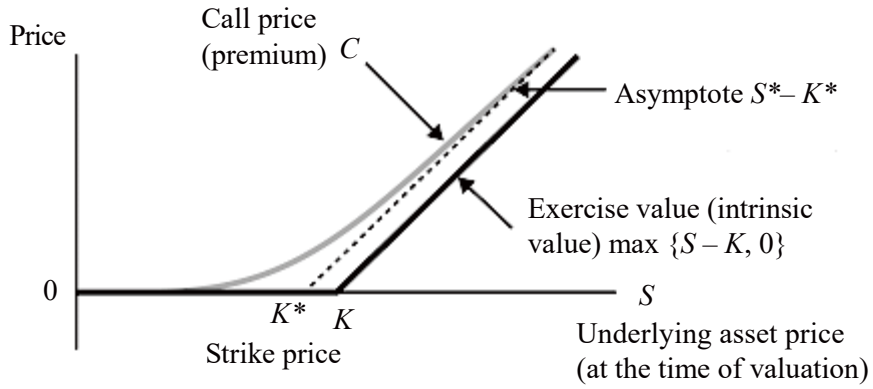
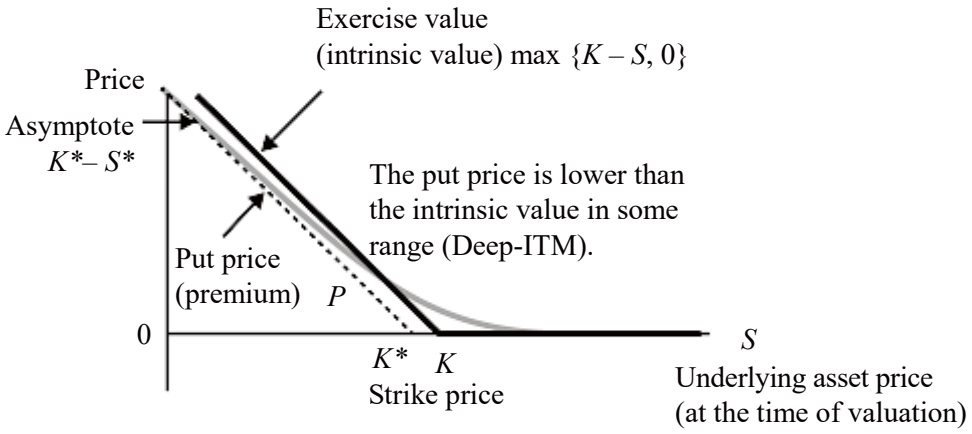


Chart 1-6 Put Option Premium



* Based on the assumption of short-term interest rate > 0

S^* = Stock price ex-dividend adjustment

K^* = Present value of strike price K

$K = F = \frac{S^*K}{K^*}\left(S^* = K^*\right)$:Forword ATM

$K = S$:Spot ATM

(3) Premiums on Options

The horizontal axes in Charts 1-5 and 1-6 above represent the market value of the underlying assets (the stock price at the time of valuation), while vertical axes show the size of the premium. These charts plot the prices of the underlying assets vs. the premiums (option prices). As we travel from the edge of the strike prices and enter the in-the-money region, the premium increases rapidly. When the option enters the in-the-money region, a difference between the price of the underlying assets and the strike price (exercise value) is determined upon the exercise of the option. This value is known as the intrinsic value. The intrinsic value is zero in the at-the-money and the out-of-the-money regions.

The difference between the intrinsic value and the overall premium is called the time value. This is the

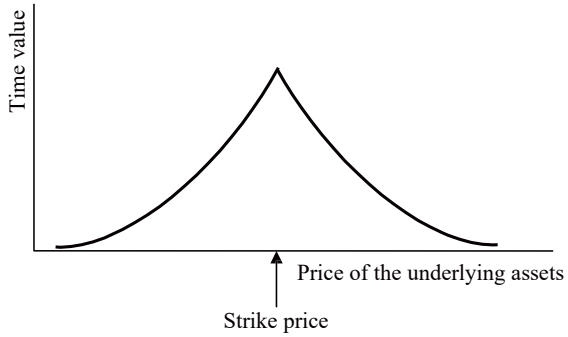
amount of premium that is determined by the length of time to maturity τ, the amount of variability in the price of the underlying assets (the **volatility** σ), and interest rate r.

As described above, the price of premiums can be thought of as comprising two parts:

Premium = Intrinsic value + Time value

Let us look at the time value component in more detail. Chart 1-7 shows the part of the premium on call options that is left over after the intrinsic value has been removed. The time value is largest at-the-money (from the standpoint of forward transactions), and falls deeper as it goes into the in-the-money or the out-of-the-money region.

Chart 1-7 Relationship Between Price of Underlying Assets and Time Value



The time value of a European option can be divided into a contribution by a discount (Contribution (1)) and a contribution by diffusion (Contribution (2)). The latter is an effect specific to options and it shows a monotonic increase in relation to $\sigma\sqrt{\tau}$ ($\sigma\sqrt{\tau}$ gives the degree of curvature of the option price curve and the breadth of distribution of the price of the underlying assets). If the underlying assets are futures (futures option), there is no Contribution (1), and the option price (premium) curve is always above the intrinsic value line.

On the other hand, if the underlying assets are actual assets, that is, the horizontal axis represents the present underlying asset price S (hereinafter assumed as no-dividend assets ($S^* = S$)), the asymptote of the call price in the in-the-money region ($S - K^*$) and the horizontal axis contact not at the point of strike price K but at the point of K^*, the present value of K ($K^* < K$). In the case of a call option, Contribution (1) increases in addition to Contribution (2), whereas Contribution (1) decreases in the case of a put option. Therefore, in the deep-out-of-the-money region of a put option, the intrinsic value exceeds the premium (because Contribution (1) is negative for a put option). If any dividend is paid (by the expiration date), the asymptote becomes ($S^* - K^*$) where the ex-dividend underlying asset price is S^* ($< S$).

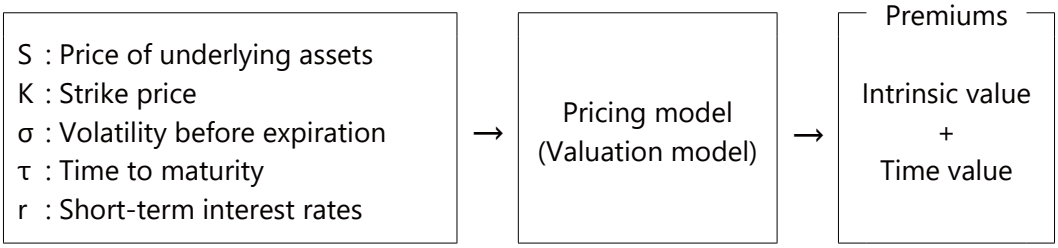
However, if the interest rate is low and the time to maturity is short, the gap between the asymptote and the intrinsic value is insignificant (a high interest rate is assumed implicitly in Charts 1-5 and 1-6). If the interest rate is negative ($r < 0$), then $K^* > K$, and the chart would be slightly different (for details, see this Chapter, "4-3 Characteristics of Options Premiums")). To put it differently, Contribution (1) to the time value is relatively smaller than Contribution (2).

Volatility σ is an especially important parameter in options transactions. It defines the size of Contribution (2) in the time value (the larger the σ value, the greater the size of Contribution (2)). On the other hand, volatility σ has no relation with Contribution (1) (in other words, futures prices and forward prices are independent from σ).

Here the volatility represents the amount of risk. For example, if it is assumed that the underlying asset price moves within the range of JPY1,000 ± JPY100 or JPY1,000 ± JPY200, the stock price is more volatile and has greater volatility σ in the latter case. On the other hand, the longer the time to maturity τ, the broader the distribution of the future price (in proportion to $\sigma\sqrt{\tau}$). Thus, the key point to determining the time value is the magnitude of the uncertainty of the underlying asset price in the future. This is an important part of options price formation.

The discussion above can be conceptually summarized as shown in Chart 1-8.

Chart 1-8 **Determining Premiums**



Premiums can be determined using some sort of function relating multiple variables we have discussed: the prices of the underlying assets, the strike price, the volatility of the underlying assets until the time of maturity, the time to maturity, the short-term interest rate, and the dividend rate (see Chart 1-8 for details). The flow of all of these variables provides the theory for calculating premiums. Although various theories have been proposed, the models typically used most broadly are the Binomial Model and the Black-Scholes Model (see this Chapter, "4-6 Option Pricing Theory" for details).

All parameters for a premium on options are indicated as annualized rates. For example, the annual volatility of 20% means that the stock price is likely to fluctuate within the range of the current price ± 20% per year until the time of maturity.

Of the multiple elements described above, the amount of realized volatility can actually be known after the fact. As a result, in actual practice, the following two measures of volatility that are available at the time of valuation are often used:

○ Historical volatility: Calculated from the standard deviation of the historic return on the price of the underlying assets.
○ Implied volatility: Calculated from the premiums applied in the market.

4 3 Characteristics of Options Premiums

In the section above we listed the elements that constitute the premium. In the section below we will characterize the changes in the premium that are seen when there are changes in these factors.

(1) Relationship Between Premium and Price of Underlying Assets

For call options, if the price of the underlying assets goes up, the premium will increase as well because there is a higher likelihood that the price will exceed the strike price. Conversely, for put options, an increase in the price of the underlying assets will cause the premium to decrease because of the reduced likelihood of falling below the strike price (see Chart 1-9).

Chart 1-9 Relationship Between Price of Underlying Assets and Options Premiums

Price of Underlying Asset	Call Premiums	Put Premiums
Rises	Rise	Fall
Falls	Fall	Rise

(2) Relationship Between Premium and Strike Price

For call options with strike prices that are high compared to the current price of the underlying assets, there is little chance that the market price will exceed the strike price to make the call option in-the-money, and thus the premium is low. On the other hand, when we consider put options, having a high strike price means that it is likely that the option will be in-the-money, and thus the premium is high (see Chart 1-10).

Chart 1-10 Relationship Between Strike Prices and Option Premiums

Strike Price	Call Premiums	Put Premiums
High	Low	High
Low	High	Low

(3) Relationship Between the Premium and the Remaining Maturities

The shorter the remaining maturity, the lower the premium. This is true for both call options and put options. This is because the shorter the remaining maturity, the lower the likelihood that the market value of the underlying assets will pass the strike price (see Chart 1-11).

Chart 1-11 Relationship Between the Remaining Maturities and Options Premiums

Remaining Maturity	Call Premiums	Put Premiums
Long	High*	High*
Short	Low*	Low*

*Conversely, in the deep-in-the-money region, the longer the remaining maturity, the lower the premium in some cases. This shows that American options which allow early exercise have greater value than European options. In the case of call options of no-dividend underlying assets for which early exercise before maturity is not profitable, the relationships are as shown in Chart 1-11.

(4) Relationship Between Premiums and Volatility

When it comes to volatility, the premium goes up with increased volatility for both call options and put options, and conversely, the premium drops with lower volatility. The reason why premiums are higher with higher volatilities is that higher volatilities increase the likelihood that the option will be in-the-money at the time of

maturity. This is true for both call options and put options (see Chart 1-12).

Chart 1-12 Relationship Between Volatility and Options Premiums

Volatility	Call Premiums	Put Premiums
Increases	Rise	Rise
Decreases	Fall	Fall

(5) Relationship Between Premiums and Short-Term Interest Rates

When short-term interest rates go up, call premiums go up as well. Due to a larger discount, K*, which represents the present value of strike price K, decreases and moves leftward along the horizontal axis. Then, the asymptote of the call price curve in Chart 1-5 (S* − K*) moves upward and the call premiums supported thereby increase accordingly. On the other hand, the asymptote of the put price curve (K* − S*) moves downward and the put premiums decrease.

We can think of this as the premium going up because of the increased cost of money. The same cash flow situation occurs with calls as if funds were secured and the underlying assets were purchased. On the other hand, for puts, the situation is analogous to selling the underlying assets and using the funds. Thus, the higher the interest rate, the lower the cost and the lower the put premium. (see Chart 1-13).

The words in parentheses in Chart 1-13 are for options on futures. While forward premiums of futures options have no relation to the short-term interest rate, the present value of upfront premiums decreases when the interest rate rises due to a discount.

With call options, even though the options transactions are “synthesized,” the futures options require no up-front funds and are thus independent of short-term interest rates in contrast to options on spot (for details, see this Chapter, “4-6. Option Pricing Theory”).

Chart 1-13 Relationship Between Short-Term Interest Rates and Options Premiums

Short-Term Interest Rates	Call Premiums	Put Premiums
Rise	Rise (fall)	Fall (fall)
Fall	Fall (rise)	Rise (rise)

*If the short-term interest rate is negative, the present value becomes larger than the future value, in which case the premium for a call option rather than a put option falls below the intrinsic value.

4 4 Sensitivity of Premiums to the Respective Factors

In practice, an analysis of factors that cause price changes is important in terms of mark-to-market valuation and risk management. When dealing with options, it is necessary to understand how the premiums will change given changes in various factors, in other words, to understand how sensitive the premiums are to minute change in the various factors. The following explanation discusses sensitivity to the six factors described in 4-2 above.

(1) Delta

The options' delta (δ) indicates the ratio of the change in the premium (Δ premium) in response to a minute change in the price of the underlying assets (Δ price of underlying assets, where Δ represents a range of variation).

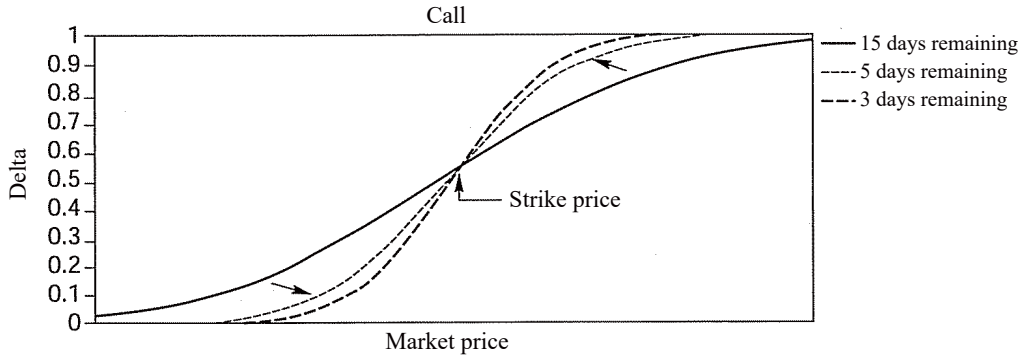
It is calculated as follows:

$$\text{Delta} = \frac{\Delta \text{ Premium}}{\Delta \text{ Price of underlying assets}}$$

For example, if the premium goes up by JPY0.5 when the price of the underlying assets changes by JPY1, then the delta is said to be 0.5. This delta represents the slope of the premium curve. As a result, the value for delta ranges between 0 and 1 for call options, and between −1 and 0 for put options. Furthermore, the closer the transaction comes to being out-of-the-money, the gentler the change in premium relative to the value of the underlying assets (*i.e.*, delta approaches 0), while the closer the transaction comes to being in-the-money, the closer the premium curve approaches the asymptote in Charts 1-5 and 1-6, and thus the variation width of the premium becomes equal to the variation width of the price of the underlying assets (*i.e.*, delta becomes 1 for call options and becomes −1 for put options).

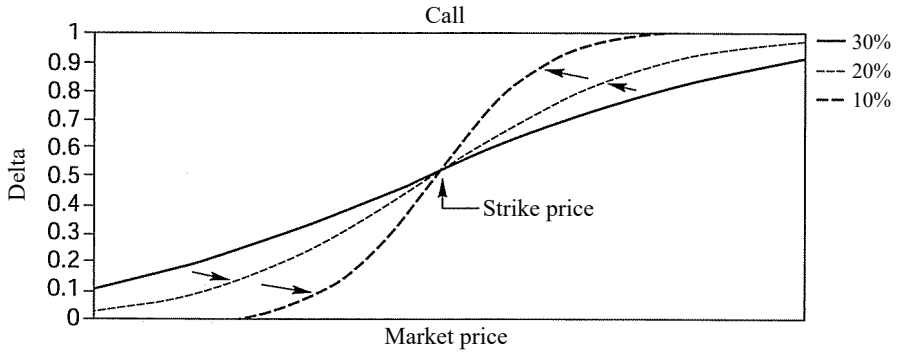
Since the option premium changes along with the passage of time and changes in the market, the delta (and other Greeks) of course changes as well. As the expiration date approaches, the time value decreases and comes to 0, and the premium comes closer to the intrinsic value. In other words, delta will either approach 0 or 1 for call options (or approach 0 or −1 for put options) (see Chart 1-14).

Chart 1-14 Relationship Between Delta and Time Remaining to Maturity



The higher the volatility, the greater the time value and the further the distance from the asymptote, and thus the change in the premium relative to the change in the underlying assets becomes gentler, so delta changes mildly. Conversely, when the volatility becomes lower, an area with a high curvature appears, and the change of delta becomes larger (see Chart 1-15).

Chart 1-15 Relationship Between Volatility Level and Delta



One way to take advantage of the delta in actual use is in hedging. Because the delta of the underlying assets is, by definition, 1, when 2 call options with a delta of 0.5 each are sold, overall, the delta will equal 0. In other words, at that moment there will be no overall change in position when there is a change in the price of the underlying assets. However, as the time passes and the market changes, the delta for options also changes but the delta for the underlying assets remains 1. That is, since the leverage for options is variable unlike that for the underlying assets, the total (netted) delta of the position no longer equals 0.

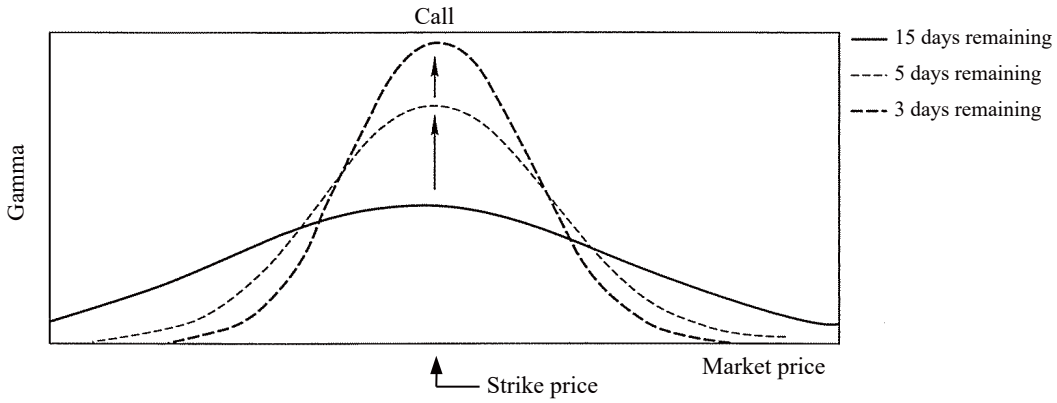
(2) Gamma

The gamma (γ) of the options is defined as the rate of change of delta given a minute change of the value of the underlying assets:

$$\text{Gamma} = \frac{\Delta \text{ Delta}}{\Delta \text{ Price of underlying assets}}$$

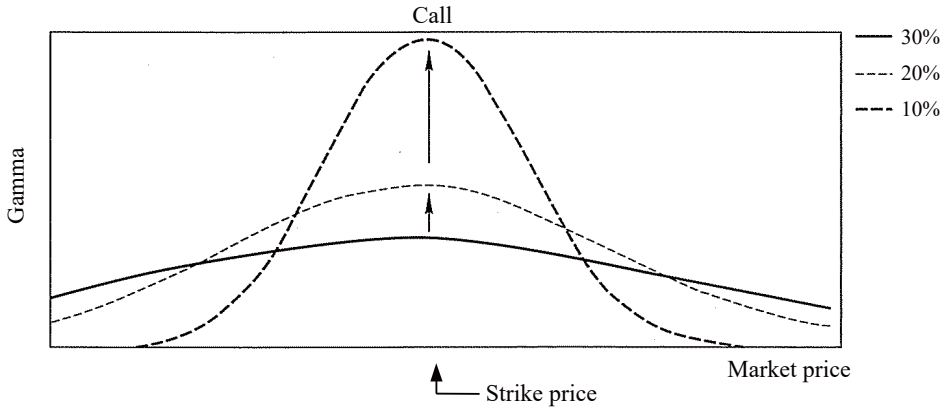
Gamma is the slope of the delta curve. With respect to the premium, this factor exhibits convexity (the curvature) of a curve. The degree of curvature is largest in the neighborhood of the (forward) at-the-money position (see Chart 1-16).

Chart 1-16 Relationship Between the Time Remaining to Maturity and Gamma



Furthermore, when the volatility is low, the time value is also low, and the change of gamma becomes large. When the volatility is 0, the premium indicates a broken line (the asymptote and the horizontal axis), and the curvature is infinite at the point of (forward) at-the-money and 0 at other points (see Chart 1-17).

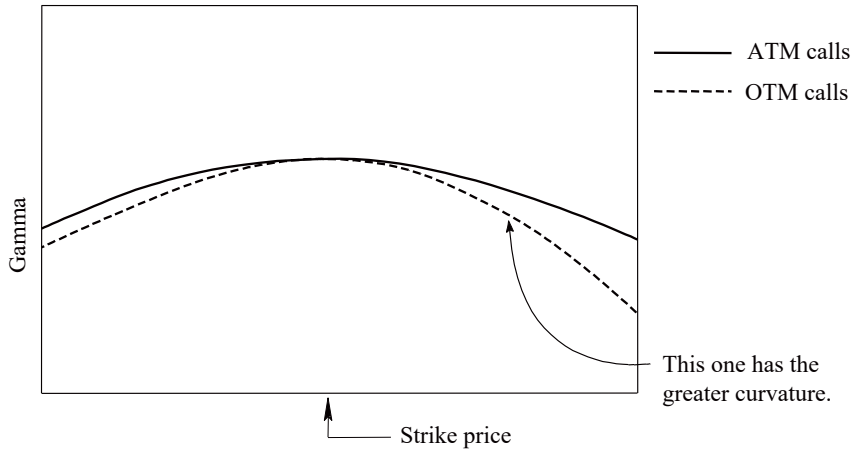
Chart 1-17 Relationship Between Volatility and Gamma



If the delta of the underlying assets is 1, which would have the largest inherent risk: selling two call contracts with a 0.5 delta each or selling four call contracts with a 0.25 delta each? Because the delta for the overall position on each of these investments is 0, there is no risk when it comes to changes in the price of the underlying assets.

However, when the price of the underlying assets changes suddenly, there will be a different type of loss. The reason for this is that the gamma for the overall position is different (see Chart1-18). In this case, we can say there is a higher gamma risk when call options with a delta of 0.25 each are sold.

Chart 1-18 Gamma of Hedges by Calls with Different Strike Prices



The payoff of call options and that of put options are symmetrical regarding the strike price. Therefore, the call gamma is equal to the put gamma if the call and put options are under the same conditions. The gamma of a long option position takes a positive value (see this Chapter, "4-6 Option Pricing Theory, [Put-Call Parity]" for details).

As a result, a position with a neutral delta and a positive gamma makes it possible to profit from a large movement in the price of the underlying assets. Conversely, when the gamma is negative (the option is short), a profit is made when the price of the underlying assets does not move (see this Chapter, 4-5(2) "(i) Long Straddle" for details).

(3) Vega

The options' vega (ν) is defined as a ratio indicating the change in option premium in response to a minute change in volatility:

$$\text{Vega} = \frac{\Delta \text{ Premium}}{\Delta \text{ Volatility}}$$

Vega is an index of risk of changes in the premium in relation to the volatility. It is proportional to gamma, and if the option is long, then vega is also long and takes a positive value. As in the case of gamma, the put vega is equal to the call vega if the put and call options are under the same conditions (see this Chapter, "4-6 Option Pricing Theory, [Put-Call Parity]" for details).

The sensitivity of the premiums will be different when the volatility is high or low. When the volatility is high, the time value is large, and thus there is high sensitivity to the volatility, but when the volatility is low, the premiums are insensitive to volatility to the degree that they are near to the asymptote (see Chart 1-19).

The time value is dependent on the length of the period before the expiration date. Thus, when the time to maturity is long, the time value itself is high, so the vega value is high as well. Conversely, when the remaining maturity is short the time value is low, so the vega value is low as well (see Chart 1-20).

Chart 1-19 Relationship Between Volatility Level and Vega

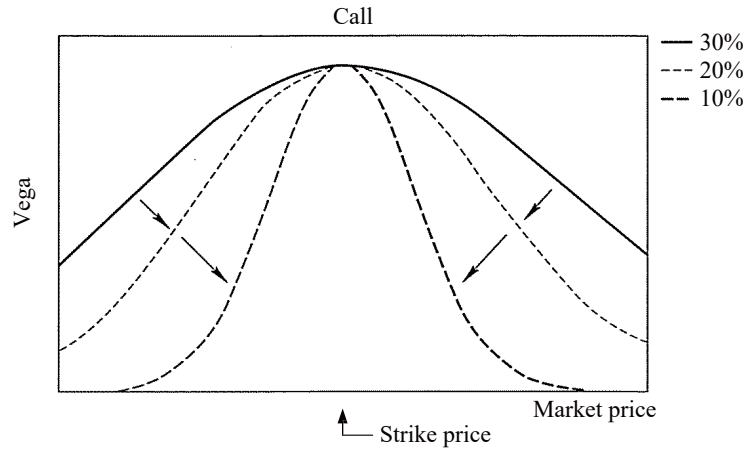
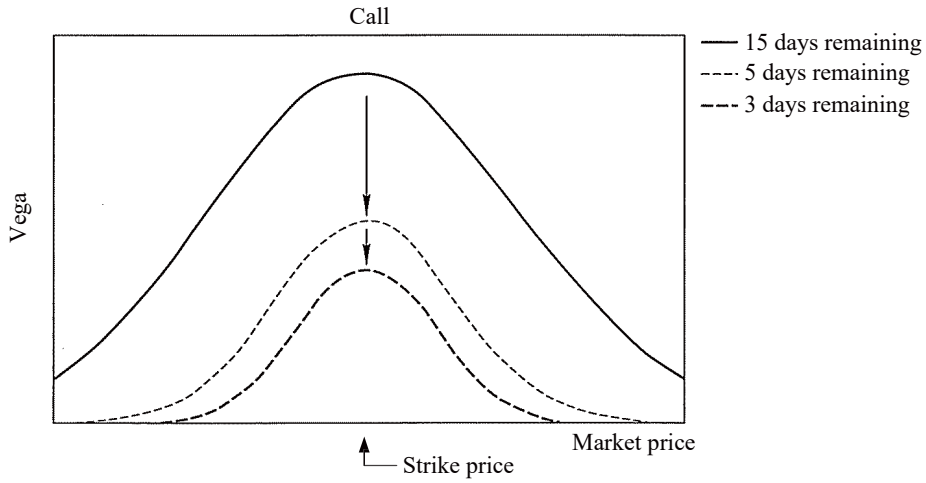


Chart 1-20 Relationship Between Time Remaining to Maturity and Vega



(4) Theta

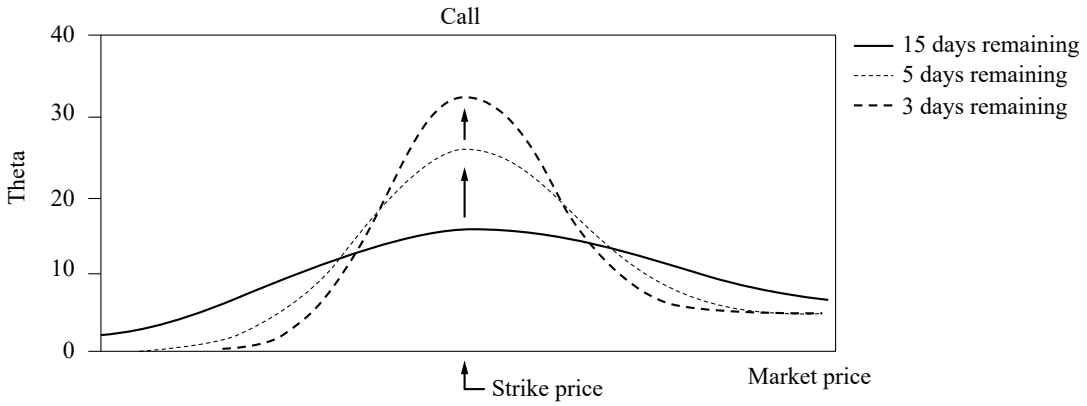
The options' theta (θ) is defined as the change in the premiums in relation to a minute change in the time to maturity:

$$\text{Theta} = -\frac{\Delta \text{ Premium}}{\Delta \text{ Time to Maturity}}$$

Generally, theta is often expressed with a minus sign in the formula. This is because the theta indicates a reduction in the premium as time passes (= time decay).

The time value falls as the maturity date approaches. Because the rate at which the time value declines gradually increases, the value of theta declines over time (where it increases over time as an absolute value) (see Chart 1-21).

Chart 1-21 The Relationship Between the Time to Maturity and Theta



(5) Rho

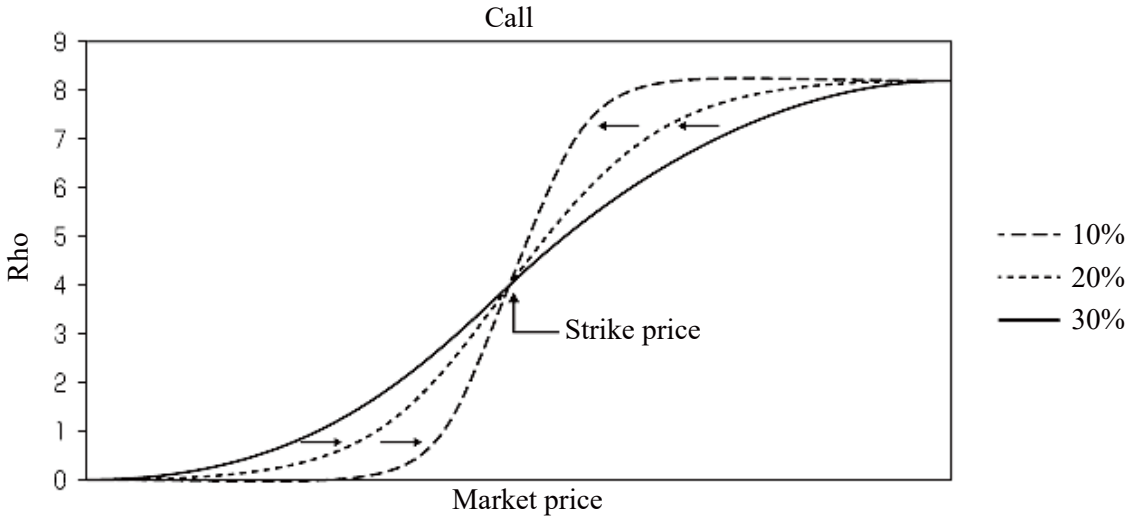
The options' rho (ρ) is defined as the change in premium in response to a minute change in short-term interest rate:

$$\text{Rho} = \frac{\Delta \text{ Premium}}{\Delta \text{ Short-term interest rate}}$$

Since rho indicates the premium's sensitivity to a change in the short-term interest rate, it has a negative impact when the future cash flow (payoff at maturity) is discounted, but it increases the cost of hedges by calls, and hence it is the sum of these two impacts. Rho is proportional to delta (delta of the strike price, not that of the price of the underlying assets) (see Chart 1-22).

For options such as listed options with relatively short expiration periods, the change in the current price of the options stemming from changes in interest rates will be smaller when compared to changes due to other factors. However, in the case of options and warrants with long expiration periods, the impact of interest rate variations will increase.

Chart 1-22 Relationship Between Volatility Level and Rho



(6) Omega

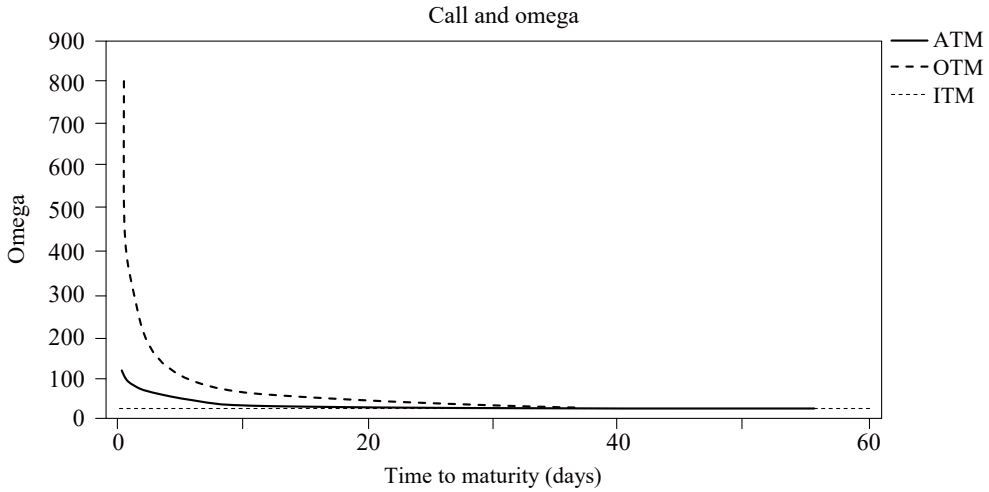
The options' omega (ω) is defined as the rate of change in the premium divided by the rate of change in the price of the underlying assets. Note that this is the rate of change and not the change itself, corresponding to the return on the investment in the underlying assets:

$$\text{Omega} = \frac{\text{Rate of change of premium}}{\text{Rate of change in the price of underlying assets}}$$

This is a concept similar to the beta (β) in the Capital Asset Pricing Model (CAPM), and it is sometimes known as the options' beta. The difference between omega and delta is that omega focuses on the rate of change while delta focuses on the range of variation of the underlying asset prices and of the premium.

Normally the beta for actual shares ranges between −1 and 2. We can see how the options prices change dramatically (see Chart 1-23).

Chart 1-23 Relationship Between the Time to Maturity and Omega



(7) How to Use Greeks

The sensitivity indicators described above (collectively referred to as "Greeks") are combined with actuals and futures and used in managing positions. They are summarized as shown in Chart 1-24:

Chart 1-24 Sensitivity Characteristics of Spot, Futures and Options

	Long Call Options	Long Put Options	Long Futures	Long Actuals
Delta (D)	0 to 1	−1 to 0	About 1	1
Gamma (G)	+	+	0	0
Vega (V)	+	+	0	0
Theta (T)	−	−	−	0

(Notes) 1. Reverse the signs for short position.
2. The theta becomes more negative as the expiration date approaches.
3. For futures, this is easily understood when thinking theoretically. For actuals, the only price is the market price, and thus all other factors are mathematically 0.

A method for using these sensitivity indicators in position risk management is described below. Essentially, the position sensitivity indicator which consists of the synthesis (portfolio) of multiple derivatives can be expressed by combining the individual derivatives indicators. More specifically, if the number of units of the *i*th derivatives is n_i and the price (present value) of this derivative is P_i:

$$\text{Present value of the portfolio of derivatives} = n_1P_1 + n_2P_2 + \cdots = \Sigma n_iP_i$$

Accordingly, the following relations are obvious:

$$\begin{aligned}
\text{Position Delta} &= n_1D_1 + n_2D_2 + \cdots = \Sigma n_iD_i \\
\text{Position Gamma} &= n_1G_1 + n_2G_2 + \cdots = \Sigma n_iG_i \\
\text{Position Vega} &= n_1V_1 + n_2V_2 + \cdots = \Sigma n_iV_i \\
\text{Position Theta} &= n_1T_1 + n_2T_2 + \cdots = \Sigma n_iT_i \\
\text{Position Rho} &= n_1R_1 + n_2R_2 + \cdots = \Sigma n_iR_i
\end{aligned}$$

If a position can be constructed in which all these values are set to 0, then all risk is momentarily eliminated. However, it must be emphasized that this risk is only eliminated momentarily. As time passes and the market changes, the premiums and the sensitivity indicators (Greeks) themselves will change, and it is impossible to keep these values 0 without adjusting positions (re-hedging). Thus, in practice, these indicators can be used effectively while adding other practical rules as well.

4 5 How to Use Options

As we saw in the section on the structure of premiums, options premiums consist of two parts: the intrinsic value part that is determined by the relationship between the price of the underlying assets and the strike price, and

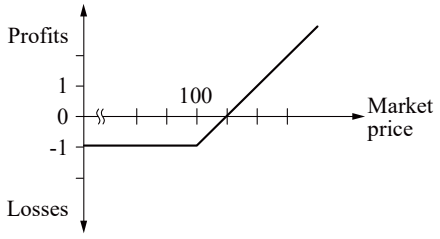
the time value part that is added because of the uncertainty in the price of the underlying assets until the maturity date. Most of the time value is dependent on changes in the time to maturity and variations in the volatility. Investment strategies for options must be constructed based on an understanding of these characteristics.

To better understand these characteristics, let us hold constant the time to maturity while examining options investment strategies based on the direction of the market and the direction of the volatility.

(1) Outright Trading

(i) Long Call Options: When we expect market prices to go up (see Chart 1-25)

Chart 1-25 Long Call Options



Market price at maturity	98	99	100	101	102	103
Profit and loss	-1	-1	-1	0	1	2

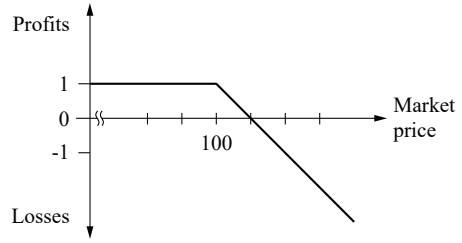
Maximum profits: unlimited
Maximum losses: -1
Breakeven price: 101

This is a strategy that is taken when we expect market prices to go up. When the market goes up, we are able to gain income commensurate with how far the market rises, and even if the market goes down, all we lose is the initial premium. In terms of the sensitivity indicators, this method succeeds or fails based on delta.

However, because the time value is reduced as the maturity date approaches, this strategy bears a theta risk.

(ii) Short Call Options: When we expect market prices to soften moderately (see Chart 1-26)

Chart 1-26 Short Call Options



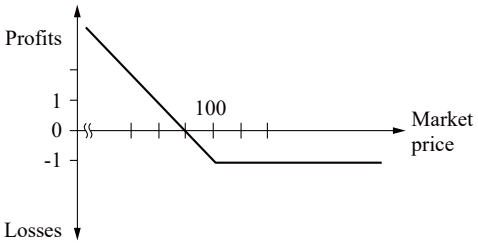
Market price at maturity	98	99	100	101	102	103
Profit and loss	1	1	1	0	-1	-2

Maximum profits: 1
Maximum losses: unlimited
Breakeven price: 101

This strategy is taken when market prices are expected to soften moderately; however, because this position is a short position, the losses will be commensurate with how far the market rises if our projection is incorrect. This strategy is characterized by the fact that its profits are obtained based on the behavior of delta and theta. These are sometimes combined with actuals purchases in order to increase yield (see this Section, (3) "(iii) Covered Calls" for details).

(iii) Long Put Options: When we expect market prices to fall (see Chart 1-27)

Chart 1-27 Long Put Options



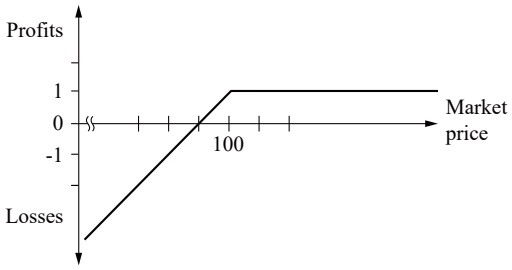
Market price at maturity	97	98	99	100	101	102
Profit and loss	2	1	0	-1	-1	-1

Maximum profits: 99
Maximum losses: -1
Breakeven price: 99

This strategy anticipates that market prices will fall, where profits are commensurate with how far the market falls. Even if market prices increase, losses are limited to the initial premium. This strategy assumes a diminishing time value (theta risk) and depends on a bearish delta.

(iv) Short Put Options: When we expect market prices to rise moderately (see Chart 1-28)

Chart 1-28 Short Put Options



Market price at maturity	97	98	99	100	101	102
Profit and loss	-2	-1	0	1	1	1

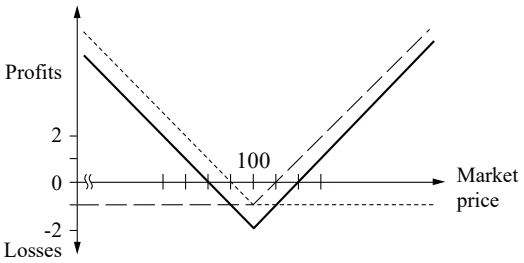
Maximum profits: 1
Maximum losses: -99
Breakeven price: 99

Although this strategy is taken when we expect market prices to rise moderately, because we are selling the put options, there may be substantial losses if our expectations are incorrect and the market falls (especially when the price has a sharp drop). From the perspective of the sensitivity indicators, profits are enjoyed when the time value diminishes, and are dependent on a bullish direction. The amount of the time value obtained, when compared to the delta for long call options, is a small profit, and thus the profits are limited.

(2) Combinations of Options

(i) Long Straddle: When we expect market prices to change dramatically (see Chart 1-29)

Chart 1-29 Long Straddle



Market price at maturity	96	97	98	99	100	101	102	103
Profit and loss	2	1	0	-1	-2	-1	0	1

Maximum profits: unlimited
Maximum losses: -2
Breakeven price: 98 and 102

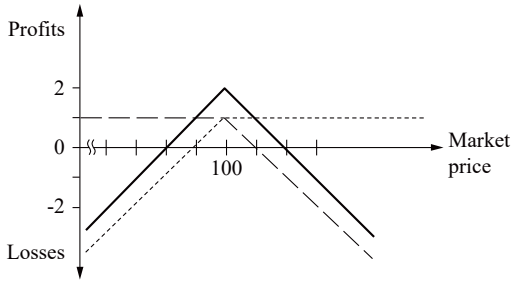
Long straddle is a position in which call options and put options of the same strike price are both

purchased together in identical amounts. The strategy is used when we anticipate the market to move dramatically, but we do not yet know which way. This strategy is used, for example before the announcement of key economic indicators or before an election in which there is a high probability that the results will have a major impact on the direction of the market. If our anticipated changes materialize, a large profit will be the result. Conversely, even if our expectations are incorrect and the market does not move, the loss is limited to the two premiums paid.

When we evaluate the strategy from the perspective of the sensitivity indicators, this position has a 0 delta, assumes theta risk, and targets the gamma.

(ii) Short Straddle: When we expect market prices to move little (see Chart 1-30)

Chart 1-30 Short Straddle



Market price at maturity	96	97	98	99	100	101	102	103
Profit and loss	-2	-1	0	1	2	1	0	-1

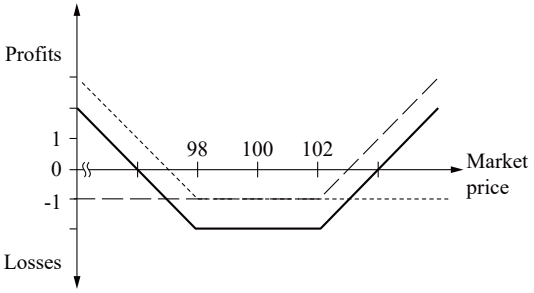
Maximum profits: 2
Maximum losses: unlimited
Breakeven price: 98 and 102

Short straddle refers to a position in which a combination of calls and puts at the same strike price and in the same amounts are sold. This strategy is used when it appears as though the market price is not likely to move. If we are right in our expectation and the market price moves only slightly, then we earn the two premiums we initially received. On the other hand, if we are wrong in our anticipation and the market moves greatly—in either direction—then we experience a loss commensurate with how far the market price moves.

When we evaluate this strategy in terms of sensitivity indicators, this is the opposite of the case in which a straddle is bought, the delta is at 0, we assume gamma risk, and we target a reduction of the time value (theta).

(iii) Long Strangle: When we expect great changes in market prices (see Chart 1-31)

Chart 1-31 Long Strangle



Market price at maturity	94	96	98	100	102	104	106
Profit and loss	2	0	-2	-2	-2	0	2

Maximum profits: unlimited
Maximum losses: -2
Breakeven price: 96 and 104

This is a strategy of purchasing calls and puts with different strike prices. Profits are made when the market price moves far enough to go outside of the range of strike prices. Conversely, even if the market does

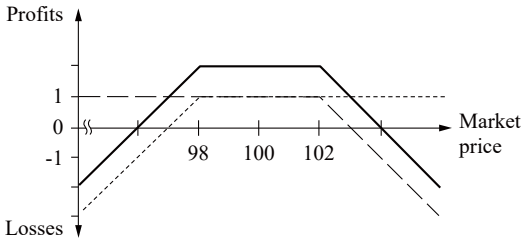
not move outside of the range of the two strike prices, the loss is limited to the two premiums.

While the strangle looks similar to the straddle, the strangle is less expensive than the straddle because it is a combination of options having different strike prices. On the other hand, market prices must move more before a profit is realized.

When we evaluate this strategy from the perspective of the sensitivity indicators, fundamentally it is the same as for long straddle, although the theta risk is smaller and the profits obtained from the gamma become smaller as well.

(iv) Short Strangle: When we expect narrow movement in market prices (see Chart 1-32)

Chart 1-32 Short Strangle



Market price at maturity	94	96	98	100	102	104	106
Profit and loss	-2	0	2	2	2	0	-2

Maximum profits: 2
Maximum losses: unlimited
Breakeven price: 96 and 104

This is a strategy of selling call options and put options with different strike prices. Profits are earned if the market price remains between the two strike prices. Conversely, the losses are unlimited if there are large changes in market prices.

When we sell a strangle, we obtain smaller premiums than when we sell a straddle; however, because the strike prices are different, there is less chance of generating loss as long as there is no major fluctuation in the market price.

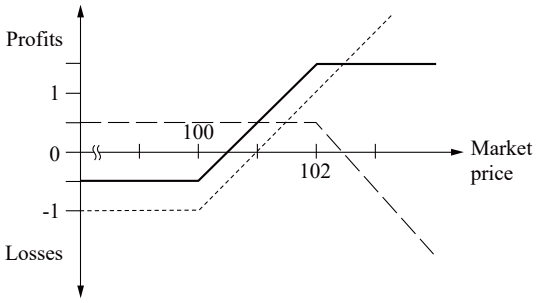
When we look at this strategy in terms of sensitivity, essentially it is the same as for selling a straddle; however, the gamma risk is reduced and the profits obtained from the theta are also reduced.

(v) Vertical Bull Spreads: When we expect market prices to increase slightly (see Charts 1-33 and 1-34)

Vertical bull spreads can either be vertical bull call spreads (see Chart 1-33) that use call options with two different strike prices, or vertical bull put spreads (see Chart 1-34) that use put options with two different strike prices.

The vertical bull call spread is a strategy where a call option with a high strike price is sold and a call option with a low strike price is purchased. On the other hand, the vertical bull put spread is a strategy where a put option with a high strike price is sold and a put option with a low strike price is purchased.

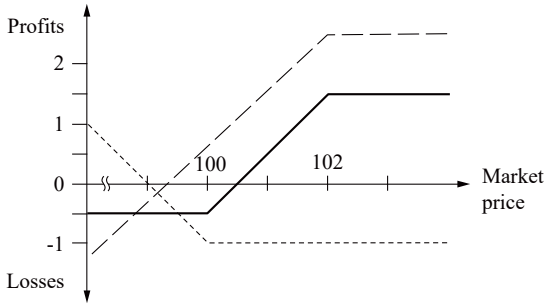
Chart 1-33 Vertical Bull Call Spread



Market price at maturity	98	99	100	101	102	103
Profit and loss	-0.5	-0.5	-0.5	0.5	1.5	1.5

Maximum profits: 1.5
Maximum losses: -0.5
Breakeven price: 100.5

Chart 1-34 Vertical Bull Put Spread



Market price at maturity	98	99	100	101	102	103
Profit and loss	-0.5	-0.5	-0.5	0.5	1.5	1.5

Maximum profits: 1.5
Maximum losses: -0.5
Breakeven price: 100.5

In both of these cases, it is anticipated that the market price will go up moderately; however, these strategies do not track large increases in prices and their potential losses are limited.

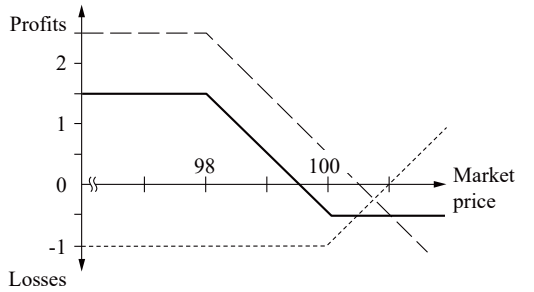
When we view these strategies from the perspective of sensitivities, the bull spread is literally a bullish position, and thus it assumes an overall positive value for delta; however, because this is a spread position involving a combination of long and short, the delta is relatively small when compared with the delta for pure long call positions. In other words, even if the price of the underlying assets were to move slightly, the movement would not produce much of a profit. Conversely, insofar as a short position is taken, we can get by with little theta risk.

(vi) Vertical Bear Spreads: When we expect market prices to fall slightly (see Charts 1-35 and 1-36)

Vertical bear spreads can be either vertical bear call spreads (see Chart 1-35) that use two call options with different strike prices, or vertical bear put spreads (see Chart 1-36) that use two put options with different strike prices.

In vertical bear call spreads, call options with high strike prices are purchased and call options with low strike prices are sold. On the other hand, in vertical bear put spreads, put options with high strike prices are purchased and put options with low strike prices are sold.

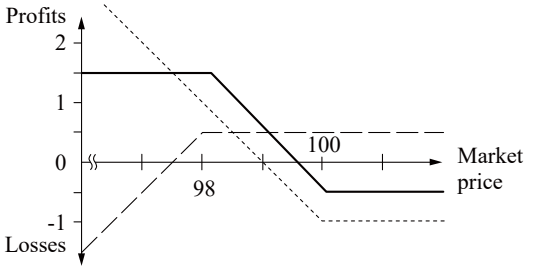
Chart 1-35 Vertical Bear Call Spread



Market price at maturity	96	97	98	99	100	101
Profit and loss	1.5	1.5	1.5	0.5	-0.5	-0.5

Maximum profits: 1.5
Maximum losses: -0.5
Breakeven price: 99.5

Chart 1-36 Vertical Bear Put Spread



Market price at maturity	96	97	98	99	100	101
Profit and loss	1.5	1.5	1.5	0.5	-0.5	-0.5

Maximum profits: 1.5
Maximum losses: -0.5
Breakeven price: 99.5

While both of these strategies are based on the expectation that market prices will fall moderately, these strategies do not track the falling prices, and potential losses are limited.

When looked at from the perspective of sensitivities, the bear spread is, literally, a bearish position, and thus it is based on the assumption of a delta that is negative overall. Because it is a spread position that is a combination of long options and short options, its delta is large relative to the delta of a simple long put (*i.e.*, the absolute value is small). In other words, it becomes difficult to achieve a profit even if the price of the underlying assets moves slightly. Instead, the theta risk is reduced by the extent of the short position taken.

(vii) Long Synthetic Futures (see Chart 1-37)

Long call options and short put options that have the same strike price and the same contract month (contract month) to make synthetic futures creates a position that is just the same as having long futures. Just like long futures, this strategy is used when we are bullish on the future. Because options with the same contract month may be combined, it is possible to use options to create futures with contract months not available through normal futures transactions. For example, even though share index futures in Japan are generally 3-month futures expiring in March, June, September, or December, options can be used to create 1-month futures.

Chart 1-37 Long Synthetic Futures

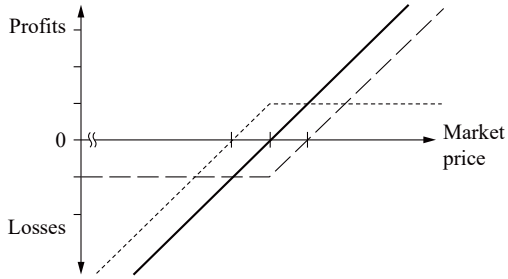
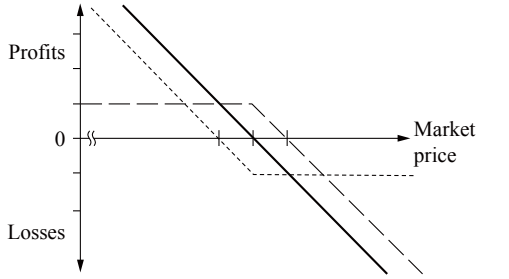


Chart 1-38 Short Synthetic Futures



(viii) Short Synthetic Futures (see Chart 1-38)

Short call options and long put options that have the same strike price and the same contract month to make synthetic futures creates a position that is just the same as having sold futures. Just like selling futures, this strategy is used when we are bearish on the future.

Other strategies include the butterfly (see Chart 1-39), which uses options with three different strike prices, the condor (see Chart 1-40), which uses options with four different strike prices, the ratio call spread (see Chart 1-41), wherein the number of options contracts sold and bought is varied and wherein there are two different strike prices, the calendar spread (see Chart 1-42), which uses options with different contract months, and so forth.

Chart 1-39 Long Butterfly

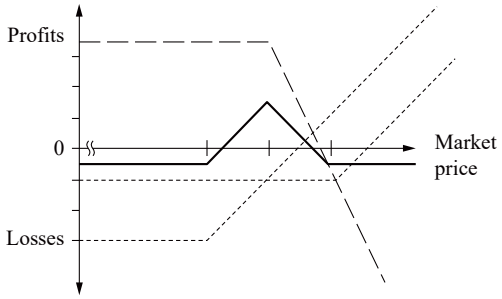


Chart 1-40 Long Condor

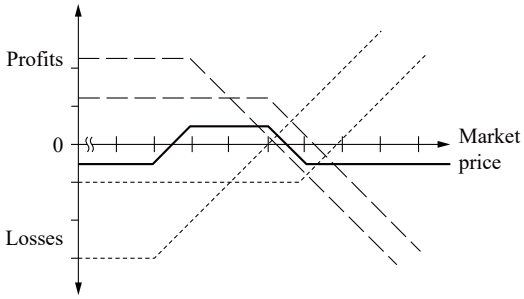
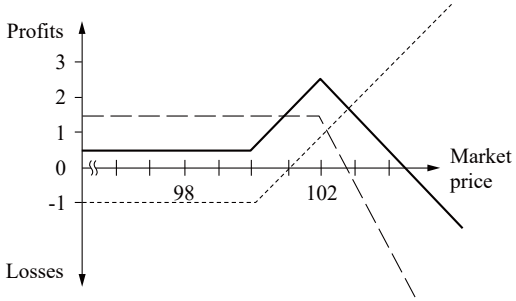


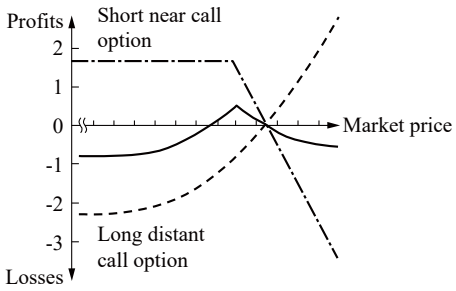
Chart 1-41 Ratio Call Spread



Market price at maturity	98	99	100	101	102	103	104
Profit and loss	0.5	0.5	0.5	1.5	2.5	1.5	0.5

Maximum profits: 2.5
Maximum losses: unlimited
Breakeven price: 104.5

Chart 1-42 Calendar Spread



The long butterfly, when compared to a short straddle, establishes a long position on both shoulders, thereby reducing the gamma risk in exchange for accepting some theta risk.

The same shall apply to the comparison of a long condor against a short strangle.

For both the butterfly and the condor, when they assume buy positions on both ends (the shoulders), it is

generally known as being in the long position.

The ratio call spread is a strategy where the call option sales in the normal vertical bull call spread are increased so that a position is created where the gamma risk is increased and the profits are obtained from the theta (the time value is reduced) when compared to a vertical bull call spread.

The calendar spread is a position that combines options with different maturity dates and is a strategy that focuses on the different thetas from the different expiration dates. Because the sensitivity of the theta increases as the remaining maturity grows shorter, if, for example, it appears as though there will be a slow movement in the near future, we would assume a position where near call options are sold and distant call options are purchased. If the movement is as we anticipated, we would close the position at the expiration of the near call options in order to obtain the profit.

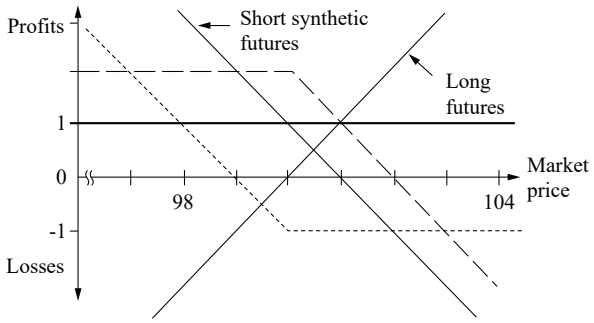
(3) Combinations with Investments Other Than Options

(i) Arbitrage of Synthetic Futures

In arbitrage using options and futures, there are, in general, two popular approaches: conversion and reversal. The call options and put options described above are combined to create a synthetic futures position, and this position is compared with futures prices.

If the synthetic futures are more expensive than the futures (conversion), then make the short synthetic futures and the long futures (see Chart 1-43). Conversely, if the synthetic futures are less expensive than the futures (reversal), then make the long synthetic futures and the short futures (see Chart 1-44).

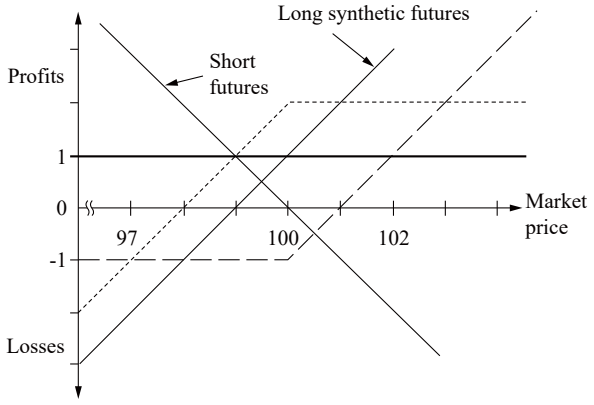
Chart 1-43 Conversion



●When call options are more expensive

Market price at maturity	96	97	98	99	100	101	102	103
Profit and loss on the short call options	2	2	2	2	2	1	0	-1
Profit and loss on the long put options	3	2	1	0	-1	-1	-1	-1
Profit and loss on the long futures	-4	-3	-2	-1	0	1	2	3
Total profit and loss	1	1	1	1	1	1	1	1

Chart 1-44 Reversal



●When put options are more expensive

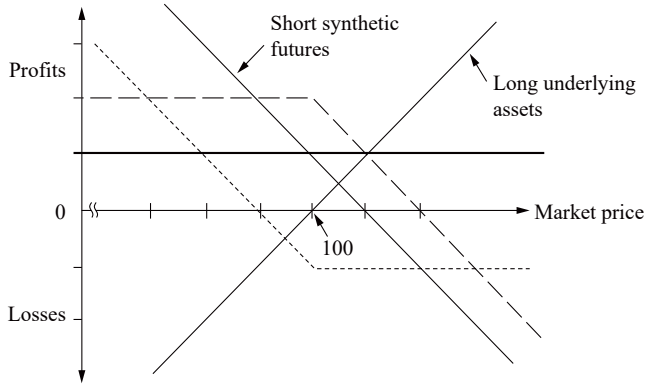
Market price at maturity	96	97	98	99	100	101	102	103
Profit and loss on the long call options	-1	-1	-1	-1	-1	0	1	2
Profit and loss on the short put options	-2	-1	0	1	2	2	2	2
Profit and loss on the short futures	4	3	2	1	0	-1	-2	-3
Total profit and loss	1	1	1	1	1	1	1	1

(ii) Hedging Using Synthetic Futures

As described above, synthetic futures are made from a combination of call options and put options. When the underlying assets are held, having a short position on synthetic futures can act the same way as hedging through shorting of normal futures.

In the example in Chart 1-45, the price of the underlying assets is JPY100, the call options are sold at JPY2, and the put options are bought at JPY1. This is equivalent to hedging by shorting JPY101 futures.

Chart 1-45 Short Hedge Using Synthetic Futures

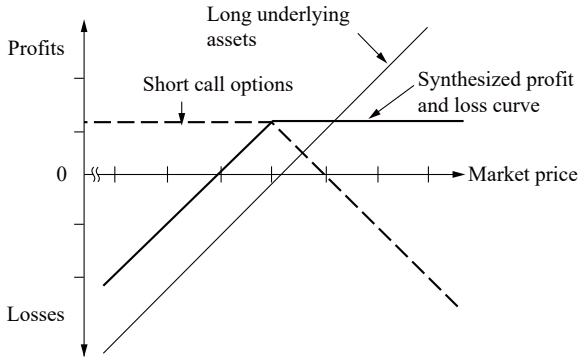


The benefit of this method is that it can be used to create futures with contract months not found in normal futures (see this Section, (2) "(vii) Long Synthetic Futures" Chart 1-37 for details).

(iii) Covered Calls

Covered calls are positions made by purchasing and holding the underlying assets and selling (writing) call options in what is also known as a buy-write transaction. Chart 1-46 shows the final profit and loss curve.

Chart 1-46 Final Profit and Loss Curve for Covered Calls



With this strategy, even if the underlying assets have fallen, the loss will be less than the case where we simply buy and hold the underlying assets thanks to a premium we have received by selling a call. This is a method that is useful for investors who wish to increase their yield based on the forecasts that the market will not drastically move upward, while holding the underlying assets.

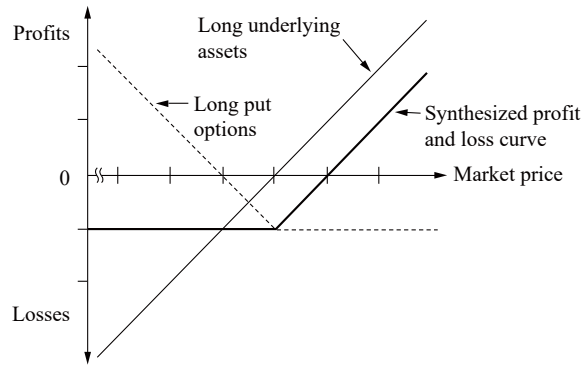
When we consider the price variations of the underlying assets, it is desirable to sell call options that are at-the-money in the short run and out-of-the-money in the long run. The actual method can be selected based on risk preferences for delta, gamma, vega, and theta.

(iv) Protective Puts (see Chart 1-47)

A protective put is a position that is made by buying and holding underlying assets and purchasing a put option. It is used by investors to hedge against down side risk, even though it is not without a cost, when it appears as though there might be an adjustment in the market in the near future. This cost corresponds to a reduction in the time value of the options. In other words, the theta risk is accepted.

If the price of the underlying assets goes up, then all that is lost is the repayment of the cost of purchasing the put option, where the range of the increase in value is small when compared with the underlying assets alone. However, even if the price of the underlying assets were to fall the total loss would be limited.

Chart 1-47 Final Profit and Loss Curve for Protective Puts



When it comes to the results of hedging in an actual portfolio, there are cases where the final synthetic profit/loss curve will not be in the position that was originally intended, such as, for example, when one holds a portfolio in a stock sector and hedges it with TOPIX options.

This is because of the following:

(a) There may be a difference between the volatility of the TOPIX options used in the hedge and the actual TOPIX volatility; and

(b) There may not necessarily be a high correlation between the TOPIX and the price movements of the portfolio.

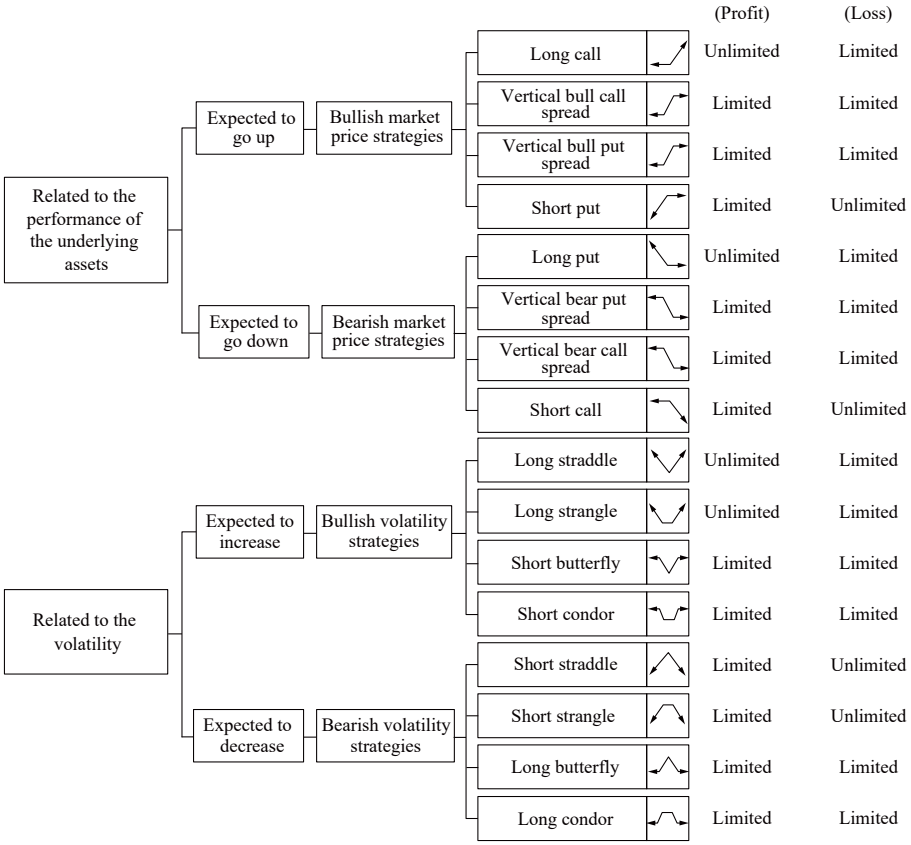
As a result, it is necessary to act only after taking into consideration two points: the characteristics of the portfolio held, and market conditions in the future.

This is equally true for bond portfolios.

(4) Summary

Options investment strategies in accordance with the market are summarized as shown in Chart 1-48:

Chart 1-48 Market Phase and Option Investment Strategies



(Note) The descriptions of the profits and losses above have been rendered in a general manner and do not take the actual prices (for example, as it must not be less than zero) into consideration.

4 6 Option Pricing Theory

Options occupy a particularly important place in the category of derivatives. They serve as a tool having an insurance motivation such as purchasing an out-of-the-money put (OTM put) in order to hedge against the risk of a fall in prices of assets and commodities, or to hedge against the risk of another derivative, or as a means of using a relatively small amount of funds to achieve a large amount of leverage.

The payoff of an option is non-linear and consequently the premium (price) is a curve, and therefore a curvature referred to as gamma occurs. To state this in reverse, if the payoff is linear as in the case of futures and forward transactions, then the volatility σ will not have any impact on present value.

Although the leverage of a futures or a forward is 1 (referred to as delta 1), the delta of an option (*i.e.*, its leverage) varies. Some financial products are designed to have a leverage that far exceeds 1, including use of exotic options, or increasing the ratio of the notional principal. However, in view of the risk of excessively high leverage, tightening regulations on leverages has been under consideration in recent years.

The volatility that is derived from the market price (premium) of a plain vanilla (European) option using the formula of Black-Scholes Model or the Black Model is referred to as implied volatility, and is used in options whose underlying assets are shares, interest rates, currency exchange, commodities and others. These models use prices of all underlying assets which show a log-normal distribution (geometric Brownian motion). The former model uses spot prices, and the latter uses forward prices. Although these models assume that volatility σ is constant, the implied volatility in the actual market differs with each term T and each level of the strike price K (or moneyness K/S). This is the volatility skew or the smile phenomenon. The closed-form solution (analytical solution) of the Black-Scholes Model or Black Model is used as a tool to link market prices to implied volatility, but other evaluation models are used for the purpose of pricing, or prices are determined by the market.

Moreover, the volatility that is used in pricing and hedging differs from historical volatility (realized volatility) in that the latter refers to subsequent volatility. If the dynamics are probabilistic, there is no direct relevance between the term structure and the time-series structure.

In an immature market, the implied volatility σ is flat. As the market matures, the implied volatility develops into the at-the-money term structure σ(T) and then IV surface σ(T, K), and the model also evolves accordingly. The market prices in plain vanilla transactions involve this kind of deep mechanism.

For financial products that include options attributes of the valuation of time, mark-to-market valuation as well as the measurement of risk (*e.g.*, calculation of Greeks (partial differentiation), which represent sensitivity of market evaluation to each parameter), are very important. In addition to sensitivity involving time and the price of the underlying asset (reference indicator), sensitivity involving interest rates, carry costs (dividends and stock loan fees), credit spreads, volatility and correlation factors may also (depending on the circumstances) have a significant impact. The parameters of valuation models include the historical base obtained by data on previous prices, as well as the implied base which is projected from current market prices. While pricing mainly uses the latter (if possible), both should be given importance from the perspective of risk management, although there are still issues regarding stability and consistency with respect to both of these parameters.

It would be imprudent to assume that there is no risk because delta hedging is being performed. When the price of the underlying asset is in the range of a negative gamma, the option is a short option (vega short) and consequently, it is difficult to limit losses, so that greater attention is required with respect to risk than is the case when gamma is zero or positive. As an example, a straddle short where the delta is zero is a high risk position with a substantial negative gamma. The amount of rebalance of delta hedge is equivalent to gamma, which represents the size of the nature of an option, that is, the convexity of the price curve. Vega and gamma are directly proportional to each other.

[Reference]

[The Black-Scholes Model (B-S Model)]

The closed solutions of European call price C and put price P on the underlying asset (spot price) is expressed by the Black-Scholes Model (B-S Model) shown below:

$$C = Se^{-q\tau}N(d_1) - Ke^{-r\tau}N(d_2)$$

$$P = -Se^{-q\tau}N(-d_1) + Ke^{-r\tau}N(-d_2)$$

$$d_1 = \frac{\ln(S/K) + \left(r - q + (\sigma^2/2)\right)\tau}{\sigma\sqrt{\tau}}$$

$$d_2 = d_1 - \sigma\sqrt{\tau}$$

in which: σ is the volatility of the underlying asset until maturity (as a percentage), q is the dividend rate (as a percentage),* r is the short-term interest rate (as a percentage) [all of these are annual rates]; τ is the time to maturity (in years); S is the spot price of the underlying asset; and K is the strike price.

$$N(d) = \int_{-\infty}^{d} \phi(x)\,dx,\ \phi(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{x^2}{2}\right)$$

N(d) is the cumulative density function in the standard normal distribution (density function of the standard normal distribution ϕ(x), integrated from -∞ to d (area)).

* In the case of Forex options, q denotes a short-term interest rate for a foreign currency; in the case of commodity options, q denotes convenience yield.

Chart **Greeks of Plain Vanilla Options**

Greeks	European Call	European Put
Delta	$\frac{\partial C}{\partial S} = e^{-q\tau}N(d_1)$	$\frac{\partial P}{\partial S} = -e^{-q\tau}N(-d_1)$
Delta (for K)	$\frac{\partial C}{\partial K} = -e^{-r\tau}N(d_2)$	$\frac{\partial P}{\partial K} = e^{-r\tau}N(-d_2)$
Rho	$\frac{\partial C}{\partial r} = -\tau K\frac{\partial C}{\partial K}$	$\frac{\partial P}{\partial r} = -\tau K\frac{\partial P}{\partial K}$
Gamma	$\Gamma = \frac{\partial^2 C}{\partial S^2} = \frac{\partial^2 P}{\partial S^2} = e^{-q\tau}\phi(d_1)/(S\sigma\sqrt{\tau})$	
Gamma (for K)	$\frac{\partial^2 C}{\partial K^2} = \frac{\partial^2 P}{\partial K^2} = e^{-r\tau}\phi(d_2)/(K\sigma\sqrt{\tau})$	
Vega	$\frac{\partial C}{\partial \sigma} = \frac{\partial P}{\partial \sigma} = e^{-q\tau}\phi(d_1)S\sqrt{\tau} = \Gamma S^2\sigma\tau$	

In fact, plain vanilla option price V (for both European put and call) can be expressed as follows:

$$V = S\frac{\partial V}{\partial S} + K\frac{\partial V}{\partial K} \qquad (V = P, C)$$

This formula shows that the option is reproduced by delta hedging using the risk asset (underlying asset) and risk-free asset, and that the two terms on the right-hand side of the formula are digital options. The following formula should also be noted:

$$S\frac{\partial V}{\partial S} = F\frac{\partial V}{\partial F},\quad K\frac{\partial V}{\partial K} = K^*\frac{\partial V}{\partial K^*} \qquad \left(F = Se^{(r-q)\tau}, K^* = e^{-r\tau}\right)$$

[Black Model]

The closed solutions of European call price C and put price P on the futures (forwards) as the underlying asset is expressed by the Black Model shown below:

$$C = e^{-r\tau}\left[FN(d_1) - KN(d_2)\right]$$

$$P = e^{-r\tau}\left[-FN(-d_1) + KN(-d_2)\right]$$

$$d_1 = \frac{\ln(F/K)}{\sigma\sqrt{\tau}} + \frac{\sigma\sqrt{\tau}}{2}$$

$$d_2 = \frac{\ln(F/K)}{\sigma\sqrt{\tau}} - \frac{\sigma\sqrt{\tau}}{2} = d_1 - \sigma\sqrt{\tau}$$

in which: σ is the volatility of the futures (forwards) until the maturity of the option T (as a percentage) and r is the short-term interest rate (as a percentage) [both are annual rates]; τ is the time to maturity (in years); F is the futures (forwards) price of the underlying asset; and K is the strike price.

The time of expiration of futures (forwards) T' comes later than T ($T' \geq T$).

* In the Black Model, since the time value does not include the effect of a discount, the put price always exceeds the intrinsic value (the same applies to the call price).
* If $F = Se^{(r-q)\tau}$, the Black Model formula corresponds to the B-S Model formula. If $F = K$ (ATM in the Black Model), the premiums (for both call and put options) are close to $0.4 \times F \times \sigma\sqrt{\tau}$.
* In the B-S Model and the Black Model, r and q may be negative figures but F, S, and K must be positive figures (τ and σ must not be less than zero) as prerequisites. When these models are applied to interest-rate options, the figures for F, S, and K could be negative if the interest rate is negative. However, for the sake of calculation, the figures are adjusted to a certain extent in order to make them positive.

[Put-Call Parity]

At maturity T, the following formula always holds:

$$\max\{S_T - K, 0\} - \max\{K - S_T, 0\} = S_T - K$$

Therefore, at any time t, the following formula holds:

$$C_t - P_t = e^{-r\tau}(F - K) = S_t e^{-q\tau} - Ke^{-r\tau} \quad (\tau = T - t)$$

This is called the put-call parity. It is interesting that this relation holds irrespective of the process through which the stock price is described, and therefore it is not necessary to assume the B-S Model. In the above formula, if t = 0 (τ = T), the right-hand side expresses (the present value of) the futures price, which does not have a curvature. When both sides are differentiated by S or σ, the following formula is derived.

$$\frac{\partial C}{\partial S} - \frac{\partial P}{\partial S} = e^{-q\tau}, \quad \frac{\partial^2 C}{\partial S^2} = \frac{\partial^2 P}{\partial S^2}, \quad \frac{\partial C}{\partial \sigma} = \frac{\partial P}{\partial \sigma}$$

These formulae also generally hold.

There are various other model-free relations which are expressed only by decomposition and recomposition of the cash flow.

[Volatility]

The parameter that has the greatest impact on the option price is the volatility σ, which represents the magnitude of the probability fluctuation of the price of the underlying asset. The input value of σ is determined as described below.

(1) Historical Volatility (HV)

The historical volatility (HV) is calculated by converting the standard deviation of the daily log-return of the underlying asset (the difference from the log price on the previous business day) into a yearly rate.

Depending on the number of days to calculate the standard deviation, the historical volatility is referred to as the 30-day HV, 60-day HV, 90-day HV, and the like. Since the time to maturity of listed options is relatively short, 20 to 30 day historical volatility is frequently used. The daily standard deviation can be converted into a yearly rate by multiplying it by $\sqrt{T}$ (T = number of business days per year), while assuming that the return is IID (independently identically distributed). The factor used for this calculation is normally $\sqrt{250}$ to $\sqrt{260}$.

(2) Implied Volatility (IV)

The volatility can be calculated backward by using the option pricing formula such as the B-S Model, so that the theoretical price matches the market price of European options.

In this calculation, parameters except for the volatility are given.

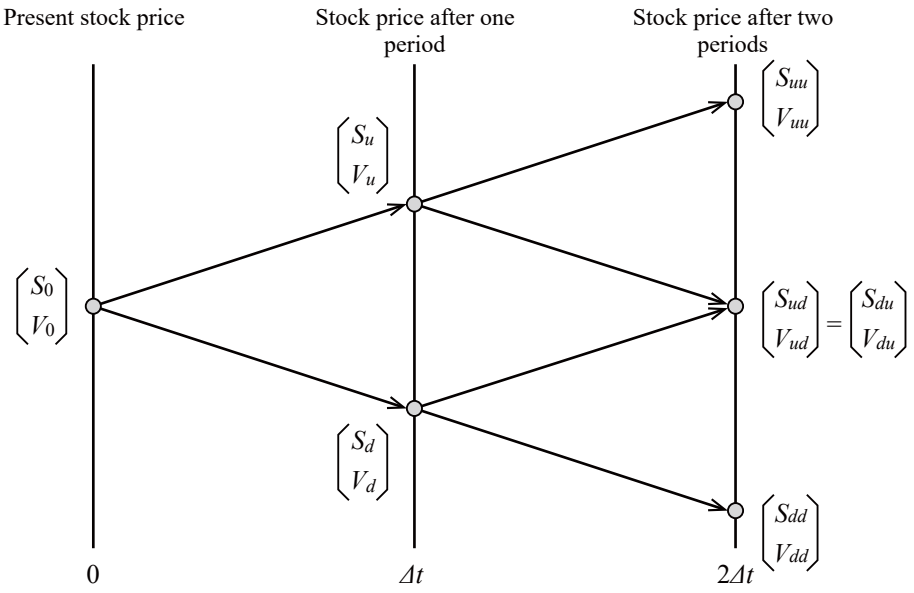
Due to the attributes of options transactions, (ii) strike price K and (iii) time to maturity τ are determined. For (iv) short-term interest rate r and (v) dividend yield q, appropriate values are used as given conditions. Since the option price shows a monotonic increase in relation to σ (vega is positive), when the market price of the option is given, the volatility σ at which the market price matches the theoretical price can be determined uniquely by iterative calculation (using Solver, etc.). This volatility σ is implied by the market and hence it is called implied volatility (IV).

In a mature market, the IV surface is observed (the IV is indicated by a curved surface in three-dimensional space as a function σ (T, K) wherein T is maturity and K is strike price (or a function σ (T, k) wherein moneyness k = K/S, K/F)). The market price shows that the assumption for the B-S Model, i.e. the volatility σ is flat, is not satisfied, which means that the B-S Model does not hold. However, the B-S Model (and the Black Model) is still employed as a useful tool. This is because expressing the option price as the IV is similar to translating the bond price into the final yield, and the expressions using Greeks such as Vega and the level of IV are easier to compare.

[Binomial Model]

The binomial model is also called binomial tree model, binomial lattice model and Cox-Ross-Rubinstein (CRR) model. Although it is described with elementary mathematics, it contains all of the essentials and meanings of derivatives pricing. Its basic form is a very simple setting (binary partition tree) in which the stock price would move only either up or down over a period, with the futures price being placed in between the two values (single-period binominal model). Then, a multi-period binominal model can be created by combining multiple binary partition trees, dividing the period from the present 0 to maturity T into n phases ($\Delta t = T/n$), creating a number of state nodes, and calculating the terminal value and the transition probability at each node by a recursion formula (no-dividend stock is assumed here).

Chart Binomial Model (Two Periods)



In this chart, S_j and V_j respectively represent the stock price (the price of the underlying asset) and the value of derivatives at state node j (the joint in the chart). The price of American options can be calculated on the assumption that the value at each node = max {terminal value, exercise value}, while the price of European options can be calculated by assuming the said value equals the terminal value.

The value at the node at maturity T is the exercise value (payoff). The present value of derivatives V_0 can be obtained through a process similar to a recursion formula, specifically, by stepping backwards from maturity T to the present by each period (Δt) and discounting the value at each node (**backwards induction**). The binomial model is a risk-neutral valuation method which does not reflect the risk premiums or the probability of actual upward or downward price movements. It also provides an economic indication that the market is free of arbitrage and complete.

According to this model, we can see that the trading strategy of rebalancing the risk asset (underlying asset) in units of x_j and the risk-free asset in units of y_j yen at each node through self-financing trade (generating no cash flow during the period) and reproducing derivatives is **delta hedging** ($v_j = x_j S_j + y_j$). As the market is arbitrage-free, at present (t = 0):

$$x_0 = \frac{V_u - V_d}{S_u - S_d} = \frac{\Delta V}{\Delta S} \cong \frac{\partial V}{\partial S}, \quad y_0 = \frac{V_d S_u - V_u S_d}{S_u - S_d} / \left(1 + r\Delta t\right)$$

$$V_0 = \frac{pV_u + (1-p)V_d}{1 + r\Delta t} \qquad \text{wherein:} \quad p = \frac{F_0 - S_d}{S_u - S_d}, \quad F_0 = \left(1 + r\Delta t\right) S_0$$

V_u and V_d should be calculated in advance. The value and delta differ from node to node, but they are locally bifurcated as above, and each V_i would be inductively obtained by going backward in time. Normally, the upward or downward stock price movements are set so that the stock return would be logarithmically symmetrical and the variation width would be $\sigma\sqrt{\Delta t}$. At the limit of continuous time ($\Delta t \to 0$) (central limit theorem), the random walk becomes the Brownian motion, and the binomial model converges with the B-S Model. Therefore, these two models are basically the same with respect to plain vanilla (European) options.

5 Swap Transactions

Swap transactions are transactions in which two parties to an agreement agree to exchange cash flows (such as variable interest and fixed interest) on **payment dates** of certain intervals from the starting date through to the expiration. This is most commonly handled among OTC derivatives. Cash flows are determined in a standard format referred to as a term sheet and based on certain formulae that use financial indicators on each payment date. It is also possible to view a swap transaction in which payment is made only once at maturity as being a forward transaction (which is functionally almost the same as a futures transaction).

Since a swap transaction does not necessarily involve the exchange of a principal amount, the size of a swap transaction is normally expressed as a "**notional principal amount**." It is important to be aware, here, however, that the calculation of the notional principal amount does not accurately reflect the total market values and risk values, but is rather a general indicator.

One motivation for swap transactions is that of comparative advantage in which there are complementary needs with the other party to the transaction, or the relative advantages of the parties differ so that economic gains can be achieved by both parties by making the swap transactions. It is also convenient as a tool for transferring risk.

With the globalization of economies, the diversification of financing techniques as well as refinancing strategies based on the business plan and the outlook of future markets of a company have become important issues of corporate strategy. Interest rate swaps are the most fundamental of these. They facilitate the exchanging of cash flows and are widely carried out.

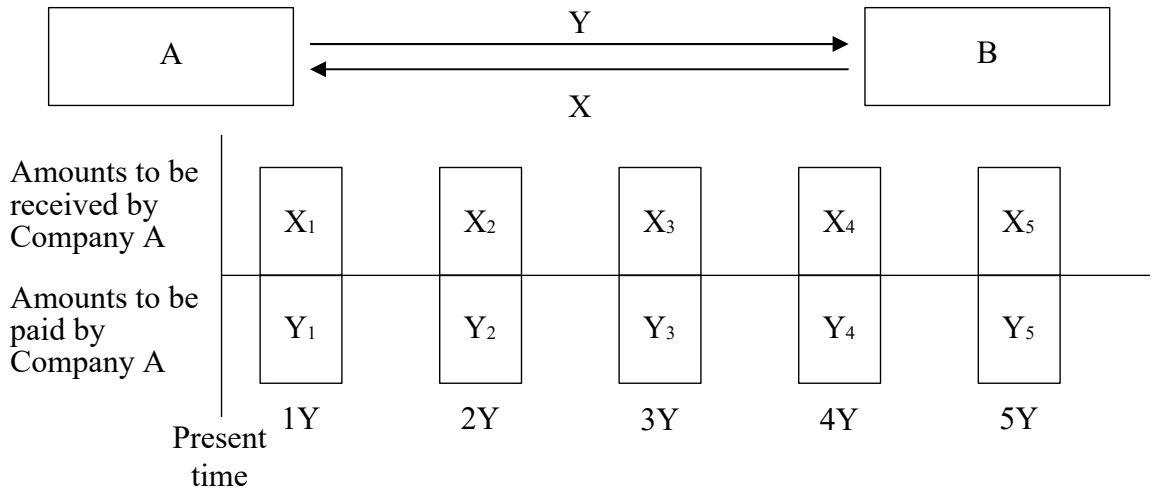
Not just the typical exchange of a fixed interest and short-term interest (LIBOR (see "(2) Interest Rate Used as a Benchmark" for details discussed later)) but interest rate swaps with long term interest (swap interest rates) are also used. Currency swaps and total return swaps are also popular.

Below we shall review a swap that expires in five years, as of June 20, 2015. On June 20 of each year, Company A will receive X_i from Company B and pay Y_i ($i = 1, \ldots, 5$).

Chart 1-49 Examples of Swap Transactions

Payment Date	Receipt by Company A (Payment by Company B)	Receipt by Company B (Payment by Company A)
2016/6/20	X_1	Y_1
2017/6/20	X_2	Y_2
2018/6/20	X_3	Y_3
2019/6/20	X_4	Y_4
2020/6/20	X_5	Y_5

Swap Transactions



Here, no particular statement is made as to what X or Y actually are, but as stated in the following Chapter there are a variety of patterns (this type of cash flow on each side, X and Y, is referred to as a "leg"). For example, in a plain vanilla interest rate swap (which for Company A would consist of receiving a fixed and paying a variable), X would be a fixed interest rate and Y would be a variable interest rate. If Company A issues fixed interest bonds and obtains financing, then if this fixed interest is used as the underlying asset of X, then Company A can procure financing by in substance using the variable interest Y (see Chapter 2, 2-3 (1) "(i) Interest Rate Swaps" for details).

The swap in the above example is a Swap S [1, 2, 3, 4, 5] with a five year maturity; this is the same as using a Swap S [1, 2, 3] with a three year maturity, and then switching to a Swap S [4, 5] with a two year maturity. The latter would be a forward swap that starts from a time in the future. The same economic effect would also be realized from the total of five swaps $S[i] = X_i - Y_i$ (similar to a forward transaction) that receive and pay the cash flows (X_i, Y_i) for one year each (the above do not take into consideration restrictions under contract or counterparty risk). And it is further possible to design products that build in various options, such as having a cap (upper limit) on each of the cash flows X_i and Y_i, or having an option to start a swap in the future (swaption).

In general, it is assumed that a future cash flow in derivatives is at present not fixed but fluctuates stochastically. However, in the case of an IBOR—a variable interest rate which is fixed in advance, such as TIBOR—the amount to be paid on each payment day of the floating leg is fixed on the predetermined reference date (reset date) (fixing). For example, in a plain vanilla swap transaction, the amount to be paid on the next payment day per floating leg is calculated by the formula of the financial indicator fixed to the most recent reset

date. On the other hand, in the case of an RFR (risk-free rate)—a daily compound interest rate which is fixed in arrears, such as TONA compounding—such amount is fixed on the last day of the interest rate observation period and determined by a somewhat complex formula (for details, see Chapter 2, 2-3 (1) "(i) Interest Rate Swaps; Overnight Interest Swaps"). The term "cash flow" as mentioned in derivatives refers simply to the flow of cash that is received or paid over a timeline (this differs from the definition of the same term in corporate accounting or corporate finance). An approach that is helpful in understanding a derivative is to focus on decomposition and recomposition of the cash flows.

(1) Valuation of Swaps

Normally, at the time of the agreement, the present values (PV) of the two cash flows are equal, and therefore the present value of a swap would be nearly zero, or should be made to zero in net terms with the party holding any excessive cash flow paying the excess amount to the other party as an upfront premium (otherwise, the transaction would be unfair transfer of profit).

The present value (PV) of the swap changes along with time.

Valuation of a swap is similar to valuation of a bond price. Assume that for each term T, a discount factor D(T) (= discount bond price with a face value of JPY1) is obtained, and that Company A and Company B have a swap agreement in which Company A receives X_i from, and pays Y_i to, Company B at term T_i as shown in the previous example. If the interest rate is fixed, the cash flow (CF) is determined, whereas, in the case of a floating interest rate or foreign currency exchange, the cash flow is yet to be determined at the present time 0. However, it is possible to calculate EX_i and EY_i as expected values at the present time 0. These are not estimated values that may occur in the future or average values but market prices obtained on an arbitrage-free basis, as in the case of forward rates and futures. The value of the swap is determined using these expected values. The present value of the swap can be obtained by multiplying the expected CF(T) at each term T by D(T). Consequently, on Company A's side, the difference between the present value of leg X it receives and the present value of leg Y it pays would be the present value of the swap.

Present value of a swap (V) = present value of leg X (V_X) − present value of leg Y (V_Y)

$$\begin{cases} \text{Present value of Leg X } (V_X) = \sum_i D(T_i) \times \text{expected CF of } X_i\ (EX_i) \\ \text{Present value of Leg Y } (V_Y) = \sum_i D(T_i) \times \text{expected CF of } Y_i\ (EY_i) \end{cases}$$

Since $D(T_i)$ is the same in the above formulas, they can be described as follows by netting (offsetting) at each term:

$$V = V_X - V_Y = \sum_{i=1}^{n} D(T_i) \times \{EX_i - EY_i\}$$

Company B receives what Company A pays, and vice versa, and hence the present value of the swap on Company B's side is $-V = V_Y - V_X$.

Assume that under the swap agreement shown in Chart 1-49, the present time is June 20, 2017. The future CF is a Swap S [3, 4, 5] with a three-year maturity, and the present value of the future CF (the sum of the present values of the cash flows at respective terms) is calculated as shown below. The net expected value of CF at valuation time t ($E_t[X_i - Y_i]$) changes moment by moment, reflecting the expectations formed in the market.

Chart 1-50 Present Value of a Swap (Component at Each Term)

Payment Day	$D(T_i)$	Receipt by Company A (net)	Present Value
2016/6/20	—	—	—
2017/6/20	1.000000	—	—
2018/6/20	0.976219	$E_t[X_3-Y_3]$	$0.976219\times E_t[X_3-Y_3]$
2019/6/20	0.959763	$E_t[X_4-Y_4]$	$0.959763\times E_t[X_4-Y_4]$
2020/6/20	0.937305	$E_t[X_5-Y_5]$	$0.937305\times E_t[X_5-Y_5]$

Several approaches are known as methods for calculating the discounter factor D(T). Here we assume a discount by LIBOR as risk-free mark-to-market that does not take credit risk into consideration. In this approach, calculations are made to equalize the marked-to-market values by approaches such as netting (offsetting) cash flows or working out their sum, so as to satisfy the law of one price. Some cash flow discount approaches take into consideration credit risk and liquidity risk. However, any change in a discount rate contributes to the denominator of D(T), affecting the addition or subtraction in mark-to-market valuation. By making a discount at a risk-free rate, this problem can be avoided and consistency in valuation can be maintained, provided that it is necessary to adjust the expected CF (expected value in risk-neutral measurement).

In the single curve approach of LIBOR discounts, calculation was easy because the forward LIBOR and D(Ti) are in a simple relationship, like two sides of one coin. However, there were concerns such as whether it is appropriate to treat LIBOR as a risk-free rate although it actually reflects credit risks of the major banks, and whether the issue was overly simplified on the market during the period of credit easing. After the collapse of the Lehman Brothers, different multi-curves for each tenor ($\Delta T_i = T_i - T_{i-1}$), security interest rates, OIS discounts have become gradually popular and secured derivatives transactions have increased, making the basic operation of a discount itself complicated. In unsecured transactions, mark-to-market approaches that adjust counterparty risk (*e.g.,* CVA) are becoming common.

In the valuation of derivatives, which do not use LIBOR but use only RFRs, the single-curve approach of OIS discounts is a standard framework. However, when it is necessary to use project curves of interest rates fixed in advance, such as TIBOR and BBSW, the multi-curve framework will continue to exist, and basis swap transactions will remain available. Currency swaps, which have referenced LIBOR 3M, will shift to RFR-based swaps (*e.g.*, TONA vs. SOFR).

[Reference]

[Discount Factor]

A discount factor is a numerical value which expresses the value of discount bonds for which a par value of one yen is to be paid at time T in the future (the maturity) (zero-coupon bonds), *i.e.*, the present value of "one yen" at some future point. Thus, the present value of a future cash flow at time T is:

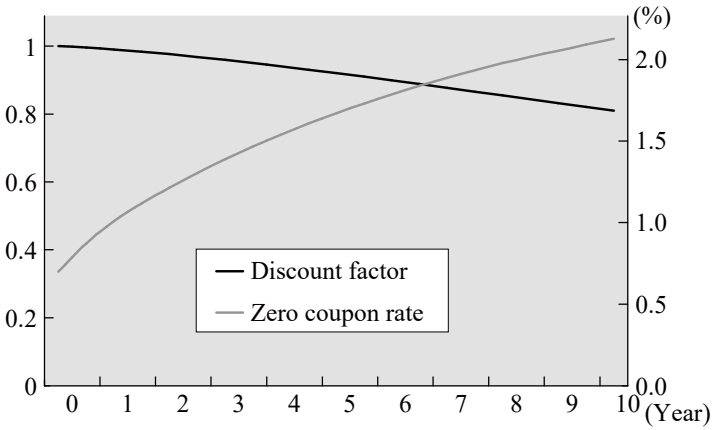
PV = D(T) × Future Cash Flow
Where; PV = Present Value
D(T) = the Discount Factor

Fixed interest bonds and interest swaps can be represented as a portfolio of discount bonds. Since the interest rates have a term structure, they are not discounted at a uniform rate.

Generally, since the nominal interest cannot be a negative value, the future value of the cash flow will be greater than the present value by the amount of the interest. For this reason, the discount factor D(T) must never be more than 1, and the longer the time T, the smaller D(T) will be (D(0) = 1, D(∞) = 0).

When the period of time T is fixed, there will be an inverse correlation between the zero coupon rate which is the final yield of a discount bond (some are term structured and not flat) and the discount factor (discount bond price). Thus, as the zero coupon rate increases the discount bond price decreases, and as the zero coupon rate decreases the discount bond price increases.

Chart Zero Coupon Rate and Discount Factor



However, under the negative interest rate policy currently adopted in Europe and Japan, D(T) shows a monotonic increase (D(T) > 1) during the period when the interest rate is negative (from a short period to a period of a certain length), and then, when the interest rate becomes positive, D(T) will begin to show a monotonic decrease. Thus, a negative interest rate does not affect the calculation of the market value.

[LIBOR Discount]

A risk-free discount factor D(T) is calculated by regarding LIBOR as a risk-free rate. Assume that forward LIBOR L (T_{i-1}, T_i) and D(T_i) at each term of years [T_{i-1}, T_i] meet the following formula:

$$\frac{1}{1+L(T_{i-1},T_i)\Delta T_i}=\frac{D(T_i)}{D(T_{i-1})} \quad \text{that is: } L(T_{i-1},T_i)=\frac{1}{\Delta T_i}\frac{D(T_{i-1})-D(T_i)}{D(T_i)} \quad \text{....(1)}$$

Based on this assumption (referred to as "single curve"), D(Ti) that is consistent with the LIBOR and swap rate for the contract month of each year observed on the market is estimated. Here, $\Delta T_i = T_i - T_{i-1}$ represents an interest payment interval (number of years), which is called "day count fraction." Since LIBOR is Act/360, ΔTi is the number of years calculated by dividing the actual number of days in [T_{i-1}, T_i] by 360. As LIBOR is simple yield, a discount factor for a term not exceeding one year is calculated by a LIBOR for spot trading.

For a term exceeding one year, in the case of a plain vanilla interest rate swap (IRS) with term of years Tn, the fixed interest rate at which the present value of the fixed leg and the present value of the variable leg are equal (at par) is a swap rate C_n, and in such case, the following formula holds with each n.

$$c_n\sum_{i=1}^{n}D(T_i)\Delta T_i=\sum_{i=1}^{n}D(T_i)L(T_{i-1},T_i)\Delta T_i=\sum_{i=1}^{n}\{D(T_{i-1})-D(T_i)\}=D(T_0)-D(T_n) \quad \text{....(2)}$$

With this formula, $D(T_n)$ can be estimated for each term of years (for more rigorous calculation, interpolation and extrapolation would be necessary).

[OIS Discount]

Since around 2010, most business-to-business transactions have been conducted as secured transactions, and valuations using multi-curves, such as OIS-based discount factor, $D(T_i)$, and projections of forward rate in each period (L (Ti-1,Ti)), have become a de facto standard. In the JPY market, TONA (Tokyo Overnight Average Rate), an uncollateralized overnight call rate which is a referencing interest rate for OIS, is applied as a risk-free interest rate (RFR, a daily compound interest rate applied to add interest to a security). The forward LIBOR is projected sequentially from the first equality in formula (2) (formula (1) and the second equality in formula (2) do not hold), but the forward rate differs according to TONA ΔTi. The currency of the collateral also has an influence on valuation. Thus, the calculation becomes complicated, making valuation models more difficult.

OIS (Overnight Index Swap) is an interest rate swap transaction which uses the overnight rate for a certain period (compound rate) as a floating rate and exchanges it with a fixed rate. Payment is made annually if the period is one year or longer, or made on the last day of the period if it is less than one year. Since (completely) secured trading is not exposed to any counterparty risk, a risk-free, OIS-based discount is applied. On the other hand, LIBOR, an unsecured short-term interest rate among leading banks, involves credit risk.

OIS reflects market players' expectations for the central bank's target rate. If C_n is an OIS rate, the first equation (containing a term for L) in Formula (2) (i.e., $c_n \sum_{i=1}^{n} D(T_i)\,\Delta T_i = \sum_{i=1}^{n} D(T_i)\,L(T_{i-1}, T_i)\,\Delta T_i$) does not hold, but the equations comprising of the leftmost expression of Formula (2) (i.e., $c_n \sum_{i=1}^{n} D(T_i)\,\Delta T_i$) and the third expression onwards (i.e., $\sum_{i=1}^{n} \{D(T_{i-1}) - D(T_i)\}$ onwards) hold, which allows $D(T_n)$ of the OIS discount to be obtained sequentially. The forward rate of RFR is given by a single curve of OIS.

Major countries use uncollateralized overnight call rates such as RFRs, except for the United States, which uses the secured overnight financing rate (SOFR) instead of the effective federal funds rate (EFFR). In October 2020, the OIS reference interest rate for CCP-cleared derivatives in the United States was changed from the EFFR to the SOFR. In principle, the interest on collateral is the daily compound interest of RFR.

(2) Interest Rate Used as a Benchmark

In almost all cases, until the second half of 2021, the LIBOR or swap interest rate for yen, dollar or euro was the interest rate used as a benchmark reference in OTC derivatives transactions.

Short-term interest rates in which the period is less than one year include the LIBOR which is determined in London time and the TIBOR which is determined in Tokyo time. The **LIBOR (London Inter-bank Offered Rate)** is the rate of lending between banks in London and pronounced "l[ɑi]b[o]r", which includes various short-term rates such as the overnight rate (O/N), the one week rate (1WK), the one month rate (1M), the three month rate (3M), the six month rate (6M), and the one year rate (1Y). **TIBOR (Tokyo Inter-bank Offered Rate)** is the rate of lending between banks in Tokyo, and pronounced "t[ɑi]b[o]r".

For interest over a period in excess of one year, the long term interest rate corresponding to the swaps for each of the term years is used (the "swap rate"). The swap rate refers to a fixed interest rate at which the present value of the cash flow on the variable side (the variable leg) and the present value of the cash flow on the fixed side of the interest rate swap are equal (at par). There are, of course, term years for up to 10 years, and the statement of reference rates (indications) also exists for very long periods such as 20 or 30 years.

It is important to be aware that interest is usually expressed at an annualized rate. Elements such as the spread and volatility are expressed in an annualized rate as well, in addition to the interest rate. It is also necessary to be aware that as shown in the Chart 1-51 there are differing rules for expressing the short-term rate.

Chart 1-51 Methods of Expressing Interest

Method of Expression	Numerator	Denominator	Examples of Use
Act/365	The actual number of days in the relevant period	365 (adjusted to 366 days in a leap year)	Short-term interest in Japan or the UK Yen/Yen swap rate
Act/360	The actual number of days in the relevant period	360	Euroyen LIBOR US short-term interest rate
30/360	Number of months in the relevant period × 30 + the increase or decrease in the actual number of days in the month	360 (30/360, 30E/360)	Bond based

The term "Act" in the method of expression is an abbreviation of "Actual" and means the actual number of days in the calendar. The charts for the denominator represent the number of days that is considered to be a year. The number of years is calculated on this basis, and is multiplied by the annual rate expressed or the par value to calculate the amount payable.

(Actual) Amount Payable = PV × R × Y
Where; PV= Par Value
R = Rate (expressed as an annual rate)
Y = Number of years (expressed as a ratio)

See the following two examples:

<Hypothetical examples>

(i) The previously reset Euroyen 6 M LIBOR (six month LIBOR) is 0.84% (Act/360), and there are 183 days from the prior payment date through the present payment date (payment interval of half a year). If the amount borrowed is JPY100 million then the amount payable will be JPY100 million × 0.84% × 183/360 = JPY427,000.

(ii) When the conversion of the number of days of an interest rate is expressed in annual units, a conversion is first made of one year into 365 days. For example, when the Eurodollar 6 M LIBOR expressed in Act/360 is 4.30%, it is converted to an Act/365 basis, i.e., 4.30% × 365/360 = 4.36%.

However, the use of LIBOR as a benchmark interest rate for the currencies of Japan, the United Kingdom, Europe and Switzerland was abolished at the end of 2021 (permanent cessation of publication of LIBOR settings) (the cessation for USD LIBOR has been postponed to the end of June 2023) (for details, see this Chapter "Conclusion 2. International Regulatory Reforms for Derivatives Transactions (5) Interest Rate Benchmark Reforms"). However, EURIBOR, TIBOR, and IBORs for currencies other than the five major currencies will remain in use.

Accordingly, market participants that were engaging in LIBOR-related derivatives transactions were forced to choose either of the following by the end of 2021: [i] they had to either replace LIBOR with an alternative benchmark called a LIBOR fallback; or [ii] terminate the existing contracts and conclude new contracts of the same type based on an RFR.

As a result of the initiatives carried out by the financial supervisory authorities, central banks and financial institutions of major countries to ensure the smooth transition from LIBOR, in the second half of 2021, the outstanding amount of LIBOR-related swaps decreased and RFR-based transactions increased, and preparations have been made to establish legal procedures and system operations for LIBOR fallbacks. Meanwhile, on July 27, 2021, Quick Benchmarks started to publish the Tokyo Term Risk-Free Rate (TORF) calculated based on OIS rates on a daily basis. TORF is considered to serve as an alternative benchmark giving top priority to loans and bonds, rather than derivatives.

The following three interest rates are available as alternative benchmarks to replace JPY LIBOR.

Chart 1-52 **Characteristics of Alternative Benchmarks to Replace JPY LIBOR**

	TONA Compounding (Fixing in Arrears)	TORF	TIBOR
Underlying rate	TONA (Uncollateralized overnight call rate)	JPY OIS	TIBOR
Tenor	—	1M, 3M, 6M	1W, 1M, 2M, 3M, 6M, 12 M
Day count	Act/365	Act/365	Act/365
Reference period	Fixing in Arrears	Fixing in Advance	Fixing in Advance
(Bank's) Credit Risk	Not included	Not included	Included
System operation load	High	Low	Low

[Reference]

[LIBOR Fallback Rate]

The LIBOR fallback rate is calculated on a daily basis, using the formula proposed by ISDA (calculated by Bloomberg). The rates for LIBOR-related swaps (LIBOR for the five currencies of Japan, the United States, the United Kingdom, Europe, and Switzerland) will be fixed based on this rate from January 2022 onward (for USD LIBOR, from July 2023 onward).

LIBOR fallback rate = Adjusted RFR + Fixed spread....(3)

・Adjusted RFR: Daily compounding RFR (OIS floating rate, fixing in arrears) x 360/365 (in the case of TONA)

・Fixed spread: the median value of spreads of the same tenor in the past five years until the announcement of a trigger event, Act/360

On March 5, 2021, the UK Financial Conduct Authority (FCA) announced the permanent cessation of publication of LIBOR settings for the five major currencies by the end of 2021 (for USD LIBOR, by the end of June 2023). Due to this trigger event, the spreads for each tenor (1M, 3M, and 6M) have been fixed. While LIBOR is a fixed-in-advance rate, RFRs are fixed-in-arrears rates, so the LIBOR fallback rate will be fixed in arrears. In Formula (3), the day count is Act/360 for LIBOR and the spread, whereas it is Act/365 for JPY RFR (TONA compounding), so the adjusted RFR will be used for conversion. It is a backward-looking rate with a lag of two business days between the reference period and the calculation period, and interest will be paid at the end of the calculation period (in the case of ordinary OIS rates, the reference period coincides with the calculation period, and interest is paid two business days after the fixing). Several calculation methods for interests are under consideration.

(3) Characteristics of Swap Transactions

By financial benchmark, swap transactions are classified into interest rate swaps, currency swaps, credit default swaps (CDS), total return swaps (TRS), equity swaps, and insurance swaps.

Swaps are handled only as OTC transactions, in contrast with futures and options that are listed on the market and traded on the exchange. Swaps are traded by negotiation, and unlike bonds, they are not supposed to be transferred to third parties based on sales transactions, and therefore they do not have the concept of accrued interests.

In addition, except for those subject to special riders containing callable options, swaps are not intended to be cancelled (unwound) before maturity without paying costs.

The major traders of swaps are incorporated entities such as financial institutions and business corporations (swaps can be traded with only those entities for which a credit limit can be set and an agreement can be made by means of an ISDA agreement or any written agreement that complies with it).

A written agreement should be prepared for each type of OTC derivatives, for example, separately for interest rate swap and for CDS. The written agreement concerning these swaps may use a proprietary agreement in the Japanese language which conforms to an agreement on banking transaction (which is based on the ISDA Agreement) if the transaction is between a business corporation and a bank (or a securities company), or use the ISDA English language agreement if the transaction is between financial institutions such as banks, securities companies and life insurance companies.

[Explanation of Terms]

(i) ISDA

ISDA stands for the International Swaps and Derivatives Association. The ISDA defines a series of sample forms regarding contracts for OTC derivatives (including swaps), such as the ISDA master agreement, schedule, confirmation, and CSA.

The ISDA master agreement is considerably long. Using this agreement form, it would take several months to conclude a new contract for OTC derivatives transactions because the risk control divisions and legal divisions of both parties would need to scrutinize the terms and conditions of the contract beforehand.

However, once it is concluded, the parties would only have to add individual agreements containing the major terms and conditions or exchanging confirmations which are short documents.

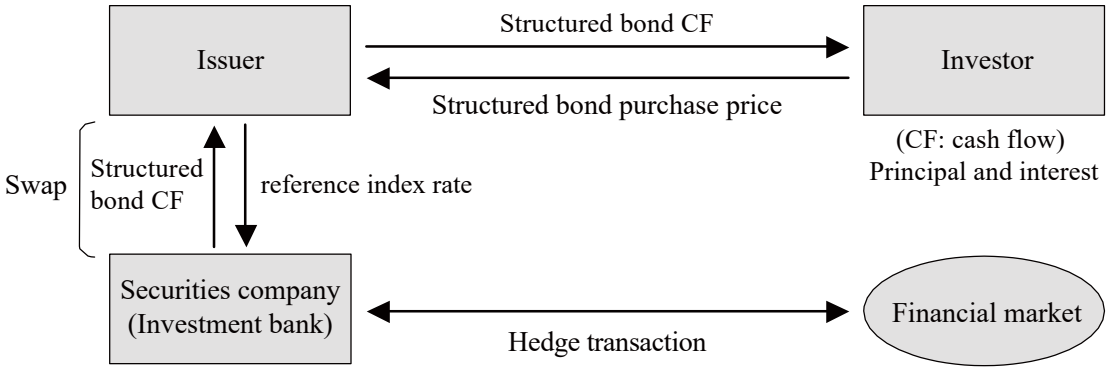
(ii) CSA

Credit Support Annex (CSA) is similar to a margin call but they are different in terms of the frequency. In the case of CSA, collateral is provided only when an increase in exposure exceeds the threshold and the amount of collateral exceeds the minimum transfer amount (MTA). On the other hand, in the case of a margin call, the threshold is zero and an increase in exposure is adjusted (marked to market) on a daily basis. The collateral value is marked to market including accrued interest and dividend.

Recently, with an eye on the introduction of the "Margin Requirements for Non-Centrally Cleared Derivatives," terms and conditions of CSA have been tightened, such as by reducing the threshold and MTA, changing the interval for mark-to-market valuation from one or two weeks to a daily basis, and requiring an independent amount (IA) to be established at the beginning of the transaction. In the summer of 2016, the ISDA published the Credit Support Annex for the initial margin (IM-CSA) and Credit Support Annex for the variation margin (VM-CSA) in line with the regulations for margins not subject to central clearing.

There are cases in which swaps are not traded directly but included as part of a package of financial products. They are called "structured products" or "structured bonds." In these transactions, the cash flow paid by the swap counterparty to the issuer is passed to investors as indicated in the chart below.

Chart 1-53 Structured Bond and Underlying Swap



Most structured bonds are designed by incorporating an early redemption scheme. Investors would receive a high coupon immediately. This is an economic effect that they can obtain by implicitly selling exotic options. Although the issuer of a structured bond should have a high rating as a prerequisite, principal and interest on the note is exposed to the counterparty risk of the securities company (investment bank), and the derivatives (swaps) contained in the note are exposed to the market risk. Therefore, it is especially important to accurately understand the payoff as defined for the relevant product by making reference to the details of the term sheet. Structured bonds are complex financial products and they are not always favorable to investors in terms of risks and returns. Many investors have complained about these types of bonds. In recent years, the Financial Services Agency has been closely monitoring the compliance status of the sales of structured bonds and requesting financial institutions to enhance transparency by disclosing the costs for structuring bonds.

6 Risks in Derivatives Transactions

Derivatives are financial products that derive from underlying assets, etc., and consequently, the market price of a derivative will change with changes to the prices and parameters of the underlying assets as well as the expiration of time (as the time to maturity declines).

There are also possibilities of unforeseen losses as a result of, *e.g.*, the market losing liquidity, investment in unfamiliar assets, or excessively leveraged trades. For these reasons, risk management in connection with the transactions is very important.

Business entities taking positions have a duty in practice to conduct risk management, *i.e.*, to allocate and calculate the necessary risk capital, in addition to conducting market evaluations of financial products (Capital Requirements).

Derivatives transactions are exposed to risks of numerous types. In identifying the risk, the most important factor is what underlying assets and reference indices (such as shares, bonds, interest, exchange rates, credit and commodities) are linked to the derivatives and how. A further important element is how the various factors that generate risk are stated. Chart 1-54 is a classification of the types of risk.

Chart 1-54 **Classification of Risks**

Types of Risks	Substance
(i) Market risk	Unpredictable or probabilistically varying risks such as market prices, interest rates or exchange rates (market risk)
(ii) Credit risk	Risks for which the price varies probabilistically in connection with unforeseen changes in creditworthiness (the risks associated with the borrower, the issuing company or the counterparty)
(iii) Liquidity risk	Includes risks such as that it will not be possible to make a trade of a sufficient size to close out a position, or the potential unwinding cost
(iv) Operational risk	*E.g.*, risks of crime, system failures and trading errors
(v) Systemic risk	*E.g.*, risks of collapse of overall liquidity of the market, or of chain reaction bankruptcies
(vi) Complexity risk	*E.g.*, mark-to-market model risk, parameter risk, risk of response to changes in regulations or systems

Among these, market risk and operational risk are of particular importance in market derivatives transactions. These two constitute core structural factors in the capital adequacy regulations and allocation of risk capital as well as the accumulation of set asides referred to as reserve or provisions, and risk management in trading and investment strategy.

(1) Market Risk

The market risk in derivatives is the risk resulting from fluctuations in the market value and various other factors (e.g. in interest or exchange rates).

The risks that should be considered will differ depending on the financial indicator to which the derivatives refer, or the underlying asset. In interest rate swaps, the interest risk (a change in prices in the event of causing fluctuation in interest rates over each term) would have paramount importance, while in share options the most important would be the delta, gamma and vega (sensitivity to volatility).

The extent of exposure to market risk does not differ between a market derivative and an OTC derivative if the payoff or rider clauses are the same.

For the purposes of risk management, the estimation of market risk is the most important task, having precedence over calculating the counterparty risk.

When handling financial products, it is obviously important to make a mark-to-market evaluation. Both the income (profit and loss) and risk calculations are to be calculated on the basis of a mark-to-market evaluation. If derivatives (structured products) are illiquid it will not be possible to obtain a market price, and consequently, the only alternative is to use a logical price that is calculated using an evaluation model. Nevertheless, there is no guarantee of accuracy regardless of the extent of sophistication and technical refinement of the technique. There is also a risk of disparity in values in the market arising from the difference in terms of the evaluation models applied (such risk is referred to as "model risk"). As a model becomes more complex, the model risk increases. In risk management practice, financial institutions conduct model validation and also have the models checked by audit corporations and third-party vendors.

In the first place, a certain tendency has recently been exhibited in the public at large, that shows doubt is being cast upon market fundamentalism which would hold that valuation at the value in the market at that time is always correct. It is necessary to examine carefully whether the market value within the market at that time is really a market value at which transactions can take place in a market suffering from a contraction in credit, or a drying up in liquidity, or excessive credit or liquidity when the supply and demand are not in balance. This also applies to the price of the underlying asset.

In addition to Value-at-Risk (VaR) and Greeks (sensitivity levels expressed by the symbols delta, gamma and vega) there has recently been an emphasis on the importance of stress tests, *i.e.*, risk management methods which simulate the amount of losses on positions when an unforeseen event occurs, under assumptions that cause a major shift in, *inter alia*, parameters and share prices.

[Explanation of Terms]

(i) Greeks

The Greeks are partial differentiation derived from parameters (measuring the level of price sensitivity) that include the price of the underlying assets, the period to maturity, interest rate and the volatility. There are such Greeks as delta, gamma, theta, rho, vega, volga, and vanna.

(ii) Value-at-Risk (VaR)

The Value-at-Risk (VaR) is the maximum loss that can be anticipated in a given time period within a certain confidence interval. As an example, a 10-day VAR at 99% means the maximum loss that can occur during the period of 10 business days at a probability of 1%.

(iii) Stressed Value-at-Risk

Stressed Value-at-Risk is a VaR under a stress during the observation period when there were large market fluctuations, such as after the collapse of Lehman Brothers.

(iv) Expected Shortfall (ES)

Expected Shortfall (ES), which is also referred to as Conditional VaR (CVaR) or Trail-VaR, represents an expected amount of loss under conditions beyond the threshold (VaR). It is better in quality in risk measurement than VaR. It will be introduced under the FRTB regulations.

In order to accurately evaluate the impact on income that will be created and what type of risk exposure will

occur as a result of fluctuations in market values or parameters (of which volatility is of particular significance in the case of options) of a financial indicator, it is necessary to analyze profit and loss on a timely (at least daily) portfolio basis, and to analyze these risk factors using tools such as Greeks.

Market risk will be the greatest risk factor if an unhedged position, whether long or short, is held in a derivative, but it is possible to reduce the market risk of the entire portfolio to almost zero if the position is hedged using various trading strategies or other derivatives. Nevertheless, even in these cases the following risks exist.

(2) Credit Risk (Counterparty Risk)

The counterparty in a derivative transaction means the other party to that transaction, and the credit risk of the counterparty is referred to as the counterparty risk.

The credit risk refers to the risk of the debtor's failure to pay its debt (default). While some derivatives transactions refer to the credit risk of a specific party, what matters in OTC transactions is the counterparty risk.

Market transactions refer to transactions on an exchange for which the form of the transaction is fixed and standardized and which are widely carried out. Numerous unspecified market participants exist as sellers or buyers, while the counterparty to settlement is a specific settlement institution exclusive to the exchange. Consequently, since a system is in place that includes margin deposits and margin calls, there is almost no need in a market derivative to consider the counterparty risk which is the credit risk of the other party to the transaction.

An Over-the-Counter (OTC) transaction, however, is unavoidably exposed to counterparty risk, since the transaction is negotiated directly in a bilateral contract between two parties, the buyer and seller. There is a potential counterparty risk of loss that may be incurred (and may become a reality in the event that the non-defaulting party has gains at market valuation which cannot be realized) if the other party falls into default (bankruptcy).

Since OTC derivatives are negotiated transactions, they are necessarily exposed to the risk of default by the counterparty (credit risk). If the counterparty defaults when it has a valuation loss (which means that the first party has a valuation gain) then the first party will be unable to realize the valuation gain. If the counterparty to a swap contract defaults then it will be necessary to enter into same swap contract with another counterparty in order to obtain the same economic effect, which will entail further structuring costs. The anticipated loss in these cases is referred to as the exposure (see [Exposure] below for details). There are various definitions and methods of calculating this exposure and this is even discussed at length within the capital requirements.

In order to protect unrealized gains from these credit risks, in some cases collateral is to be provided or a demand is made to provide further collateral. The Credit Support Annex (CSA) in accordance with the ISDA is an example of this. This is a mutual support agreement in which a deposit will be made of cash, or assets that can be easily converted to cash such as national government bonds, depending on the rise or fall in credit risk exposure in a negotiated transaction. Moreover, in some cases credit derivatives such as a CDS are used in order to hedge the counterparty risk.

When a contract is entered into with the same party to sell and to buy interest rate swaps with the same payment date and which have the same amount of notional principal, the totalized portfolio position will be zero, and consequently, if netting is possible there would be no counterparty risk. Although we have omitted a detailed discussion, to what extent counterparty risks can be reduced by exposure netting, thereby minimizing the necessary capital and increasing capital efficiency, is an issue of great importance to financial institutions.

On the other hand, in the course of the financial reform after the financial crisis triggered by the collapse of Lehman Brothers, an idea of having OTC derivatives transactions undergo collective clearing at a clearing organization has emerged. If the transactions are collectively cleared at a central counterparty clearing house

(CCP), they will not be subject to direct counterparty risk. Accordingly, taking CDS as an example, a proposal is being considered to standardize the specification of OTC derivatives transactions if possible and to transfer them to settlement at the CCP. However, as this plan causes the counterparty risk to be centralized at the CCP, in a strict sense, there is a concern that it would be difficult to collect sufficient margin or collateral, which means that there is room for discussion about the credit risk of the CCP itself if its capacity to pay in the event of the counterparty's default is inadequate.

[Reference]

[Exposure]

Exposure indicates a quantity that expresses the extent of vulnerability to a particular risk. In the event of counterparty risk this means the anticipated loss (restructuring cost).

Under the current exposure method which is a simplified method of calculating exposure, the exposure is the total amount calculated by adding (1) the cost of restructuring that is calculated based on the market value at the present time, with this cost represented by zero if it is a negative value, plus (2) the potential exposure (the notional principal multiplied by a certain add-on weight that corresponds to the remaining period).

Exposure = (1) Restructuring Cost + (2) Potential Exposure
Where the Potential Exposure = the Notional Principal × an Add-on Weight corresponding to the Remaining Period

The add-on weights under the current exposure method are as shown in the chart below.

Chart **Add-On Weights Under the Current Exposure Method**

Remaining Period	Interest	Exchange rate/ gold	Equity	Precious Metals (Excluding Gold)	Other
Not more than 1 year	0.0%	1.0%	6.0%	7.0%	10.0%
More than 1 year but not more than 5 years	0.5%	5.0%	8.0%	7.0%	12.0%
More than 5 years	1.5%	7.5%	10.0%	8.0%	15.0%

* In credit derivatives transactions, 5% applies to blue-chip companies, and 10% applies to others.

However, in March 2018, the Basel Committee put into operation the proposal to abolish the current exposure method (CEM) and replace it with a "standardized approach for counterparty credit risk (SA-CCR)" (CEM remains available for the time being, except for financial institutions that adopt the Internal Model Approach).

Exposure at default (EAD) = α × ((1) Restructuring Cost (RC) + (2) Potential Future Exposure (PFE) Add-on)
α = 1.4

The above formula resembles CEM, but (1) RC and (2) PFE are calculated more precisely. (1) RC

depends on the availability of variation margin (VM), and add-on weights, which are used to calculate (2) PFE, are classified in more detail (for each asset class) and aggregated.

Recently, it has come to be understood that it is desirable to calculate the Expected Potential Exposure (EPE) and the Potential Future Exposure (PFE) on the portfolio basis after netting (setting off the gains or losses to the same transaction counterparty). A method for calculating the expected exposure precisely is recognized as an internal model method (IMM), and either the abovementioned standardized approach or the IMM may be chosen. However, since the IMM is developed by each company, it must be approved by the authorities and also undergo verification by back-testing regarding the consistency and effectiveness as a measuring method.

Losses that occur to you when the counterparty defaults are limited to those in which you stand to gain (have a valuation gain at a market price evaluation), and consequently, your anticipated future losses (exposure) in the relevant swaps would be a call option with the gains or losses in the mark-to-market evaluation as the underlying assets and the collateral value as a strike price (= max{valuation gain or loss - collateral value, 0}). If there is no collateral, the strike price would be zero. For this reason, the counterparty risk includes the nature of options.

In interest rate swaps, the cash flow declines as maturity is approached and consequently fluctuation of the market value declines, causing the exposure to approach zero. Initially, the current value of the swap is zero, and the exposure maximizes during the period of the swap. Nevertheless, in the case of a swap involving exchange of the principals, the credit risk involving the principal is large, and the exposure does not approach zero even when maturity is approached.

The exposure can be reduced by the collateral provided by the counterparty. For the simplification of the discussion, however, we assume the case where there is no collateral.

In an option, the option premium is usually paid at the start of the transaction (**upfront premium**), and consequently, the seller does not incur any counterparty risk. However, exposure does exist if the premium is payable afterwards.

In a simplified formula, the amount of counterparty credit risk (CCR) is expressed as follows:

Counterparty credit risk = Loss given default (LGD) × Exposure (EAD) × Counterparty's Probability of Default (PD)

Wherein LGD refers to the rate of loss that may occur in the event of the counterparty's default ($0 \leqq LGD \leqq 1$), and the Counterparty's PD refers to the probability that the counterparty will default in the future.

When the market conditions deteriorate, the PD and the exposure often increase at the same time. For example, suppose that you have bought CDS to cover credit risk, but if there is a positive correlation between the reference company's PD and the counterparty's PD, credit risk will increase with regard to both the reference company and the counterparty, and the counterparty risk will increase accordingly. Such a situation is called "**wrong way risk**."

In over-the-counter transactions (negotiation transactions), as these transactions cannot avoid counterparty risk, the trend is to incorporate a reasonable credit risk adjustment in the valuation.

In the case of unsecured derivatives transactions, the CVA (Credit Value Adjustment) is made in which the market value will be the amount of the risk-free valuation (without considering the risk of default) less the amount

of the adjustment items that take into account the (other party's) counterparty risk. The adjustment that takes into account one's own default is called DVA (Debt Valuation Adjustment), and the adjustment that takes into account one's own funding is called FVA (funding valuation adjustment). Mark-to-market valuation would thus be complicated (these are collectively referred to as "XVA"). These have risks as they are exposed to fluctuations in market or credit prices. CVA risk is added to credit risk assets. The Basel III finalization announced recently that it rejected the internal model approach for measuring CVA risk (IMA-CVA) and adopted the following: (level adjustments will be made during the transitional period)

Chart 1-55 Basel III Finalization: CVA Risk Measurement Approach

Measurement Approach	Outline
SA-CVA	Calculated based on the risk sensitivity (*e.g.*, delta, vega) (requiring consistency with the Fundamental Review of the Trading Book (FRTB) and supervisory approval)
BA-CVA	CCR (calculated by the formula designated by the supervisory authority using the EAD measured by SA-CCR or IMM) and the effective maturity as input factors
Simplified approach	Requiring the same amount of capital as that required to cover CCR (financial institutions dealing in non-clearing derivatives with assumed principal of less than 100 billion euros)

At the same time, secured derivatives transactions are expanding after the financial crisis triggered by the collapse of Lehman Brothers. If exposure is reduced to zero by security (margin), CVA also becomes zero.

(3) Liquidity Risk

With regard to options, in general, complex options are not welcomed in market derivatives, and in the majority of cases plain vanilla options such as European calls and European puts are used. For this reason, market derivatives are thought to have a higher degree of market liquidity than is the case for OTC derivatives.

Since in many cases OTC derivatives involve made-to-order options (hereinafter referred to as "exotic options") such as a product design to meet customer needs, their liquidity is considered to be lower than that of a market derivative. Nevertheless, not all OTC derivatives have exotic options. Some OTC plain vanilla options may be used as hedge tools or investment commodities. In addition, some exotic options are standardized, such as barrier options in a Forex trade for example, and have a high liquidity in the market.

Almost all exotic derivative products are OTC derivatives, and it is thought that their market liquidity is not generally that high. Nevertheless, depending on the financial product, there are transactions which are standardized and conducted frequently.

In some cases, for plain vanilla financial products (such as fixed and standardized products, or typical European options), the OTC derivatives have stronger demand and higher liquidity than market derivatives. This is particularly the case for derivatives involving interest or Forex or credit, in which the market is for OTC trading. In contrast to market derivatives, the market participants in OTC derivatives are limited in almost all cases to professionals such as investment banks and securities companies. A market in which liquidity has become very low means a market that has experienced a deterioration in the balance between supply and demand, such as a situation in which everyone is trying to sell, and it is only possible to sell at a cheaper price. This frequently causes a credit contraction, and consequently, liquidity risk and credit risk have the nature of being inseparable. For example, in the case of credit spread for corporate bonds, the extent to which liquidity risk is included as a risk premium in

addition to the credit risk is uncertain. In either case, depending on the trading strategy and the like there are cases in which it would be best to make a conservative valuation that takes liquidity risk into consideration in a situation in which the liquidity is low.

(4) Operational Risk

Operational risk is overall risk in relation to business activities, or more specifically, risk arising from inappropriateness or malfunction of internal process, human resources and systems or from losses caused by exogenous events. It may be subcategorized into: risk of violation of laws and regulations (compliance risk); risk of misconduct or mistake (clerical risk); risk of system failure and hacking (system risk); risk of fire, earthquake, flood or other natural disaster (disaster risk); and risk of damage to the company's reputation due to rumors (rumor risk). The frequency of each event and the scale of loss arising therefrom would be material issues, and improvement for internal management systems and control is required.

Since Basel II, there has been a call for financial institutions to maintain their capital to cover operational risk. Basel III reformed the approaches for measuring operational risk and replaced them with a standardized approach of calculating the operational risk capital charge by multiplying the business indicator component (BIC) which represents the business scale by the internal loss multiplier (LIM) which is based on the actual loss.

(5) Systemic Risk

Systemic risk refers to risk of default of a single company or corporate group or malfunction of a specific market affecting the market or financial system as a whole. Large-scale disasters, wars and terrorist attacks are also included in this category. If such an event occurs, the sense of uncertainty or malfunction could spread across the market or financial system in an instant and cause liquidity to deplete (liquidity risk), and could finally result in a financial crisis of a scale on a par with the one after the collapse of Lehman Brothers or the Great Depression. In the present time, with global financial transactions, complicated networks, and real-time communication of information ongoing, a default of a large amount and the resulting failure of the financial system could have an immeasurable, adverse impact.

(6) Complexity Risk

This is a specific risk peculiar to OTC derivatives transactions, which is derived from the complexity of financial products. In particular, if it is difficult to obtain the market value of derivatives, there is no choice but to use a theoretical value obtained by a model in order to conduct mark-to-market valuation, which would inevitably invite model risk and parameter risk. Although an internal model method (IMM) is exposed to the impact of model risk, it is not expressly included in the regulatory capital under the Basel Regulations but is included in the management capital. Conventionally, model risk has been generally recognized and added to VaR or covered by a reserve. It is also subject to periodical validation of mark-to-market valuation and validity check. There is a third party who collects mark-to-market data of OTC derivatives from the participants on the sell side (banks and securities companies), analyzes the distribution, and calculates the respective participants' deviation from the average. There are also third-party vendors providing mark-to-market services. In light of the importance of model management, the Financial Services Agency published the "Principles for Model Risk Management" in November 2021.

Changes in the regulations and accounting systems introduced by the supervisory authorities may also pose complexity risk by increasing costs to be incurred by companies in order to carry out a complex operational flow or

develop additional systems. OTC derivatives regulations and the Basel Regulations are becoming increasingly complex, giving rise to an argument that the capital requirements should be simplified.

On the other hand, there is a view that the figure for the risk asset calculated by the standardized approach can be used as the floor when assessing the risk assets by the internal model, in order to obtain a conservative assessment and reduce the variance in assessments caused by such complexity. In Basel III finalization, in order to limit the regulatory capital benefits that a bank using internal models can derive relative to the standardized approaches, the output floor is applied under which a banks' risk-weighted assets are calculated as the higher of (i) 72.5% of the total risk-weighted assets calculated using the standardized approaches, or (ii) the total risk-weighted assets calculated using the internal model approaches.

The standardized approaches for credit risk have also been revised to apply different methods for calculating exposure to: 1) banks; 2) corporates; 3) residential real estate; 4) commercial real estate; 5) subordinated debt and equity. In addition, input floors for internal rating-based (IRB) approaches, such as PD, LGD, and EAD, have been introduced.

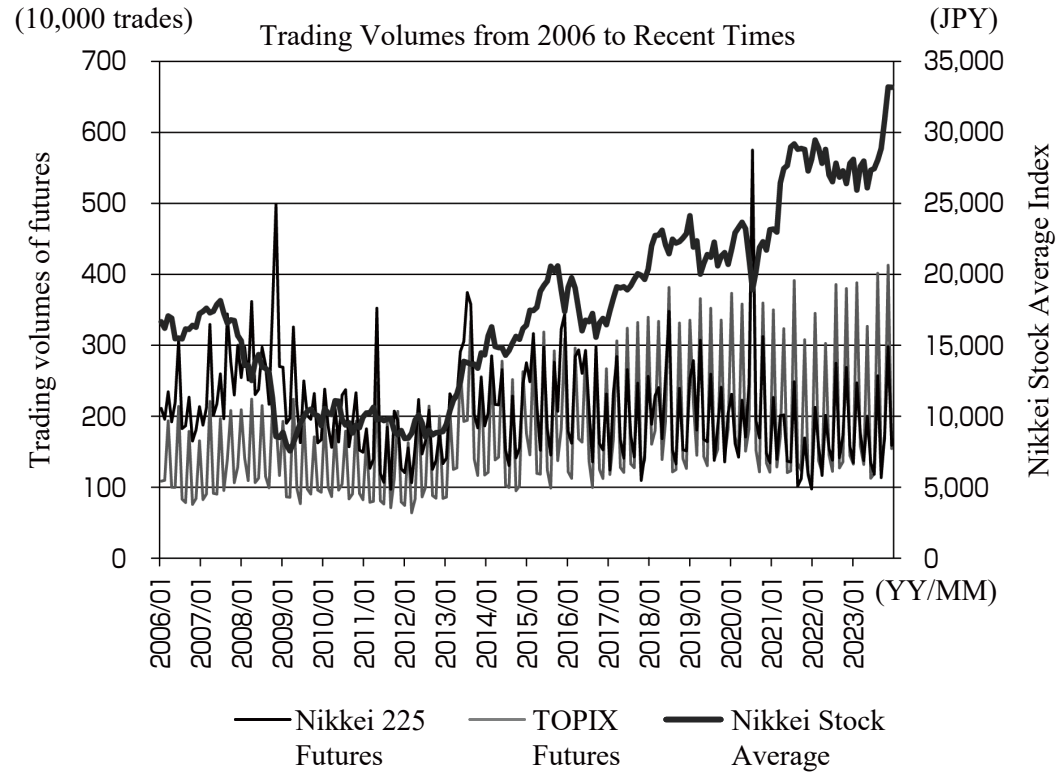
Conclusion

1. Current Status of Derivatives Transactions

Let us look at the current status of derivatives transactions in Japan.

(1) Trading Volumes

Chart 1 Monthly Trends in Trading Volumes of Nikkei 225 Futures and TOPIX Futures

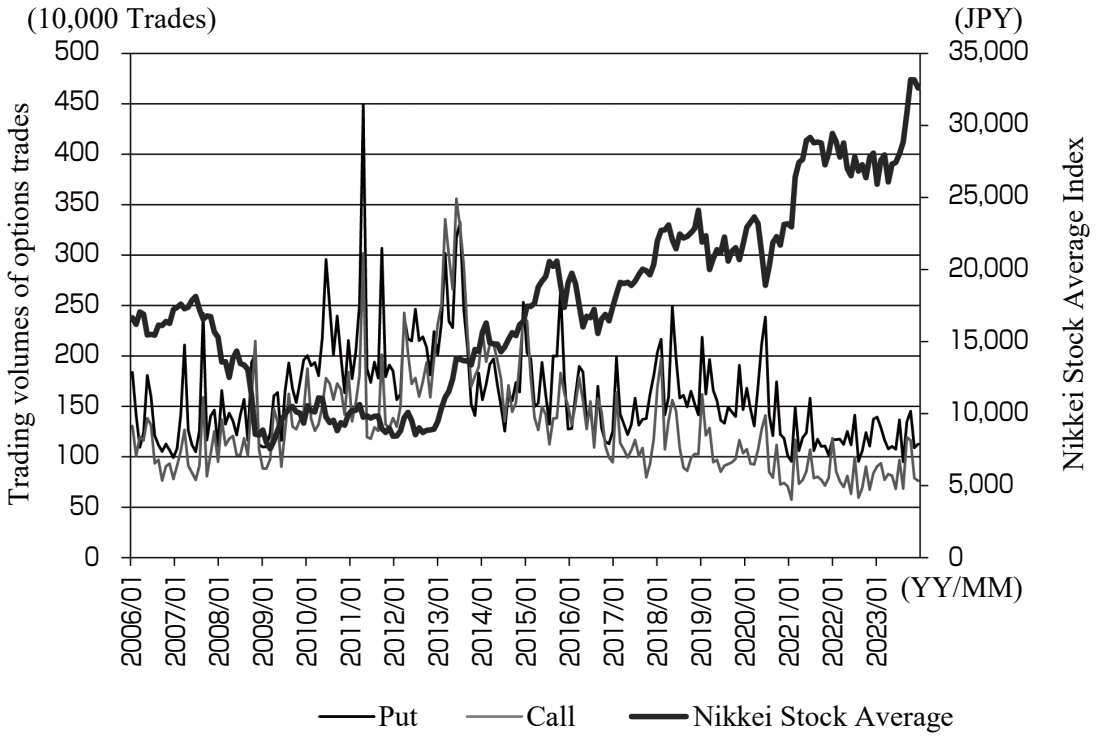


(Source) Based on data from e-AURORA

Chart 1 shows the trends in the trading volumes of Nikkei 225 Futures and TOPIX Futures.

The trading volumes of futures grew when the share prices moved largely. This tendency could be conspicuously seen at the time after the collapse of Lehman Brothers in 2008 and the time following the announcement of the monetary easing policy by the Bank of Japan in 2013, and most recently, at the time when the global stock price fell due to the COVID-19 pandemic in March 2020. In addition to the trades by foreign investors and Japanese individual investors, who are the main trading participants, bull/bear-type investment trusts linked with the prices of Nikkei 225 Futures and the net assets of leveraged ETF that show price movements that are twice as large as those of Nikkei 225 Futures have expanded, causing a recent increase in the total trading volumes on the markets.

Chart 2 **Monthly Trends in Trading Volumes of Nikkei Average Stock Price Index Options**



(Source) Based on data from e-AURORA

Chart 2 shows the trends in the trading volumes of put options and call options of Nikkei Stock Average Price Index options.

According to this chart, in Nikkei Average Stock Price Index options, the trading volumes of put options and call options were only about 250,000 trades around 2000, but the volumes continued to increase, reaching 3,500,000 trades in 2013. This can be explained by an increase in the number of foreign investors and increased participation by domestic individual investors due to reform of the tax system. In April 2013, the Bank of Japan introduced quantitative and qualitative monetary easing. As options are essentially traded for hedging purposes, the volume of option trading has been decreasing due to the reduction in opportunities for profits resulting from the decline in volatility, while the Nikkei Average Stock Price Index continued to rise due to the monetary easing.

(2) Trends in Trading by Major Investors by Investment Sector

Chart 3 Shares of Major Investors by Product

(10,000 Trades)

Nikkei 225 Futures	2015	2016	2017	2018	2019	2020	2021	2022	Average	Share
Corporations	350	424	330	367	311	366	282	294	340	8.2%
Individuals	628	460	364	441	322	460	316	407	425	10.2%
Foreign investors	3,746	3,589	3,223	3,612	3,274	3,935	2,502	3,157	3,380	81.1%
Securities companies	61	45	25	30	11	13	8	1	24	0.6%

10-year JGB Futures	2015	2016	2017	2018	2019	2020	2021	2022	Average	Share
Corporations	55	61	62	71	58	45	48	48	56	5.3%
Individuals	0	0	0	0	0	0	0	0	0	0.0%
Foreign investors	887	724	881	1,260	1,182	888	1,060	1,088	996	94.5%
Securities companies	2	2	0	2	1	1	1	1	1	0.1%

Nikkei 225 Options	2015	2016	2017	2018	2019	2020	2021	2022	Average	Share
Put by individuals	488	359	368	435	417	467	422	471	428	8.2%
Put by foreign investors	2,860	2,526	2,726	3,058	2,665	2,527	2,008	2,083	2,556	49.2%
Call by individuals	448	327	342	400	283	317	296	319	342	6.6%
Call by foreign investors	2,424	2,350	1,976	2,045	1,733	1,615	1,478	1,377	1,875	36.0%

(Source) Japan Exchange Group

Chart 3 shows the shares of the major investors for each product.

The share of trades by foreign investors is 81% for Nikkei 225 Futures, 95% for 10-year JGB Futures, and 85% for options (put and call options). Thus, foreign investors hold a considerably large share of derivatives trading activity. Looking at this situation, it would be no exaggeration to say that the price directions would be determined based on their behavior.

(3) Shares in Trading Values by Product

Chart 4 Shares in Trading Values by Product (2022)

Index Futures Transactions

	Product	Average Trading Value per Day (million yen)	Share
Stock index futures, etc.	Nikkei 225 Futures	2,443,160	32.0%
	Nikkei 225 mini	3,055,005	40.1%
	TOPIX Futures	2,015,049	26.4%
	mini-TOPIX Futures	57,521	0.8%
	JPX-Nikkei Index 400 Futures	22,060	0.3%
	TSE Mothers Index Futures	10,217	0.1%
	RN Prime Index Futures	0	0.0%
	TOPIX Banks Index Futures	3,657	0.0%
	TOPIX Core 30 Futures	3	0.0%
	TSE REIT Index Futures	7,856	0.1%
	Nikkei 225 VI Futures	11	0.0%
		7,614,538	99.88%
Dividend index futures	Nikkei 225 Dividend Index Futures	13	0.0%
		13	0.00%
Overseas index futures	DJIA Futures	8,787	0.1%
	TAIEX Futures	0	0.0%
	FTSE China 50 Index Futures	0	0.0%
		8,787	0.12%

JGB Futures Transactions

	Product	Average Trading Value per Day (million yen)	Share
JGB Futures	5-year JGB Futures	0	0.0%
	10-year JGB Futures	4,949,226	100.0%
	mini-10 year JGB Futures	203	0.0%
	20-year JGB Futures	4	0.0%

Options Transactions

	Product	Average Trading Value per Day (million yen)	Share
Options	Nikkei 225 Options	27,641	96.2%
	Nikkei 225 Weekly Options	254	0.9%
	TOPIX Options	786	2.7%
	JPX Nikkei Index 400 Options	0	0.0%
	Options on JGB Futures	49	0.2%
	Securities Options	7	0.0%
	Options on Gold Futures	0	0.0%

(Source) Japan Exchange Group

Chart 4 shows product-by-product comparison in terms of the average trading value per day regarding futures trading and options trading, based on the estimated trading values during 2022.

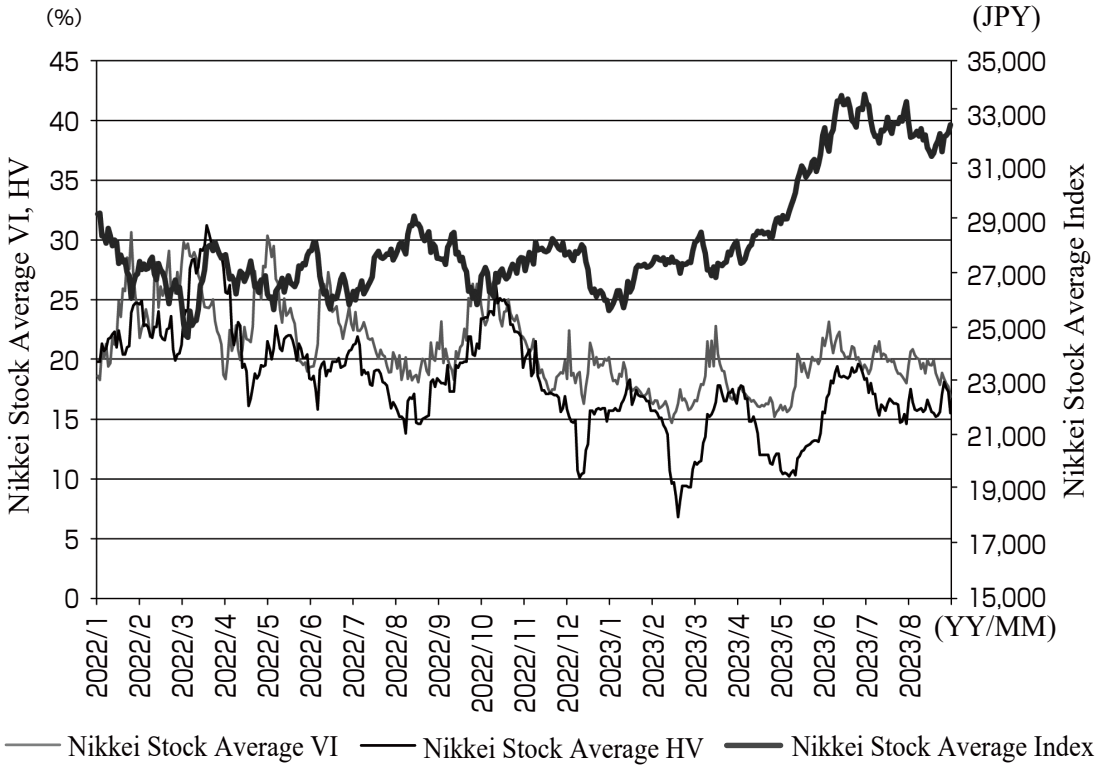
In index futures trading, Nikkei 225 Futures, Nikkei 225 mini and TOPIX Futures account for almost all of the total trading value. A comparison of the Nikkei 225 Futures/Nikkei 225 mini and TOPIX Futures/mini-TOPIX Futures shows that the former accounts for 72%, which is larger than the share of the latter, 27%.

Most options transactions are for Nikkei 225 Options and most JGB Futures transactions are for 10-year JGB Futures.

(4) Volatility

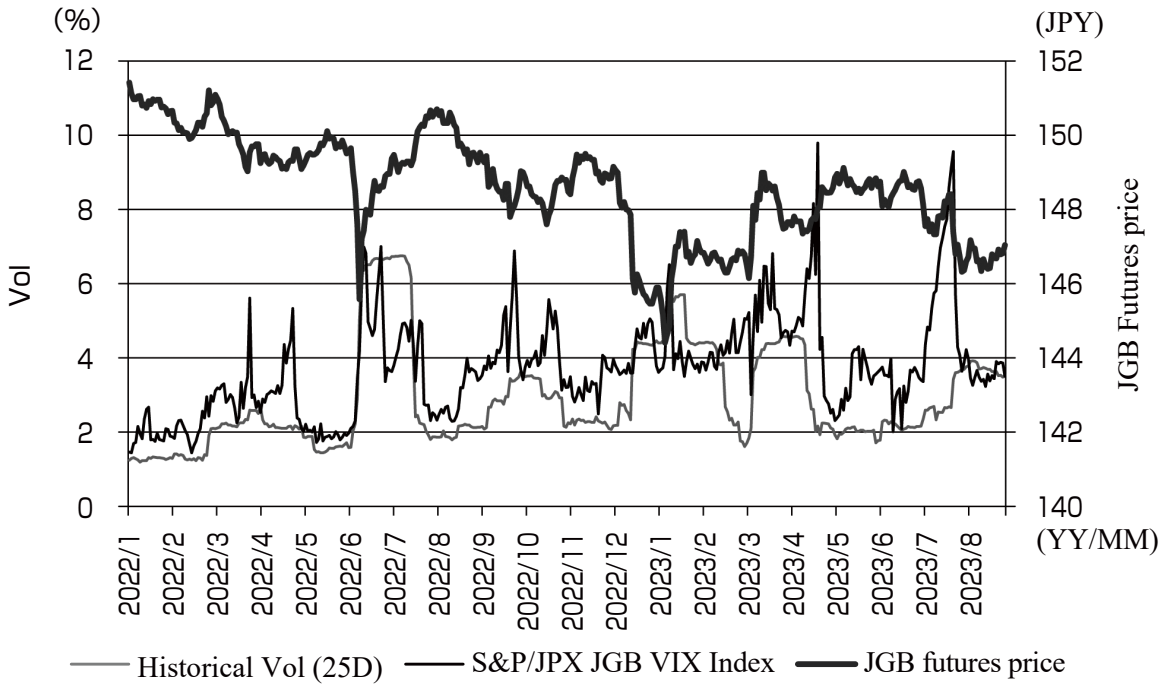
Let us look at the trends in volatility of Nikkei 225 Futures and JGB Futures.

Chart 5 Volatility of Nikkei 225 Futures and Nikkei Stock Average Index



(Source) Based on data from e-AURORA

Chart 6 Volatility of JGB Futures and JGB Futures Price



(Source) Based on data from Factset, JPX Group

Volatility is a major indicator used to calculate premiums of options transactions. It represents the tendency for a price to change. A "higher volatility" means that a price has greater tendency to change and increases options premiums. A historical volatility is a standardized price volatility over a past period. An implied volatility is an estimated volatility calculated back from actual options premiums.

Under normal circumstances, the historical volatility is somewhere around 10% to 25% for Nikkei 225 Futures and 1% to 4% for JGB Futures, and the implied volatility tracks several percentage points higher than these. When share prices are turbulent, rising or falling, the volatility increases. From the chart, one can see that as the Nikkei Stock Average Index was stable in the upward trend in the first half of 2023, the volatility was slightly lower than before. After that, the Nikkei Stock Average has been fluctuating within a range, showing a decline in volatility. Regarding the JGB Futures Price, when the U.S. Federal Reserve Board (FRB) implemented a substantial interest rate hike of 0.75% in June 2022, Australia, countries in Northern and Eastern Europe, and other major emerging countries followed and substantially raised interest rates. As this caused a growing concern over the global economic recession, there was a sell-off of bonds and historical volatility jumped to over 6%. Volatility has remained at a high level due to the continuing concern over the interest rate hike by the FRB.

(5) The Impact of Derivatives on the Spot Market

The futures and options markets exert a variety of influences on the spot markets. Examples of the influence of these derivative products are as follows:

A) Increased activity in basket trading of underlying securities;

B) The influence on arbitrage trading; and

C) The influence on the movement of the index by the low-liquidity shares used in the index.

The increased activity in basket trading (sometimes called program trading) of underlying securities was not directly due to the influence of derivative products. However, as it is possible to trade the underlying securities in

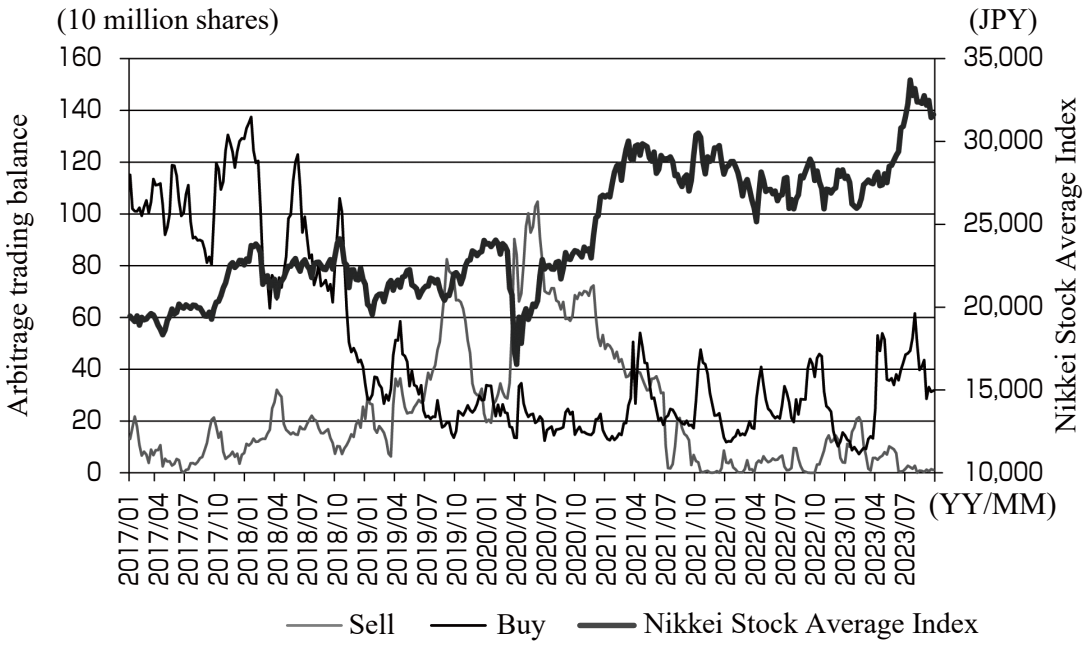
combination with the derivative products, this leads to diversification of trading. Arbitrage trading is also a type of basket trading.

In theory, arbitrage trading plays a neutral role in the market and is one method in which to increase the liquidity of the market. However, it becomes more difficult to be persuaded by this theory when one examines the characteristics of the Japanese market, where the volumes increase when a bull market exists and trading becomes thin in a bear market, and when considered from the perspective of those investors who cannot perform arbitrage trades (for normal investors there is the barrier of the brokerage commissions). In the actual balance of arbitrage trading, "buy arbitrage" tends to be the majority, because it is rare for the futures price to consistently fall below the theoretical price.

However, in 2017 (Chart 7), the selling balance was overwhelmingly larger than the buying balance.

In January 2016, the introduction of the negative interest rate policy was decided at the Bank of Japan monetary policy meeting. This caused the theoretical futures price to fall but the actual futures prices in the market fell below the theoretical price because the actual financing rates were positive. Behind this was the fact that arbitrage traders did not actively engage in buying arbitrage transactions. In addition, since the Bank of Japan doubled the amount of purchases of ETF, arbitrage traders exchanged their buying positions with the ETF, which resulted in a considerable reduction in the buying balance. In November 2016, Mr. Donald Trump won the United States presidential election, and the expectations for this event's stimulus effects boosted the Nikkei index and caused a rise in the amount of purchases, which gradually started to decline thereafter due to the geopolitical risks such as the US administration imposing punitive duties on imports from China. In 2019, the amount of purchases further decreased, down to the historical level that was reached after the collapse of the Lehman Brothers.

Chart 7 Arbitrate Trading Balance and Nikkei Stock Average Index



(Source) Based on data from e-AURORA

Chart 8 shows the relationship of the SQ price of the Nikkei Stock Average Index on the day on which the SQ value is calculated, the closing price for that day, and the closing price from the previous day. While this depends on the volume of trading, when we compare the prices with those of the previous day, there is similarity between

the direction of the SQ price and the direction of the closing price for the day. Since positions of futures and options are finally settled based on the SQ on the expiration date, investors' speculations would vary depending on whether the whole positions trend to selling or buying, sometimes causing a share price movement that is greater than expected, which may be called a turmoil, on the SQ day or a few days before that.

Chart 8 Characteristics of SQ of Nikkei Stock Average Index

Date	(A) Previous Day Closing Price	(B) SQ	(B−A)/A	(C) SQ Day Closing Price	(C−A)/A	Direction
2020.03.13	18,559.63	17,052.89	−8.12	17,431.05	−6.08	○
2020.06.12	22,472.91	22,071.46	−1.79	22,305.48	−0.75	○
2020.09.11	23,235.47	23,272.88	0.16	23,406.49	0.74	○
2020.12.11	26,756.24	26,713.47	−0.16	26,652.52	−0.39	○
2021.03.12	29,211.64	29,282.41	0.24	29,717.83	1.73	○
2021.06.11	28,958.56	29,046.40	0.30	28,948.73	−0.03	×
2021.09.10	30,008.19	30,085.93	0.26	30,381.84	1.25	○
2021.12.10	28,725.47	28,523.30	−0.70	28,437.77	−1.00	○
2022.03.11	25,690.40	25,457.94	−0.90	25,162.78	−2.05	○
2022.06.10	28,246.53	28,122.81	−0.44	27,824.29	−1.49	○
2022.09.09	28,065.28	28,253.40	0.67	28,214.75	0.53	○
2022.12.09	27,574.43	27,576.37	0.01	27,901.01	1.18	○
2023.03.10	28,623.15	28,377.34	−0.86	28,143.97	−1.67	○
2023.06.09	31,641.27	32,018.38	1.19	32,265.17	1.97	○

(Source) Based on data from IDS-QE

2. International Regulatory Reforms for Derivatives Transactions

After the collapse of the Lehman Brothers, the financial authorities in the world, in particular those of European countries and the United States, launched regulations on OTC derivatives. As a first step, they revised and standardized the rules for CDS trading, and are considering the application of these new rules to interest rate swaps and other derivatives transactions as well. At the G20 Pittsburgh Summit held in September 2009, the G20 leaders announced a reform program for strengthening financial regulations for OTC derivatives transactions.

[Outline of the Leaders' Statement at the G20 Pittsburgh Summit in 2009]

- All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate.
- All standardized OTC derivative contracts should be cleared through **central counterparty (CCP)** (mandatory CCP clearing).
- Non-centrally cleared contracts should be subject to higher capital requirements.
- OTC derivatives contracts should be reported to **trade repositories**.

While such overall policy for strengthening financial regulations is shared among G20 countries, the details of regulations and the scope of parties subject to the regulations differ from country to country. In particular, cross-

border transactions are controversial and the regulations thereof need to be coordinated among the regulatory authorities of the countries concerned. The due date for implementing the abovementioned rules was initially set as the end of 2012, but some of them have been decided to be phased in.

Basel III (to be applied in phases from 2013) has tightened the regulations for risk management in relation to counterparty risk (*e.g.*, CVA risk), requiring financial institutions to have sufficient capital buffers to sustain stress, such as by enhancing their capital adequacy ratio for Common Equity Tier 1 Capital and improving the quality of capital. The matters concerning stress VaR, including additional capital charge and securitizations, are already discussed in Basel 2.5. The Basel Committee has proposed an idea of using ES (Expected Shortfall) instead of VaR under stress conditions. Basel III has also introduced measures with regard to credit value adjustments (CVA) of mark-to-market counterparty risk and the fluctuation risk thereof, credit support annexes (CSAs) (for risks not covered by CCPs), and capital buffers for leverage, liquidity risk and procyclicality.

(1) Movement toward Centralized Clearing

In order to reduce counterparty risk itself, an attempt is being made to impose the obligation of centralized clearing of standardized transactions at CCPs. Against the backdrop of these global moves, clearing houses such as LCH. Clearnet have rapidly appeared on the scene.

The Japan Securities Clearing Corporation (JSCC) serves as the CCP in Japan. At present, the following types of transactions are subject to centralized clearing.

Chart 9 Transactions Subject to Centralized Clearing at the JSCC

CDS	Yen-yen Interest Rate Swap (IRS)
iTraxx Japan (CDS index) Single-name (individual issue) CDS (limited to certain issues)	Plain vanilla swap, tenor swap (at 3M TIBOR, 6M TIBOR as a floating rate), OIS (TONA compounding (fixing in arrears)), etc.

Under the FIEA, centralized clearing by the JSCC is mandatory for some of these transactions.

Entities seeking to engage in clearing derivatives transactions between Japan and the United States must be registered as derivatives clearing organizations (DCO). In this respect, there are many issues to discuss that could arise when equivalence is not secured due to differences, inconsistencies and redundancies among regulations on cross-border trading and extraterritorial application enforced in different countries.

However, not all OTC derivatives are standardized derivatives which may be settled in a centralized manner at CCPs. Some OTC derivatives for equity, exchange, and commodities have low liquidity due to being subject to complicated special clauses. Accordingly, Basel III has proposed an idea of imposing a punitive capital requirement on financial institutions that deal in exotic kinds of derivatives so as to prevent them from creating new types of exotic derivatives.

(2) Margin Requirements for Non-Centrally Cleared Derivatives

In September 2013, the Basel Committee published the final draft for the "Margin Requirements for Non-Centrally Cleared Derivatives" jointly with the International Organization of Securities Commissions (IOSCO). These requirements were scheduled to be put into force in December 2015 but the schedule was delayed. They were introduced in Japan in phases, for globally operating major financial institutions in September 2016 and for other financial institutions (subject to requirements) in March 2017 (Europe and the United States introduced the

requirements in September 2017).

These requirements comprise two types of margin, (i) **initial margin** (IM) and (ii) **variation margin** (VM), between which collateral may not be interchanged.

Chart 10 Margin for Non-Centrally Cleared Derivatives

Type of Margin	Outline	Note
Initial margin (IM)	・Reflecting the potential future exposure (PFE) which is to be incurred at a certain point in time in the future ・IM＝max {X－K, 0}Wherein: X＝amount of margin calculated by a prescribed formula; K＝JPY7 billion (threshold)	・Equivalent to the independent amount (IA) ・The reuse of collateral provided as an IM (re-hypothecation) is not allowed. ・Calculated by the internal model or the ISDA-SIMM (standardized IM model)
Valuation margin (VM)	・Reflecting replacement cost (current exposure) ・Applicable when the outstanding amount is JPY300 billion or more (only in Japan)	・Equivalent to the credit support amount under the CSA (the amount of collateral provided to cover an increase in exposure) ・Subject to daily mark-to-market

Since both parties are required to provide initial margin (IM) which is subject to segregated management (in the case of central clearing, the CCP does not provide but only collects IM). Therefore, initial margin would be collected for a new transaction when the notional amount of non-centrally cleared derivative transactions between the trading entities (on a consolidated basis; average for three months) exceeds the threshold. This threshold was set as JPY420 trillion at the time of introduction of margin requirements, and will be reduced in phases each year to JPY1.1 trillion in September 2022. Contrary to the impression given by the term, it is not sufficient to provide IM only once at the beginning of trading but it is subject to periodical review according to market volatility.

Swift and strict measures are required for collateral management. The interval for mark-to-market valuation of derivatives and collateral has been shorter. The VM is calculated on a daily basis and if any shortage in collateral occurs, a margin call is made to increase collateral. However, collateral is transferred only when the amount of collateral exceeds the minimum transfer amount (MTA). While transfer of collateral is required “without delay” in Japan, the schedule for transfer is tighter in Europe and the United States, i.e. T+1 settlement is required. Accordingly, collateral for VM is assumed to be money (cash) in major currencies or currencies used for settlement. Interest on collateral is another important issue (in the case of a negative interest rate). On the other hand, JGBs are used as collateral for IM.

Chart 11 Transfer of Collateral Under Margin Requirements

Terms Related to Collateral	Notes
Minimum transfer amount (MTA)	Transfer of collateral is executed only when the amount of collateral (IM+VM) > MTA Range of MTA: 0 ≤ MTA ≤ 70 million yen
Threshold	Amount of margin actually required as IM = (amount of IM – threshold) Threshold of not more than JPY7 billion (for each product group as a whole)
Appraisal value of collateral and haircut	Appraisal value of collateral = Market value of collateral × (1- haircut (assets) – haircut (currency)) Haircut for collateral is between 0% (cash) and 15% (shares) In the case of currency mismatch, haircut is 8% (or 0% for VM if collateral is cash).

The amount of margin required for non-centrally cleared derivatives could be larger than that for CCP-cleared derivatives. This can be described as a safety measure to absorb a potential systemic risk. In other words, the margin requirements are designed to reduce transactions of exotic derivatives (difficult to clear centrally) and encourage the shift to the central clearing. For some types of derivatives, clearing at CCPs may be made obligatory in the future.

At the same time, consistency with a margin call in securities lending (repos) will be ensured. The margin requirements for non-centrally cleared derivatives must be consistent with various other regulations, including the comprehensive regulations regarding a credit limit and regulations for shadow-banking.

(3) Reporting of Transactions

The Dodd-Frank Wall Street Reform and Consumer Protection Act, which is a new piece of US legislation designed for comprehensive regulatory reforms relating to OTC derivatives, requires the settlement of standardized derivatives at clearing houses as well as registration and reporting of transactions, as in the case of dealing in securities and listed transactions. In particular, this Act provides for the obligation to report transactions to the trade repository.

As the conventional type of OTC derivatives is a negotiation transaction, it is difficult to cancel the contract or assign the transaction to a third party, and therefore the transaction needs to be hedged with a similar new transaction. In that case, even when the balance of the OTC derivatives is a trivial amount if it is netted out, the notional principal of the transaction is accumulated and counted multiple times, becoming a large amount in gross. Where this gross calculation method is applied, no one can identify the size of the balance or the degree of risk, and this may be a cause that magnified the systemic risks. In fact, when the Lehman Brothers collapsed, it was extremely difficult to estimate the CDS trading balance. To cope with this problem, the new US legislation has made it obligatory to report daily OTC derivatives transaction data to the trade repository, thereby ensuring the integrated management of transaction records and the timely monitoring of the transaction balance.

(4) Digitization of Execution of Transactions

An IT revolution is also taking place, such as the introduction of a system called Straight-Through Processing (STP), which allows data on all transaction contracts to be handled electronically in a fixed form so as to reduce manual data input to the extent possible, increasing accuracy and efficiency in back-office operations such as ensuring accuracy and verification. System development is also called for in relation to collateral and credit management. The same applies to execution and clearing of transactions and risk management. While major dealers

need to build advanced systems and develop infrastructure for electronic trading, end users do not necessarily have to fulfil this requirement. If financial institutions and business entities engaged in swap transactions find it difficult to have their transactions centrally cleared or keep custody of collateral, they can entrust these tasks to brokers which provide client clearing services (banks and securities companies).

Developing an electronic trading platform for standardized OTC derivatives transactions was one of the requirements agreed among the G20 Leaders. This platform will not be a closed one but will be designed as an electronic trading platform to accept bid offers from multiple participants so that transactions can be executed at the fair market price. The U.S. Dodd-Frank Act requires swap transactions subject to centralized clearing to be executed on swap execution facilities (SEF). Under this requirement, swap dealers and major swap participants will conduct transactions via SEF.

In Japan as well, the obligation to use an electronic trading platform for plain vanilla yen-yen interest swap trading was introduced and put into effect in September 2015. Entities that wish to provide and operate an electronic trading platform (including foreign entities) will have to be registered as type 1 financial instruments business operators (excluding those approved overseas) and must meet the requirements for trading systems, such as ensuring transparency of quotations and transaction prices and disclosing the transaction immediately after it is executed (or by the end of the next business day in the case of a large block trade).

(5) Interest Rate Benchmark Reforms

Recently, suspicion has arisen that traders of several major banks had illegally manipulated LIBOR over many years, which resulted in shaking the confidence in LIBOR. In the fall of 2011, with the aim of making LIBOR recover its transparency and reliability as a representative reference interest rate, the UK Financial Service Authority (FSA) announced a drastic LIBOR reform plan to revise the conventional system that had relied on the major banks' self-regulation. Specifically, the plan (i) limits the types of LIBOR (by limiting the currency or term and abolishing the unnecessary LIBORs in a phased manner), (ii) expands the scope of banks subject to the system, and (iii) adopts a calculation method that only uses contract data. As part of this reform, the Australian dollar LIBOR was abolished and replaced with the Australian interbank rate (bank bill swap; BBSW) in the spring of 2013. In February 2014, the Intercontinental Exchange in the United States assumed the task of calculating the LIBOR in order to improve its transparency as a benchmark interest rate.

However, after the financial crisis, as secured transactions became popular and LIBOR-based unsecured funding became obsolete, a controversy arose as to whether the IBOR (interbank offered rate such as LIBOR) or RFR (risk-free interest rate) was more appropriate as a benchmark interest rate. Finally, in the summer of 2017, the UK Financial Conduct Authority (FCA) announced that it would stop using LIBOR at the end of 2021. LIBOR is currently used as a reference for a vast number of financial transactions, including not only swap transactions but also lending and loans of securities. LIBOR was replaced with an RFR in principle as a reference interest rate for swaps and other OTC derivatives transactions. In Japan, the RFR is TONA (Tokyo Overnight Average Rate; a reference interest rate for OIS) (SONIA (Sterling Over Night Index Average) in the UK; and ESTR (Euro Short-Term Rate) in Europe (EONIA (Euro Over Night Index Average) has been set at ESTR + 8.5 bp)). In the United States, the Secured Overnight Financing Rate (SOFR; TB rate on overnight repo transactions) was created as a new RFR in spring 2018, as a replacement of the effective Federal Funds rate (EFFR), and SOFR futures have already been listed. However, as of 2019, LIBOR was referenced as the floating leg in a number of interest rate swaps, which totaled about USD 350 trillion in terms of the notional principal amount. Moreover, there were also many basis swaps (currency swaps) which involved exchanges between different floating 3M LIBOR. LIBOR was used

as a reference benchmark for loans, floating rate bonds, subordinated bonds, preferred shares, and securitized products, and it was also used by financial institutions for a broad range of operations, such as risk management, performance measurement and hedge accounting. Therefore, there was a concern that this change could have a considerable impact, including increases in sales, legal, operational and system costs.

In Japan, in August 2018, the Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks was established by financial institutions which served as main members, and an extensive project was launched jointly with the Financial Services Agency, the Bank of Japan, ISDA and other participants. Progress was slow in Japan, but the transition from JPY LIBOR was basically smoothly implemented in the second half of 2021. In the beginning of 2022, LIBOR was abolished (permanent cessation) for the currencies of Japan, the U.K., Europe and Switzerland.

Following this, USD LIBOR was abolished (permanent cessation) at the beginning of July 2023. The transition to RFR-based interest rate options and currency swaps was completed without major problems.

However, there are various other issues, such as the transition from IBOR to RFR for currencies other than the major five currencies being under consideration (for example, regarding the Canadian dollar (CAD), the transition from CDOR (IBOR) to CORRA (RFR) is scheduled for the summer of 2024). Since the reform to regulations for OTC derivatives transactions is in progress, special attention should be paid to changes in the regulations and market practices relating to OTC derivatives transactions.

(6) Basel Regulations

The Basel Regulations are international standards developed by the Basel Committee, which provide for equity capital and liquidity requirements for banks engaged in international trade. The regulatory authorities and central banks of the member countries are to develop laws in accordance with the Basel Regulations and enforce regulatory and supervisory measures.

(i) Capital Requirement

Basel II includes operational risk in addition to market risk and credit risk in the denominator (risk-weighted assets) in the calculation of the capital adequacy ratio. Banks adopting uniform international standards must have a minimum equity capital of at least 8% of the risk-weighted assets (in the case of banks adopting domestic standards, at least 4%).

Capital adequacy ratio = equity capital (= Tier 1 + Tier 2) / risk-weighted assets ≥ 8%
Risk-weighted assets = credit risk + (market risk + operational risk) × 12.5

These formulas can be expressed as:

Equity capital ≥ 8% × credit risk + market risk + operational risk = capital requirement (note: 12.5 × 8% = 1)

Moreover, Basel III raised the minimum requirement of Common Equity Tier-1 Capital to 4.5% by 2015 (3.5% by 2013 and 4% by 2014, as transitional measures) and required the phased introduction of capital conservation buffer starting in 2016, thereby requiring banks to meet the minimum capital requirement (Common Equity Tier-1 plus conservation buffer) of 7% by 2019. After the finalization of Basel III at the end of 2017, further capital regulations are scheduled to be introduced in phases.

Meanwhile, with regard to banks subject to the domestic standards in 2014 and onward, the numerator of

the capital adequacy ratio has been changed from "Tier 1 + Tier 2" to "Core Capital" (common shares + retained earnings + mandatory convertible preferred shares).

In March 2023, for the calculation of operational risk, the existing approaches namely, the Advanced Measurement Approach, the Basic Indicator Approach and the Standardized Approach, will be abolished and unified into a new standardized measurement approach that combines the business scale with the actual loss.

(ii) Large Exposures Regulation

In April 2014, the Basel Committee presented a framework for "large exposures regulation" which is to be implemented in January 2019. The sum of all exposure values of a bank is referred to as "large exposure" if it accounts for 10% or more of a bank's Tier-1 capital. The scheduled regulation sets a limit of credit extended by a bank to a single group at 25% of the bank's Tier-1 capital (tighter than the conventional limit of 25% of the bank's equity capital). The upper limit in relation to exposures between global systemically important banks (G-SIBs) will be 15% of the bank's Tier 1-capital. This regulation aims for diversification of counterparties in order to reduce liquidity risk and systemic risk. However, the exposure to qualifying CCPs is exempted from the application (although monitoring is required). Japan also has the regulatory framework corresponding to this.

(iii) Other New Regulations

Various new regulations are scheduled to be introduced within the Basel framework, including: revisions of risk measurement methods (enforcing discipline on the internal model by applying the standardized approach); regulations on leverage and liquidity risk (e.g. buffers for low-liquidity assets); and fundamental review of the trading book (FRTB).

However, due to the COVID-19 crisis in 2020, the Basel Committee and regulatory authorities of major countries have announced the one-year deferral of the phased implementation of the final drafts of Basel III, and allowed financial institutions to use their capital during the stress period in order to provide liquidity as their priority function.

Chart 12 **Major Revisions of Risk Measurement Methods**

Revised Regulations	Notes
Restriction on the internal model	Revision and sophistication of the standardized approach; improvement of risk sensitivity Capital floor for the internal model (72.5% of the risk assets measured by the standardized approach) Discontinuation of the use of the internal model for measurement of operational risk (Advanced Measurement Approach) FRTB market risk measurement (transition from VaR to ES)
Regulations on liquidity and leverage	Leverage ratio Liquidity Coverage Ratio (LCR) Net Stable Funding Ratio (NSFR)
Review on credit risk and market risk	Revision of the boundary between banking book and trading book Classification of types of credit exposure, revision of RW Calculation method for the CVA risk equivalent Interest rate risk in the banking book (IRRBB) Fundamental review of trading book (FRTB)

[Future Prospects]

Derivatives have various potential. By creating new derivatives, it is possible to hedge and invest against risks that are not covered under existing securities and derivatives (such as climate risks, disaster risks, and inflation risks, etc.). It may be said that one of the reasons for the existence of derivatives is to complete the market in this manner by providing new products and transaction methods which will shift risk, between customers who have risks that they cannot hedge using traditional methods and investors who wish to take these risks, thereby contributing economically to the overall capital market. "Completing the market" in this sense may be one of the reasons for the existence of derivatives.

In Europe and North America, inflation derivatives are dealt in which are a subspecies of interest rate derivatives and are swaps and options that refer to the Consumer Price Index (CPI) or real interest rates, although these are not yet popular in Japan. One cause of this is that inflation linked bonds are commonly handled in Europe and North America. Since the CPI is an economic statistic, it is covered within the category of financial indicators.

In Europe and North America, while power derivatives and emissions derivatives are frequently handled, instruments such as insurance derivatives and real estate derivatives (property swaps) still remain in the development stage. Products utilizing derivatives are now being designed with trading strategies such as portfolio insurance (PI) and index management through customization of rule-based investment strategies.

Various types of exotic derivatives had been developed by around 2007 and exotic swap transactions necessary for creating structured products had frequently been conducted. Recently, however, through the revisions to the Basel Regulations, the capital charge to cover such exotic derivatives has been increased in consideration of the magnitude of the potential risk. Furthermore, it is not necessarily desirable for investors to design complex products blindly and make the pricing or risk valuation difficult and opaque in order to achieve an attractive high coupon (yield enhancement) by structured products. At present, the question of how to reduce the systemic risk that could impact the overall financial market is the most important issue.

Recently, financial products with simple designs and a high degree of transparency tend to be preferred. A shift can be seen towards standardizing the structures of financial products as well as towards standardizing derivatives transactions (or to make them similar to market derivatives on an exchange). For example, standardization has begun on the terms regarding credit default swaps (for details, see Chapter 2, 2-3 (3) "(ii) Credit Default Swap (CDS)"). Furthermore, there has been a momentum toward increasing transactions that can be centrally cleared by CCPs.

The use of derivatives is absolutely necessary in today's financial market, and various facilities have started to be developed. As the definitions of the "risk-free rate" and "discount" have been reconsidered, pricing by taking into account the counterparty risk or pricing by secured transactions have become popular, further increasing the complexity. Unlike the introduction of Basel III that has been deferred due to the COVID-19 crisis, the response to the discontinuance of LIBOR by the end of 2021 was implemented almost on schedule (the same applies to USD LIBOR which had been used until the end of June 2023). This change had an impact on a broad range of financial products covering not only derivatives, but also bonds, loans, and securitized products, as well as investment strategies. There are various other issues that need to be addressed, such as effective collateral management, credit extension, delivery, fund raising and management, risk management, and auditing.

Since the COVID-19 crisis and the Ukraine crisis, the economic and financial environment around the world has drastically changed in the last few years, and various composite risks have emerged, such as large-scale disaster risks, geopolitical risks, economic fragility due to block economies, inflation risks and the resulting rise in interest rates and bank failures due to the failure in fund raising or ALM. We must keep in mind that financial and capital

markets, including derivatives markets, are exposed to these risks.

Chapter 2 Products of Derivatives Transactions

1 Market Derivatives Transactions

1 1 Market Derivatives Transactions

Derivatives transactions are categorized into market derivatives transactions for which each exchange specifies the details of the trading system (*e.g.,* underlying assets, contract month), and over-the-counter derivatives transactions for which the details of the trading system can be set freely by the parties to the transaction as they wish.

The products traded in market derivatives transactions include stock indices and interest rates. In Japan, these transactions are conducted on Osaka Exchange, Inc. (hereinafter referred to as the "OSE" in Chapter 2, Section 1) and Tokyo Financial Exchange Inc. (hereinafter referred to as the "TFX" in Chapter 2, Section 1). Chapter 2, Section 1 explains the major system of market derivatives transactions on the OSE.

* Detailed explanation of each product listed on the OSE will be given later.

(1) Products

(i) Underlying Assets

Assets used in derivatives transactions are referred to as the underlying assets. On the OSE, stock price indices such as the Nikkei Stock Average (referred to as "Nikkei 225" in Chapter 2, Section 1) and the Tokyo Stock Price Index (referred to as "TOPIX" in Chapter 2, Section 1), financial indicators calculated based on the Tokyo Overnight Average (TONA) rate, and commodities such as gold and platinum are traded.

(ii) Types of Transactions

Futures transactions and options transactions can be conducted on the OSE. Swap transactions that can be used in over-the-counter transactions are not available.

(iii) Contract Month, Etc.

The contract month (delivery month) is the month in which the term of a futures or options contract expires. For market derivatives transactions conducted on exchanges, contract months are designated by exchanges in advance. In principle, a futures or options contract that expires on a certain day in March 20XX is referred to as 20XX March contract. Normally, contracts of the same product with different contract months can be traded at the same time. If a product is tradable under the term of "three quarterly contract months", the product is listed and traded for the latest three contract months among March, June, September and December 20XX. Tradeable contract months are predetermined according to the rules established by exchanges for each product. The interval between contract months varies depending on the characteristics of each product, such as monthly, bimonthly, quarterly (March, June, September and December), and semiannually (June and December). Recently, contracts that expire on a weekly basis (weekly options) and contracts for which the expiration date can be specified on a per day basis (flexible options trading) have also been introduced. There is also a type of futures transaction for which the contracts expire on every business day (contract date). In the case of gold rolling-spot futures listed on the OSE, positions are automatically rolled over to the following business day, enabling investors to carry out trading without thinking about the settlement deadline.

(2) Transactions

(i) Individual Auction

Market derivatives transactions on the auction market are conducted by collecting orders from a number of investors and individually matching the orders of the same price and volume (auction trading).

There are two pricing methods: executing an order immediately if it is possible (*Zaraba* method); and collecting orders over a certain period of time and executing them at one price (*Itayose* method). Both methods are subject to the price priority and time priority rules.

Market derivatives transactions can also be conducted by way of off-floor trade on a market that is independent from the auction market. Off-floor trade is conducted by designating a counterparty in advance and executing sale and purchase of the product of the same contract month at the same time. Off-floor trade on the OSE is referred to as J-NET trading. The same trading participant or different trading participants can be designated as the counterparty. J-NET trading is conducted mainly for the purpose of executing large-lot orders or strategy trading required to trade multiple issues concurrently at a desired price without fail, etc. The settlement, mark-to-market valuation differences, and margin deposits for the contracts of J-NET trading are the same as those applicable to auction trading.

Prices at which J-NET trading may be executed (the range of tradable prices) are set by exchanges separately from tradable prices of transactions during trading sessions, in light of prevailing market rates such as prices of transactions during trading sessions at the time of the trade, etc.

Tick sizes for J-NET trading are not always the same as, but generally smaller than, those for transactions during trading sessions.

(ii) Trading Hours

Trading hours are determined by exchanges for each product. For example, Nikkei 225 futures, one of the major market derivatives products in Japan, are tradable during the period from 8:45 a.m. to 3:15 p.m., which covers the trading hours on the spot market, and also tradable in night sessions from 4:30 p.m. to 6:00 a.m. of the next day. In night sessions, investors can conduct transactions in reference to the financial information and news concerning companies published after the end of day sessions. Night sessions coincide with the trading hours on European and US markets, and in this respect they are advantageous for investors who wish to trade in accordance with trends in overseas markets.

Since September 2022, the holiday trading system has been introduced (except for some products) for the purpose of enhancing convenience for investors through the provision of hedging opportunities during national holidays.

(iii) Tick Size and Trading Unit

Investors place orders according to the tick size predetermined by exchanges for each product. For example, TOPIX futures using TOPIX as underlying assets can be traded in increments of 0.5 points, such as at 2,200.0 points, 2,200.5 points, and 2,201.0 points.

Trading units are also predetermined by exchanges for each product. For example, the trading unit for TOPIX futures is JPY10,000, and therefore, a transaction in one unit of TOPIX futures at TOPIX futures price of 2,200.0 points is equivalent to a transaction amounting to 2,200 points × JPY10,000 = JPY22 million. A move in a quote by one tick is equal to a price movement equivalent to 0.5 point × JPY10,000 = JPY5,000.

In some cases, products with the same underlying assets are listed on the exchange as different types of products with different tick sizes and trading units, namely, TOPIX futures and mini-TOPIX futures, and Nikkei 225 futures, Nikkei 225 mini futures and Nikkei 225 micro futures, so that investors can choose

products according to their needs.

(iv) Strategy Trading

Strategy trading refers to a transaction in which multiple contracts for combinations of futures issues are executed at the same time.

There are two types of strategy trading that are possible for futures: with regard to two contracts of the same product with different contract months, when a contract for either month is purchased while a contract for the other month is sold simultaneously, the trade is executed based on the price difference between the two contract months (such difference is called "calendar spreads" and this type of trading is called "calendar spread trading"); and with regard to two contracts of different commodities with the same contract month, when a contract for either commodity is purchased while a contract for the other commodity is sold simultaneously, the trade is executed based on the price difference between the two commodities (such difference is called "inter-commodity spread" and this type of trading is called "inter-commodity spread trading"). Combinations of contract months available for strategy trading are limited to those set by exchanges.

Calendar spread trading in JGB futures transactions, interest rate futures transactions, and commodity futures transactions takes place for calendar spreads where the value of a distant contract is subtracted from the value of a nearby contract. Zero and negative orders are possible. The strategy selling (purchasing) order in these transactions refers to the order to be placed when selling (purchasing) the nearby contract and purchasing (selling) a distant contract, and when the trade is performed, the sale (purchase) of the nearby contract and the purchase (sale) of the distant contract occur simultaneously.

Calendar spread trading in an index futures transaction, in which the sale and purchase are opposite to those of calendar spread trading in a JGB futures transaction and commodity futures transaction, takes place for a calendar spread where the value of a nearby contract is subtracted from the value of a distant contract. The strategy buy (sell) order in an index futures transaction refers to the order to be placed when selling (purchasing) the nearby contract and purchasing (selling) a distant contract, and when the trade is performed, the sale (purchase) of the nearby contract and the purchase (sale) of the distant contract occur simultaneously.

The price limits applicable to strategy trading are calculated on the basis of the upper and lower price limits for the respective contract months. When a futures transaction is temporarily suspended, strategy trading for the relevant contract month will also be temporarily suspended.

(v) Settlement Price

For each issue traded on the market for market derivatives, the appraisal value (referred to as the settlement price, settlement value or settlement figure per product) is determined by the clearing organization designated by the exchange (hereinafter referred to as the "designated clearing organization" in Chapter 2, Section 1) on each trading day, and used for the calculation of margins and settlement prices (see (3)(vi) Margin System). The final settlement of interest rate futures transactions and index futures transactions, etc. is made based on, for example, the special quotation (SQ) which is calculated on the business day following the last trading date.

(3) Trading Systems

(i) Daily Price Limits and Temporary Trading Halts

Ordinarily, for market derivatives transactions, a specific limit is placed by exchanges on the range of price changes in a single day. While the point of this price limit is to prevent the prices from rising or falling excessively in a one-day time period, it is also expected to reduce confusion on the part of market participants

during occasions such as when the price fluctuates wildly, and thereby also contributes to protecting investors.

In order to encourage prudent investment decisions by investors and prevent drastic up and down swings in the market when it is overheated, if, for example, the price of the central contract month trade (meaning the contract month trade designated by the OSE as the contract month trade with the highest liquidity) of each future trading rises above or falls below the limits on price fluctuations (daily price limits) determined by the exchange, trading will be subject to a temporary halt for not only the central contract month trade but also all of the other contract months trade (this procedure is called a "circuit breaker"). In cases where a temporary trading halt is implemented, trading will be halted for a while (at least ten minutes), and after the halt, the price limits will be expanded to the next stage and trading will be resumed. Except for some types of products, this procedure is implemented for products on the OSE.

(ii) Dynamic Circuit Breaker

While price limits are designed to set limits on price movements during a single day, another price limitation system is in operation for the purpose of preventing sudden price changes caused by mistaken orders, etc. Under this system called a dynamic circuit breaker, if an order is placed at a price which would lead a contract to be executed at a price that exceeds the base price (*e.g.,* the middle rate of the best bids and offers or the last contract price; hereinafter referred to as the "DCB base price" in Chapter 2, Section 1) by a predetermined range of prices (hereinafter referred to as the "DCB price range" in Chapter 2, Section 1), a temporary trading halt (for 30 seconds, etc.) will be triggered after contracts within the DCB price range are executed.

Upon triggering the temporary halt, the DCB base price will be updated to the price within the DCB price range that is closest to the negotiated price, and trading will be resumed if the negotiated price is within the DCB price range after a certain period of time (for 30 seconds, etc.) has passed, and will be temporarily halted again (for 30 seconds, etc.) if the negotiated price falls outside the DCB price range. This system makes it possible to prevent sudden price changes and facilitate price formation.

(iii) Non-Cancel Period (NCP)

Non-Cancel Period (NCP) is a system under which, for one minute before the opening of a day session, and one minute before the opening and closing of a night session, investors cannot modify or cancel their orders. This system applies to Nikkei 225 Futures, Nikkei 225 mini, Nikkei 225 micro futures, TOPIX Futures, and commodity futures and options (except for those for which the underlying asset is rubber). This system has been introduced to prevent excessive price fluctuations due to order modifications or cancellations just before *Itayose*, aiming to increase transparency and fairness in price formation.

(iv) Give-Up System

The Give-Up System is designed to allow the clearing operations such as executing orders, management of positions and margin deposits to be contracted to different trading participants.

This can be conducted by executing a give-up contract as a tripartite agreement between the customer, the participant executing the order, and the participant executing the clearing. This system contributes, *inter alia*, to greater efficiency in managing margin deposits, as even when orders are placed with multiple participants it is possible to consolidate management of the positions with a single participant.

At the Japan Securities Clearing Corporation (hereinafter referred to as the "JSCC" in Chapter 2, Section 1), which is the designated clearing organization of the OSE, a system of transferring position an open management has been separately introduced whereby management is transferred from a trading participant with which a position is held, to another participant.

(v) Market Maker Scheme

The Market Maker Scheme is a scheme that creates a trading environment where market makers designated by the exchange continuously place bids and offers for specified issues under certain conditions so that investors can trade them at any time. Market makers provide quotes and receive incentives if their quotes meet the conditions. Except for some types of products, this scheme is implemented for products on the OSE.

(vi) Margin System

A margin system has been adopted for market derivatives transactions as well, in order to guarantee the fulfillment of settlement obligations and maintain the stability of trading. A margin is collateral to be provided to secure the fulfillment of contracts for transactions. When an investor conducts a transaction, he/she must deposit a margin (performance bond) with the financial instruments business operator (hereinafter a "securities company, etc." in Chapter 2, Section 1), which is a clearing participant. The margin deposited by the investor with the clearing participant is then deposited with the clearing organization. Margins to be deposited for transactions on the OSE by clearing participants are deposited integrally with the JSCC, whereas margins for futures and options transactions handled by the TFX must be deposited with the TFX, which also serves as a clearing organization.

In trading futures and options listed on a stock exchange, there is a margin system that requires a deposit be made on the business day following the day on which the transaction took place. For futures transactions, a mark-to-market system has also been introduced and it requires that a deposit covering the amount of a valuation loss be made on the business day following the day on which the loss occurs.

The margin deposit and mark-to-market differential are the collateral that assures the fulfillment of debt obligations, such as payment of settlement funds, and if the debt cannot be fulfilled by the designated time limit, the clearing organizations or securities company will use these deposits at its own discretion to pay the obligations, without giving any notice or warning and without having to follow any legal procedures.

a. Calculating the Amount of Margin Requirement

The amount of the margin requirement is the margin for all open contracts in a portfolio.

Currently, the JSCC, which is the designated clearing institution of the OSE, uses the Value at Risk (VaR) Method to calculate margin requirements. There are two types of VaR Methods: the Historical Simulation Method (HS-VaR) and the Alternative Simulation Method (AS-VaR). Under the HS-VaR Method, the portfolio profit/loss is determined according to each of the scenarios generated based on historical market data and other factors, and the amount to cover 99% of such profit/loss is determined as the amount of margin requirement. Under the AS-VaR Method, certain parameters, such as expected price fluctuations, are set in advance, the portfolio profit/loss is determined according to the scenarios generated based on these parameters, and the maximum amount of loss is determined as the amount of margin requirement.

* For details of the products covered by each calculation method, see the JSCC's website. (https://www.jpx.co.jp/jscc/seisan/sakimono/shokokin_seido.html)

When a customer carries out a transaction, the customer deposits the margin on the following day, by the time designated by the securities company. In addition to cash (Japanese yen or US dollar), securities or warehouse receipts (hereinafter referred to as "securities, etc." in this Chapter 2, Section 1) may be deposited as margins. The eligibility for margin securities, etc. to be deposited in lieu of cash is determined by the JSCC.

b. Payments Between the Customer and the Securities Company, Etc.

If a customer carries out a transaction and the total margin deposit is less than the margin requirement, the customer must deposit the shortfall in the form of cash or securities, etc. at the request of the securities company, etc.(Note 1) Contrarily, if the deposit exceeds the margin requirement, the customer will be able to withdraw funds from it. However, if the amount deposited in cash falls short of the expected cash payment (Note 2), the shortfall must be made up in cash (Japanese yen). The margin must be paid to the securities company, etc. by a time designated by the company, no later than the next business day after the shortfall came about (two business days for non-residents).

If the customer is a broker (Note 3) and the transaction is being performed as a broking of entrusted orders, then the broker shall inform the securities company, etc., which is a clearing participant of a clearing organization, of this fact and shall clearly define to the securities company whether margins deposited by the broker are monies deposited by an applicant(Note 4), or whether they are cash or securities, etc. possessed by the broker and deposited with the permission of the applicant, in lieu of a deposit by the applicant.

(Notes) 1. Margin deposit:

In futures and options transactions, the amount of cash and margin securities, etc. the customer has deposited as margin will be calculated and subtracted from (or added to) the customer's cash on account.(Note 2) Margin can be substituted by securities, etc. for its entire amount. (The valuation of margin securities, etc. will be made using the mark-to-market values from the two preceding days. The range and cash conversion ratio (*kakeme*) of margin securities, etc. are determined and reviewed as necessary by the JSCC.)

* For the range and cash conversion ratio of margin securities, etc. please see the JSCC website:
https://www.jpx.co.jp/jscc/en/rule/rule.html

2. Expected cash payment by customer:

A customer is expected to pay an amount of cash equivalent to the total amount of calculated profit and loss* from futures transactions, unsettled settlement profit and loss, and the unsettled transaction fees from options transactions (including monetary differences that come from exerting rights under index options) if the said total is less than zero. A margin to cover a difference (shortfall) generated when the amount submitted or deposited by a customer falls below the expected amount of cash to be paid by the customer may not be substituted by securities, etc.

* Calculated profit and loss:

In futures transactions, the payment of cash due to the daily calculation of profit and loss on unsettled open positions by a securities company, etc.

3. "Broker" refers to a company that undertakes brokering of the entrustment of transactions to trading participants of the exchanges.
4. "Applicant" refers to one who requests that a transaction be entrusted.

c. Payments Between the Clearing Participants (Securities Company, Etc.) and the Clearing Organization

Formerly the clearing of futures and options transactions took place between the securities companies, etc. and each stock exchange. At present, clearing for futures and options transactions handled by the OSE is integrally carried out not by the OSE, but by the JSCC, which is a designated clearing organization (however, margins for futures and options transactions handled by the TFX must be deposited with the TFX, which also serves as a clearing organization).

Unsettled open positions of futures transactions between clearing participants and the JSCC will be marked to market daily and the differences paid. Further, clearing participants will divide up margin requirements into their own portion and their customer's portion (total margins deposited with the clearing participant) and deposit these amounts with the JSCC. Payment between clearing participants and the clearing organization must take place by one business day after the shortfall or surplus comes about.

d. Intraday Margin and Emergency Margin

For market derivatives transactions, in addition to the ordinary margin system under which margins are paid or received on a daily basis, there are other margin systems: an intraday margin system introduced for the purpose of reducing the estimated amount of loss that may arise in the event of bankruptcy of trading participants; and an emergency margin system introduced from the perspective of guaranteeing the performance of settlement in the event of violent price movements on the market during a day. Under the intraday margin system, the risk amount is re-calculated at 11:00 am (for 10-year JGB futures, at the closing of morning session) each business day, and if the risk amount has increased, securities companies, etc. are required to deposit an additional margin in the day. Emergency margins will be deposited by securities companies, etc. when a clearing organization determines that it is particularly necessary if there has been excessive price fluctuation by 1:00 p.m. in the trading on the OSE. The required amount of the intraday margin or emergency margin is: the amount of the portfolio risk of a clearing participant's proprietary position on futures and options calculated by the VaR Method + the required amount of delivery clearing margin and the amount of margin requirement calculated for the proprietary position ± the amount equivalent to mark-to-market margin of futures position and the premium of options trades on proprietary book + risk amount exceeding collateral for each account other than clearing participant's house account. If their own deposited trading margin is less than the required amount of the intraday margin or emergency margin, the balance must be deposited respectively by 2:00 p.m. or 4:00 p.m. that day. Margin securities, etc. may be used as a substitute to cover the entire amount of an intraday margin or emergency margin. The eligibility criteria for margin securities, etc. available for an intraday margin or emergency margin are the same as the eligibility criteria for the ordinary trading margin.

1 2 Futures Transactions

Market derivatives futures transactions in Japan are categorized by underlying assets into products related to government bonds (bonds), interest rates, stocks, and commodities .

(1) JGB Futures Transaction

(i) Characteristics and Products

Market derivatives transactions on JGBs are ordinarily conducted using standardized bond products which are fictitious bonds with a fixed interest rate and maturity, rather than individual JGB issues, as the underlying assets. At present, all JGB futures transactions in Japan uses such standardized bond products as the underlying bond. Settlement at the expiration takes place using the basket approach, in which multiple JGB issues to be delivered are designated.

The advantages of using such standardized bond products instead of individual JGB issues to underlie a bond future are as follows:

- No need to change the underlying bonds;
- No impact from the attributes of an individual bond; and
- Price continuity can be maintained.

The outline of the JGB futures transaction system is as described in Chart 2-1.

Chart 2-1 Outline of the JGB Futures Transaction System

Product name	5-year JGB Futures	10-year JGB Futures	20-year JGB Futures	mini-10 year JGB Futures
Underlying asset	Standardized 5-year JGB, 3%	Standardized 10-year JGB, 6%	Standardized 20-year JGB, 3%	Price of standardized 10-year JGB, 6%
Trading hours	<Morning sessions> Opening: 8:45 Regular session: 8:45 – 11:00 Closing: 11:02 <Afternoon sessions> Opening: 12:30 Regular session: 12:30 – 15:00 Closing: 15:02 <Night sessions> Opening: 15:30 Regular session: 15:30 – 5:55 of the next day Closing: 6:00 of the next day			
Contract months (delivery months)	March, June, September, and December: Nearest 3 contract months			
Trading unit	100 million yen at par		10 million yen at par	100,000 yen multiplied by the price of the 10-year notional JGB

Product name	5-year JGB Futures	10-year JGB Futures	20-year JGB Futures	mini-10 year JGB Futures
Last trading day	Trading day that ends five days (excluding non-business days) before the delivery/settlement day			Trading day that ends on the day preceding the last trading day of 10-year JGB futures of the same contract month (if the relevant trading day falls upon a non-business day, the preceding business day)
Tick size	0.01 yen per 100 yen at par			0.005 yen per 100 yen at par
Final settlement	Delivery settlement			Cash settlement

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

(ii) Settlement

There are two methods of settling a JGB futures contract: paying the cash difference after executing an offsetting trade prior to the last trading day; and making or taking delivery of the underlying bond for the final settlement.

To settle by paying the cash difference, a trader would execute an offsetting trade by the last trading day and settle using the cash difference between the selling price and buying price.

To settle a futures contract by making or taking delivery of bonds, the party selling futures delivers the bonds to the buying party and receives cash in return and the buying party receives the bonds simultaneously with the payment.

If an open position is not settled by an offsetting trade by the last trading day, it will be settled by either making or taking delivery of the underlying bond (in the case of mini-10-year JGB futures transactions, however, the settlement will be made only by net cash settlement at the price of 10-year JGB futures).

The person buying them will take delivery and pay cash in return. This is the reason that the futures exchange has designated certain existing JGBs as deliverable grade, and will make or take delivery from among them. When such a delivery takes place, the bond seller, the person who makes delivery of the bond, has the right to select the bond. The bond buyer is not allowed to specify the bond.

Since the underlying bonds in JGB futures trades are fictitious bonds (standardized bond products), the bonds that are actually delivered may have maturity dates and coupons that differ from the standardized bond products. For this reason, a conversion factor (CF) is used to adjust the value between the standardized bond products and deliverable bonds so that they are the same. This conversion factor is used to find the delivery price when the bonds are actually delivered. It sets the value of standardized bond products at 1 to find the value of a deliverable bond on its delivery settlement date.

(2) Interest Rate Futures Transaction

(i) Characteristics and Products

An interest rate futures transaction is a futures transaction involving a financial indicator, etc. calculated based on the interest rate for monetary claims. Interest rate futures can be traded on the OSE and the Tokyo Financial Exchange.

The outline of the trading systems of the major interest rate futures transactions is as described in Chart 2-2.

Chart 2-2 Outline of the Interest Rate Futures Transaction System

Product name	3-Month TONA Futures
Underlying asset	Tokyo Over Night Average rate (TONA) (100 minus 3-month compounded TONA)
Trading hours	<Morning sessions> Opening: 08:45 Regular session: 08:45 – 11:00 Closing: 11:02 <Afternoon sessions> Opening: 12:30 Regular session: 12:30 – 15:00 Closing: 15:02 <Night sessions> Opening: 15:30 Regular session: 15:30 – 05:55 of the next day Closing: 06:00 of the next day
Contract months (delivery months)	March, June, September, and December: Nearest 20 contract months
Trading unit	250,000 yen × (100 – 3-month compounded TONA)
Last trading day	Trading day that ends on the day preceding the third Wednesday of the third month after each contract month (to be moved up in order if the date falls on a non-business day)
Tick size	0.0025 points
Final settlement	Cash settlement

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

(ii) Settlement

Interest rate futures can be settled by an offsetting trade prior to the last trading day or by making a final settlement. Both of them are made by paying the net cash difference.

A final settlement is made on the basis of the final settlement price which is calculated on the business day following the last trading day.

Delivery of the net cash difference must be made: until the business day following the day on which any excess or shortage occurs if the settlement is made by an offsetting trade prior to the last trading day (as in the

case of the delivery of the daily mark-to-market difference); or on the third business day counting from and including the last trading day (or in the case of nonresidents, on the fourth business day counting from and including the last trading day) if the final settlement is made.

Trade	Settlement Amount
Buy long → Final settlement	(Final settlement price – Buying contract price) × Multiplier × Quantity
Sell short → Final settlement	(Selling contract price – Final settlement price) × Multiplier × Quantity

(3) Index Futures Transaction

(i) Characteristics and Products

An index futures transaction is a futures transaction based on a share index, etc. and various other indices in Japan and abroad.

The outline of trading systems of the major index futures transactions is as described in Chart 2-3.

In addition to those indicated in this chart, other products are traded on the OSE, such as TOPIX Banks Index Futures, Nikkei 225 Dividend Index Futures, etc.

On September 21, 2021, flexible futures trading was introduced as a system under which the contract month can be set flexibly, unlike the ordinary type of futures trading that is conducted with fixed contract months.

The outline of the flexible futures trading system is as described in Chart 2-4.

Chart 2-3 Outline of Trading Systems of Major Index Futures Transactions

Product name	Nikkei 225 Futures	Nikkei 225 mini	Nikkei 225 micro Futures	TOPIX Futures	mini-TOPIX Futures
Underlying asset	Nikkei Stock Average (Nikkei 225)			Tokyo Stock Price Index (TOPIX)	
Trading hours	<Day sessions> Opening: 8:45 Regular sessions: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day				

Product name	Nikkei 225 Futures	Nikkei 225 mini	Nikkei 225 micro Futures	TOPIX Futures	mini-TOPIX Futures
Contract months (delivery months)	June and December: Nearest 16 contract months March and September: Nearest 3 contract months	June and December: Nearest 10 contract months March and September: Nearest 3 contract months (Other contract months) Nearest 3 contract months	March, June, September and December: Nearest 2 contract months Other contract months: Nearest 2 contract months	March, June, September and December: Nearest 5 contract months	March, June, September and December: Nearest 3 contract months
Trading unit	Nikkei 225 × 1,000 yen	Nikkei 225 × 100 yen	Nikkei 225 × 10 yen	TOPIX × 10,000 yen	TOPIX × 1,000 yen
Last trading day	Trading day that ends on the day preceding the second Friday of each contract month (if the second Friday or the preceding day falls upon a non-business day, the preceding business day)				
Tick size	10 yen	5 yen		0.5 points	0.25 points
Final settlement	Cash settlement				

Product name	JPX –Nikkei Index 400 Futures	TSE Growth Market 250 Index Futures	TSE REIT Index Futures	Nikkei 225 VI Futures
Underlying asset	JPX-Nikkei Index 400 (JPX Nikkei 400)	TSE Growth Market 250 Index	TSE REIT Index	Nikkei Stock Average Volatility Index (Nikkei 225 VI)
Trading hours	<Day sessions> Opening: 8:45 Regular session: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day			<Day sessions> Opening: 9:00 Regular session: 9:00 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 18:55 Closing: 19:00
Contract months (delivery months)	March, June, September and December: Nearest 5 contract months	March, June, September and December: Nearest 5 contract months	March, June, September and December: Nearest 3 contract months	Nearest 8 consecutive contract months
Trading unit	JPX Nikkei 400 × 100 yen	TSE Growth Market 250 Index × 1,000 yen	TSE REIT Index × 1,000 yen	Nikkei 225 VI × 10,000 yen
Last trading day	Trading day that ends on the day preceding the second Friday of each contract month (if the second Friday or the preceding day falls upon a non-business day, the preceding business day)			Trading day that ends 30 days before the second Friday of the month following each contract month (if the relevant trading day, the second Friday or the preceding day falls upon a non-business day, the preceding business day)
Tick size	5 points	1 point	0.5 points	0.05 points
Final settlement	Cash settlement			

Product name	DJIA Futures	TAIEX Futures	FTSE China 50 Index Futures	CME Group Petroleum Index Futures
Underlying asset	Dow Jones Industrial Average (DJIA)	TAIEX	FTSE China 50 Index	CME Group Petroleum Index
Trading hours	<Day sessions> Opening: 8:45 Regular session: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day	<Day sessions> Opening: 8:45 Regular session: 8:45 – 15:10 Closing: 15:15	<Day sessions> Opening: 8:45 Regular session: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day	<Day sessions> Opening: 8:45 Regular session: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day
Contract months (delivery months)	March, June, September and December: Nearest 4 contract months	Nearest 2 contract months, plus nearest 3 contract months among March, June, September and December	Nearest 2 contract months, plus nearest 2 contract months among March, June, September and December	Nearest 6 contract months from the month following the month of the first trading day
Trading unit	DJIA × 100 yen	TAIEX × 100 yen	FTSE China 50 Index × 100 yen	CME Group Petroleum Index × 10,000 yen
Last trading day	Trading day that ends on the third Friday of each contract month (if the third Friday falls upon a non-business day or a day on which DJIA is not calculated, the preceding business day)	Trading day that ends on the business day preceding the third Wednesday of each contract month (if the relevant trading day falls upon a non-business day, or if the third Wednesday falls upon a day on which TAIEX is not calculated, the preceding business day)	Trading day that ends on the business day preceding the last day of each contract month (if the relevant trading day falls upon a non-business day or a day on which FTSE China 50 Index is not calculated, or if the last day falls upon a non-business day, the preceding business day)	The first business day of each contract month (if said day in U.S. falls on a day on which the CME Group Petroleum Index will not be calculated, the following business day)
Tick size	1 point	1 point	5 points	0.05 points
Final settlement	Cash settlement			

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

Chart 2-4 Outline of the Flexible Futures Trading System

Trading method	J-NET market only
Underlying asset	Nikkei Stock Average (Nikkei 225) (* only Large trading is available) TOPIX (* only Large trading is available) JPX-Nikkei Index 400 TSE REIT Index TOPIX Banks Index Nikkei 225 Total Return Index (* only flexible futures trading is available for Nikkei 225 Total Return Index Futures)
Trading hours	8:20 – 6:00 of the next day
Contract month	For a maximum 5-year period (*per day basis; the minimum period from the creation day to the last trading day shall be five business days.)
Trading unit	Same as regular index futures (*Nikkei 225 Total Return Index × 1,000 yen)
Last trading day	Per day basis (* to be advanced chronologically if the day falls on a non-business day)
Tick size	Four decimal places (JPY/Pts)
Final settlement	Cash settlement by SQ or closing price (*only SQ settlement can be selected for Nikkei 225 Total Return Index Futures.)

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please check the latest information and details on Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

(ii) Settlement

Price index futures can be settled by an offsetting trade prior to the last trading day or by making a final settlement. Both of them are made by paying the net cash difference.

A final settlement is made on the basis of the special quotation (SQ) which is calculated on the business day following the last trading date. For flexible futures trading, in addition to the special quotation (SQ), the closing price of the underlying index as of the last trading day can be chosen.

Delivery of the net cash difference must be made: until the business day following the day on which any excess or shortage occurs if the settlement is made by an offsetting trade prior to the last trading day (as in the case of the delivery of the daily mark-to-market difference); or on the third business day counting from and including the last trading day (or in the case of nonresidents, on the fourth business day counting from and including the last trading day).

Trade	Settlement Amount
Buy long → Final settlement	(SQ – Buying contract price) × Multiplier × Quantity
Sell short → Final settlement	(Selling contract price – SQ) × Multiplier × Quantity

(4) Commodity Futures Transaction

(i) Characteristics and Products

A commodity futures transaction is a futures transaction targeting a commodity such as precious metals (e.g., gold, platinum), rubber, and agricultural products.

The outline of trading systems of the major commodity futures transactions is as described in Chart 2-5.

Chart 2-5 Outline of Trading Systems of Major Commodity Futures Transactions

Product name	Gold Standard Futures	Gold Mini Futures	Gold Rolling-Spot Futures	Silver Futures
Underlying asset	Gold	Price of Gold Standard Futures	Gold	Silver
Trading hours	<Day sessions> Opening: 8:45 Regular sessions: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day			
Contract months (delivery months)	Nearest 6 contract months from the month following the month of the first trading day (February, April, June, August, October and December)		On a daily basis	Nearest 6 contract months from the month following the month of the first trading day (February, April, June, August, October and December)
Trading unit	1 kg	100 g		10 kg for contract months until April 2024 30kg for contract months from June 2024
Last trading day	Day session on the third business day preceding the delivery day	Day session on the business day preceding the last trading day of the current contract month of the standard contract	–	Day session on the third business day preceding the delivery day
Tick size	1 yen per gram	0.5 yen per gram	1 yen per gram	0.1 yen per gram
Final settlement	Delivery settlement	Cash settlement	- (Daily cash settlement)	Delivery settlement

Product name	Platinum Standard Futures	Platinum Mini Futures	Platinum Rolling-Spot Futures	Palladium Futures
Underlying asset	Platinum	Price of Platinum Standard Futures	Platinum	Palladium
Trading hours	<Day sessions> Opening: 8:45 Regular sessions: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day			
Contract months (delivery months)	Nearest 6 contract months from the month following the month of the first trading day (February, April, June, August, October and December)		On a daily basis	Nearest 6 contract months from the month following the month of the first trading day (February, April, June, August, October and December)
Trading unit	500 g	100 g		500 g for contract months until April 2024 3kg for contract months from June 2024
Last trading day	Day session on the third business day preceding the delivery day	Day session on the business day preceding the last trading day of the current contract month of the standard contract	–	Day session on the third business day preceding the delivery day
Tick size	1 yen per gram	0.5 yen per gram	1 yen per gram	
Final settlement	Delivery settlement	Cash settlement	- (Daily cash settlement)	Delivery settlement

Product name	RSS3 Rubber Futures	TSR20 Rubber Futures	Soybean Futures	Azuki (Red Bean) Futures	Corn Futures
Underlying asset	Ribbed Smoked Sheet (RSS) No.3	Technically Specified Rubber (TSR) No. 20	Soybean	Azuki (red bean)	Corn
Trading hours	<Day sessions> Opening: 9:00 Regular sessions: 9:00 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 18:55 Closing: 19:00		<Day sessions> Opening: 8:45 Regular sessions: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular sessions: 16:30 – 5:55 of the next day Closing: 6:00 of the next day		
Contract months (delivery months)	Nearest 12 contract months from the month following the month of the first trading day		Nearest 6 months from the month following the month of the first trading day (February, April, June, August, October, December)	Nearest 6 months from the month following the month of the first trading day	Nearest 6 months from the month following the month of the first trading day (January, March, May, July, September, November)
Trading unit	5,000 kg	5,000 kg	25 kg	2,400 kg (80 bags)	50,000 kg
Last trading day	Day session on the fourth business day preceding the delivery day.	Day session on the last business day of the month immediately preceding the delivery month	Day session on the 15th day of the contract month (if the relevant day falls upon a non-business day, the preceding business day)	Day session on the 2nd business day preceding the delivery day	Day session on the 15th day of the month immediately preceding the current contract month (if the relevant day falls upon a non-business day, the preceding business day)
Tick size	0.1 yen per kilogram		10 yen per 1,000 kg	10 yen per 30 kg (1 bag)	10 yen per 1,000 kg
Final settlement	Delivery settlement				

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

(ii) Settlement

Commodity futures can be settled by: paying a difference between the selling price and the buying price in an offsetting trade made prior to the last trading day; or making a final settlement when holding the position until the last trading day. Final settlement can be made by actually delivering the commodity (delivery settlement) or paying a cash difference (net cash settlement).

In the case of net cash settlement-type commodity futures transactions, the final settlement is made based on the opening price of the underlying asset on the day following the last trading day.

On the other hand, in the case of delivery settlement-type commodity futures, the selling party delivers the commodity and receives the price, and the buying party pays the price and receives the commodity.

If a delivery settlement-type commodity futures transaction is not settled by offsetting trade by the last trading day, all positions are settled by delivery settlement.

1 3 Options Transactions

Market derivatives options transactions in Japan are categorized by underlying assets into products related to government bonds, stocks and commodities.

(1) Options on JGB Futures

(i) Characteristics and Products

Options on 10-year JGB futures are one type of bond options transaction.

These options are American options, meaning the option can be exercised at any time until to the last trading day. It is possible to waive the right. The underlying assets of the options on 10-year JGB futures are 10-year JGB futures, and when the right is exercised, a contract is executed for 10-year JGB futures, not for 10-year JGB. The underlying assets differ by each contract month contract. For example, the underlying asset of the option on 10-year JGB futures for which the contract month is September is 10-year JGB futures for which the contract month is September. However, the underlying asset of the option on 10-year JGB futures for which the contract month is October or November is 10-year JGB futures for which the contract month is December. Options transactions on 10-year JGB futures provide bond holders with an effective means to hedge price fluctuation risks of JGB.

The outline of the trading system for options on 10-year JGB futures is as described in Chart 2-6.

Chart 2-6 Outline of the Trading System for Options Transactions on 10-year JGB Futures

Product name	Options on 10-year JGB Futures
Underlying asset	10-year JGB Futures
Trading hours	<Morning sessions> Opening: 8:45 Regular session: 8:45 – 11:00 Closing: 11:02 <Afternoon sessions> Opening: 12:30 Regular sessions: 12:30 – 15:00 Closing: 15:02 <Night sessions> Opening: 15:30 Regular session: 15:30 – 5:55 of the next day Closing: 6:00 of the next day
Contract months (delivery months)	March, June, September and December: Nearest 2 contract months (Other contract months) Nearest 2 contract months at the maximum
Trading unit	Amount equal to 100 million yen par value of each JGB futures transaction per contract.
Type of exercise	American type
Strike price intervals and settings	(At the opening of trading) The base strike price which is closest to the settlement price of the underlying contract month futures transaction, and 20 respective strike prices above and below the base strike price in 0.25-yen increments (41 strike prices in total) (Additional setting) Additional prices are set as necessary to ensure that there are at least 20 respective strike prices above and below the base strike price, in 0.25-yen increments. (Other) Additional strike prices are set based on application from participants alongside normal strike prices (On-demand strike prices).
Last trading day	Trading day that ends on the last day of the month preceding each contract month (if the last day falls upon a non-business day, the preceding business day).
Final settlement	The 10-year JGB futures transaction becomes effective when the rights are exercised.

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

(ii) Settlement

An option contract for 10-year JGB futures can be settled by an offsetting trade prior to the last trading day or by making a final settlement (exercising the option). It is possible to have the option extinguished by waiving the right.

Upon a final settlement (exercise of the option), a 10-year JGB futures contract is executed at the closing time (15:15) of the exercise day.

In-the-money unsettled open positions for which settlement has not been made by an offsetting trade by the last trading day will be automatically exercised unless the right is waived (*i.e.,* the rule for automatic exercise of rights).

(2) Share-Related Options Trading

(i) Characteristics and Products

Share-related options include share index options (underlying asset: Nikkei 225 or TOPIX) and securities options (underlying asset: shares listed on the TSE, exchange traded funds (ETF) that are linked to various share indexes, or real estate investment trust (REIT)). These options products are used in combination with securities and futures to hedge risks and increase investment efficiency.

For the purpose of revitalizing listed options markets and securing the stability of the financial system, flexible options trading was also introduced as a new type of contract for options transactions under which the exercise date and strike price can be set flexibly.

The outline of the trading systems of the major share-related options transactions under regular contracts is as described in Chart 2-7, and the outline of the systems for flexible options trading is as described in Chart 2-8.

Chart 2-7 Outline of Trading Systems of Major Share-Related Options Transactions Under Regular Contracts

Product name	Index Options			
	Nikkei 225 Options	Nikkei 225 mini Options	TOPIX Options	JPX-Nikkei Index 400 Options
Underlying asset	Nikkei Stock Average (Nikkei 225)		Tokyo Stock Price Index (TOPIX)	JPX-Nikkei Index 400
Trading hours	<Day sessions> Opening: 8:45 Regular session: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular session: 16:30 – 5:55 of the next day Closing: 6:00 of the next day			
Contract months (delivery months)	June and December: Nearest 16 contract months March and September: Nearest 3 contract months Other contract months: Nearest 8 contract months	Contract months maturing in the 2nd week: Nearest 3 contract months Contract month maturing in a week other than the 2nd week: Nearest 4 contract months	June and December: Nearest 10 contract months March and September: Nearest 3 contract months (Other contract months) Nearest 6 contract months	
Trading unit	Option price × 1,000 yen	Option price × 100 yen	Option price × 10,000 yen	Option price × 1,000 yen
Type of exercise	European type			

Product name	Index Options			
	Nikkei 225 Options	Nikkei 225 mini Options	TOPIX Options	JPX-Nikkei Index 400 Options
Strike price intervals and settings	(At the opening of trading) The strike price closest to the closing Nikkei 225 on the day (if the relevant day falls upon a non-business day, the preceding business day) preceding the first trading day, and 16 respective strike prices both above and below the said strike price in 250-yen increments (33 strike prices in total).	(At the opening of trading) The strike price closest to the closing Nikkei 225 on the day preceding the first trading day (if the first-mentioned day falls upon a non-business day, the preceding business day), and 24 respective strike prices both above and below the said strike price in 125-yen increments (49 strike prices in total).	(At the opening of trading) The strike price closest to the closing TOPIX on the day preceding the first trading day (if the first-mentioned day falls upon a non-business day, the preceding business day), and 6 respective strike prices both above and below the said strike price in 50-point increments (13 strike prices in total).	(At the opening of trading) The strike price closest to the closing JPX-Nikkei Index 400 on the day preceding the first trading day (if the first-mentioned day falls upon a non-business day, the preceding business day), and 8 respective strike prices both above and below the said strike price in 500-point increments (17 strike prices in total).
	(Additional setting) 16 respective strike prices continuously both above and below the strike price closest to the closing Nikkei 225 each day, in 125 yen increments for the nearest three contract months and in 250-yen increments for other contract months.	(Additional setting) 24 respective strike prices continuously both above and below the strike price closest to the closing Nikkei 225 each day, in 125 yen increments	(Additional setting) 9 respective strike prices continuously both above and below the strike price closest to the closing TOPIX each day in 25-point increments for the nearest 3 contract months, and 6 respective strike prices continuously both above and below the said strike price in 50-point increments for other contract months.	(Additional setting) 8 respective strike prices continuously both above and below the strike price closest to the closing JPX-Nikkei Index 400 each day in 250-point increments for the nearest 3 contract months, and 8 respective strike prices continuously both above and below the said strike price in 500-point increments for other contract months.
	(Other: On-demand strike prices) Additional strike prices are set based on application from participants alongside normal strike prices. * Not applicable to Nikkei 225 mini Options			
Last trading day	Trading day that ends on the day preceding the second Friday of each contract month (if the second Friday or the preceding day falls upon a non-business day, the preceding business day).	Trading day that ends on the day preceding the second Friday of each contract month (if the second Friday or the preceding day falls upon a non-business day, the preceding business day).	Trading day that ends on the day preceding the second Friday of each contract month (if the second Friday or the preceding day falls upon a non-business day, the preceding business day).	
Final settlement	Cash settlement			

Product name	Securities Options
Underlying asset	Issued securities listed on all stock exchanges selected by the OSE
Trading hours	<Morning sessions> Opening: 9:00 Regular session: 9:00 – 11:30 Closing: 11:35 <Afternoon sessions> Opening: 12:30 Regular session: 12:30 – 15:10 Closing: 15:15
Contract months (delivery months)	Nearest 2 contract months, plus nearest 2 contract months among March, June, September and December
Trading unit	In general, the figure of the contract size of the securities to which the options apply (* this may be adjusted if there are stock splits, etc.)
Type of exercise	European type
Strike price intervals and settings	(At the opening of trading) The strike price closest to the closing price for the underlying securities on the day preceding the first trading day (if the first-mentioned day falls upon a non-business day, the preceding day), and 2 respective prices both above and below the said strike price (5 strike prices in total). (Additional setting) Additional prices are set as necessary to ensure that there are 2 consecutive strike prices both above and below the strike price, which is closest to the closing price for the underlying securities each business day.
Last trading day	The day preceding the second Friday of each contract month (if the second Friday or the preceding day falls upon a non-business day, the preceding day).
Final settlement	Delivery settlement

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

Chart 2-8 Outline of Trading Systems of Flexible Options Trading

Product name	Securities Options Transactions	Index Options Transactions
Trading method	J-NET market only	
Underlying asset	Eligible underlying issues for regular options trading (excluding REIT)	Nikkei Stock Average (Nikkei 225) Tokyo Stock Price Index (TOPIX) JPX-Nikkei Index 400 TSE REIT Index (*available only in flexible options trading) TOPIX Banks Index (*available only in flexible options trading)
Trading hours	8:20 – 16:00, 16:15 – 17:30	8:20 – 16:00, 16:15 – 6:00 of the next day
Contract months (delivery months)	A maximum 3-year period (*per day basis; the minimum period from the creation day to the last trading day shall be five business days.)	A maximum 5-year period (*per day basis; the minimum period from the creation day to the last trading day shall be five business days.)
Contract unit/ multiplier	In general, the figure of the contract size of the securities to which the options apply (*This may be adjusted if there are stock splits, etc.)	Same as the trading units of the options transactions under regular contracts, except for: -TOPIX REIT Index × JPY 1,000 -TOPIX Banks Index × JPY 10,000
Type of exercise	European type	
Strike price	Two decimal places (JPY)	
Last trading day	Per day basis (*to be advanced chronologically if the day falls on a non-business day)	
Final settlement	Physical delivery or cash settlement by closing price	Cash settlement by SQ or cash settlement by closing price of the underlying index as of the last trading day

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

(ii) Settlement

An index option contract can be settled by an offsetting trade prior to the last trading day or by making a final settlement (exercising the option). It is also possible to have the option extinguished by waiving the right.

A final settlement is made on the basis of the difference between the special quotation (SQ), which is calculated on the business day following the last trading date, and the strike price. For flexible options trading, the closing price of the underlying index as of the last trading day can be selected instead of SQ.

In-the-money unsettled open positions, for which settlement has not been made by an offsetting trade by the last trading day, will be automatically exercised unless the right is waived (*i.e.,* the rule for automatic exercise of rights).

Calculation Method for Final Settlement of Index Options (Regular Options Trading)

Trade	Settlement Amount
Call option	(SQ – strike price) × Multiplier × Quantity
Put option	(Strike price – SQ) × Multiplier × Quantity

Calculation Method for Final Settlement of Index Options (Flexible Options Trading)

Trade	Settlement Amount
Call option	(SQ or index closing price – strike price) × Multiplier × Quantity
Put option	(Strike price – SQ or index closing price) × Multiplier × Quantity

A securities option contract can be settled in two ways; by an offsetting trade prior to the last trading day or by making a final settlement (exercising the option). It is also possible to have the option extinguished by waiving the right. A final settlement is made by physical delivery of the underlying securities of the option. For flexible options trading, cash settlement by the closing price of the afternoon session can be selected instead of delivery settlement.

In the case of delivery settlement, the settlement amount is calculated as follows:

Strike price × Underlying securities contract size × Number of exercises

If any corporate action, such as share split or share consolidation, takes place with regard to the underlying securities, adjustments are made for the strike price, the position, and the delivery size.

If the number of underlying securities per unit of securities options has been adjusted after adjusting the strike price, the settlement for the number of securities that do not amount to a contract size is performed as follows:

$$\text{Option liquidation price} \times \frac{\text{Number of underlying securities less than a contract size}}{} \times \text{Number of exercises}$$

In the case of cash settlement, the final settlement amount is calculated as follows.

Trade	Settlement Amount
Call option	(Afternoon session closing price – strike price) × Multiplier × Quantity
Put option	(Strike price – afternoon session closing price) × Multiplier × Quantity

With respect to trades in securities underlying the options concluded upon exercise of rights, the JSCC assumes the obligations, and settlement occurs at the JSCC on the third business day following the day on which the rights were exercised. The settlement cutoff time is 2:15 p.m. for payment and 2:45 p.m. for receipt with respect to cash delivery, and 1:00 p.m. for delivery and 2:15 p.m. for receipt with respect to the exchange of securities underlying the option.

(3) Commodity Futures Options Trading

(i) Characteristics and Products

Options trading on gold futures is a type of commodity futures options transaction.

The outline of trading system of commodity futures options transactions is as described in Chart 2-9.

Chart 2-9 Outline of Trading System of Commodity Futures Options Transactions

Product name	Options on Gold Futures
Underlying asset	Price of Gold Standard Futures
Trading hours	<Day sessions> Opening: 8:45 Regular session: 8:45 – 15:10 Closing: 15:15 <Night sessions> Opening: 16:30 Regular session: 16:30 – 5:55 of the next day Closing: 6:00 of the next day
Contract months (delivery months)	Nearest 6 contract months from the month following the month of the first trading day (February, April, June, August, October and December)
Trading unit	Option price × 100 yen
Type of exercise	European type
Strike price intervals and settings	(At the opening of trading) The price that is equal to the integral multiple of 50 yen and is close to the final settlement price of gold standard futures on the business day preceding the first trading day, and 20 respective prices both above and below the said strike price, with intervals of 50 yen (41 strike prices in total). (Additional setting) Additional prices are set to ensure that there are 20 consecutive strike prices both above and below the strike price, which is equal to the integral multiple of 50 yen and close to the final settlement price for gold standard futures on each business day.
Last trading day	Day Session on the business day preceding the last trading day of the current contract month of the standard contract
Final settlement	Cash settlement

(Note) This chart provides an outline of the trading system as of January 4, 2024. The trading system is subject to changes as necessary. Please confirm the latest information and details at Japan Exchange Group, Inc.'s website (https://www.jpx.co.jp/english/).

(ii) Settlement

An options transaction on gold futures can be settled by an offsetting trade prior to the last trading day or by making a final settlement (exercising the option). It is also possible to have the option extinguished by waiving the right.

A final settlement is made on the basis of the difference between the final settlement price (the opening

price on the day session of the gold standard futures with the same contract month as of the business day following the last trading day) and the strike price.

In-the-money unsettled open positions, for which settlement has not been made by an offsetting trade by the last trading day, will be automatically exercised unless the right is waived (*i.e.,* the rule for automatic exercise of rights).

Calculation Method for Final Settlement of Options on Gold Futures

Trade	Settlement Amount
Call option	(Final settlement price – strike price) × Multiplier × Quantity
Put option	(Strike price – Final settlement price) × Multiplier × Quantity

14 Sample Calculation Questions of Futures Transactions and Options Transactions

1. Futures Transactions

○ Hedging Trading

(Question 1)

Suppose the price of the spot 10-year JGB is JPY108.50 and the price of the 10-year JGB futures is JPY99. Mr. A presently owns JPY1 billion (face value) of the spot 10-year JGB. He expects that interest rates will rise in the future, causing the bond market to fall. Consequently, he decides to obtain a sell-hedge of 10-year JGB futures at the same face value as the spot 10-year JGBs he holds. Afterward, the spot 10-year JGBs fall in price, as he expected, to JPY105.30, while the 10-year JGB futures have fallen to JPY96.10. If Mr. A buys back the 10-year JGB futures, how much will he profit or lose (ignoring brokerage commissions, taxes and other costs)?

(Answer 1)

Spot: (JPY105.30 − JPY108.50) × JPY1 billion / JPY100 = − JPY32 million

Futures: (JPY99.00 − JPY96.10) × JPY1 billion / JPY100 = JPY29 million

Profit and loss: − JPY32 million + JPY29 million = − JPY3 million

	Spot	Futures
Beginning End	JPY108.50 JPY105.30	Sell short: JPY99.00 Buy back: JPY96.10
Profit/loss	-JPY3.20	+JPY2.90

Answer: A loss of JPY3 million

○ **Arbitrage Trading**

(Question 2)

Let us assume that, at present, Nikkei 225 is at JPY14,000, the dividend rate is 0.5%, the short-term interest rate is 1.2%, and the Nikkei 225 futures with expirations three months off are selling for JPY14,600. The futures price later converges to JPY14,500 on the last trading date for the futures. At this time, if we sell the basis (a buy arbitrage) by selling the Nikkei 225 futures and buying the spot basket of Nikkei 225 simultaneously, what is the amount of pure arbitrage profit (ignoring brokerage commissions, taxes and other costs)?

(Answer 2)

Spot: (JPY14,500 − JPY14,000) × JPY1,000 = JPY500,000

Futures: (JPY14,600 − JPY14,500) × JPY1,000 = JPY100,000

Profit and loss: JPY500,000 + JPY100,000 = JPY600,000

	Spot	Futures
Beginning End	Buy: JPY14,000 Sell: JPY14,500	Sell short: JPY14,600 Buy back: JPY14,500
Profit/loss	+JPY500	+JPY100

Interest rate: JPY14,000 × 0.012 × 3/12 × JPY 1,000 = JPY42,000

Dividend: JPY14,000 × 0.005 × 3/12 × JPY1,000 = JPY17,500

Pure arbitrage profit: JPY 600,000 − JPY42,000 + JPY17,500 = JPY575,500

Answer: JPY575,500

○ **Calendar Spread Trading (JGB Futures Transaction)**

(Question 3)

Let us assume that the nearby contract month for 10-year JGB futures is currently at JPY103.50, while the distant contract is at JPY103. Mr. A expects that interest rates will fall in the future and bond prices will rise, widening the spread between long-term and short-term interest rates, so he decides to buy the spread. The bond market rose subsequently as he expected and the nearby contract month went to JPY107 while the distant contract month went to JPY106.30. How much will his profit or loss per unit be (ignoring brokerage commissions, taxes and other costs)?

(Answer 3)

Nearby contract month: JPY107.00 − JPY103.50 = JPY3.50

Distant contract month: JPY103.00 − JPY106.30 = − JPY3.30

Profit and loss: JPY3.50 − JPY3.30 = JPY0.20

	Nearby Contract Month	Distant Contract Month	Spread
Beginning End	Buy long: JPY103.50 Resell: JPY107.00	Sell short: JPY103.00 Buy back: JPY106.30	JPY0.50 JPY0.70
Profit/loss	+JPY3.50	-JPY3.30	

Answer: A profit of JPY0.20

○ **Calendar Spread Trading (Index Futures Transaction)**

(Question 4)

Let us assume that at present the nearby contract month for Nikkei 225 futures stands at JPY14,500 and the distant contract month stands at JPY14,700 (a spread of JPY200). Mr. A expects that interest rates will rise and the spread will widen, and decides to buy the spread. Afterward, interest rates appear to be rising sharply. The nearby contract month goes to JPY14,600 while the distant contract month goes to JPY14,850, increasing the spread to JPY250. How much will his profit or loss per unit be (ignoring brokerage commissions, taxes and other costs)?

(Answer 4)

Nearby contract month: JPY14,500 − JPY14,600 × JPY1,000 = −JPY100,000

Distant contract month: JPY14,850 − JPY14,700 × JPY1,000 = JPY150,000

Profit and loss: −JPY100,000 + JPY150,000 = JPY50,000

	Nearby Contract Month	Distant Contract Month	Spread
Beginning End	Sell short: JPY14,500 Buy back: JPY14,600	Buy long: JPY14,700 Resell: JPY14,850	JPY200 JPY250
Profit/loss	-JPY100	+JPY150	

Answer: A profit of JPY50,000

○ **Speculative Trading (Trend-Following)**

(Question 5)

Let us assume that the current price for a 10-year JGB future is JPY106. Mr. A expects that the market will continue to rise in the future, and purchases ten units of 10-year JGB futures. Afterwards, the 10-year JGB futures do indeed rise in value as expected, reaching JPY107.50.

If he liquidates the ten units of 10-year JGB futures at this point through selling them, how much will his profit or loss be (ignoring brokerage commissions, taxes and other costs)?

(Answer 5)
(JPY107.50 − JPY106.00) × JPY100 million / JPY100 × 10 units = JPY15 million

Answer: A profit of JPY15 million

○ **Calculation of Profit and Loss (Index Futures Transaction)**

(Question 6)
How much will the profit or loss be after purchasing 20 units of TOPIX futures at 1,600 points and reselling them at 1,610 points? Assume that purchase fees and resale fees are JPY224,000 and JPY225,400, respectively.
(Note) Consider brokerage commissions, taxes and other costs. 10% consumption tax applies.

(Answer 6)
(i) Profit on Trade: (1,610 − 1,600) points × JPY10,000 × 20 units = JPY2 million
(ii) Purchase Fees: JPY224,000 + Applicable consumption tax = JPY246,400
(iii) Resale Fees: JPY225,400 + Applicable consumption tax = JPY247,940
(iv) Final profit: JPY2 million − JPY246,400 − JPY247,940 = JPY1,505,660

Answer: A profit of JPY1,505,660

○ **Calculation of Margin (JGB Futures Transaction)**

(Question 7)
Mr. A buys JPY2 billion at face value in 10-year JGB futures of JPY100. The margin requirement is JPY20 million and he deposits the entire amount in margin securities, not cash.
Assume that on the day following the contract date, either the futures' settlement price changed or the value of the margin securities changed or that trading took place, causing changes. These changes are described in sections (i) through (iv) below. Then, calculate the margin surplus or short-fall, and divide it into cash and margin securities (ignoring brokerage commissions, taxes and other costs).

(Question 7-(i))
If the settlement price of the 10-year JGB futures rose to JPY100.30 and the margin securities increased in value by JPY1 million, how much of the margin would one be able to withdraw? Assume that there are 20 futures contracts and that the required margin remains at JPY20 million.

(Answer 7-(i))

The net margin after marking to market = Cash + Margin securities
= 0 + (JPY20 million + JPY1 million)
= JPY21 million

Unrealized profits and losses: (JPY100.30 − JPY100) × JPY100 million / JPY100 × 20 units = JPY6 million

Profits/losses from futures settlements, etc.: JPY0

Margin in account = Margin on deposit after marking to market + Unrealized profits and losses + Profits and losses from futures settlements, etc.
= JPY21 million + JPY6 million + 0 = JPY27 million

Required margin = JPY20 million

Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY27 million − JPY20 million
= JPY7 million

Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on futures settlements, etc.
= 0 + JPY6 million + 0 = JPY6 million

Answer: The surplus margin makes it possible to withdraw JPY7 million (JPY1 million in margin securities and JPY6 million in cash).

(Question 7-(ii))

If the settlement price for 10-year JGB futures has dropped to JPY99.40 and the margin securities have experienced a JPY1 million loss in valuation, how much more of the margin needs to be deposited? Assume that there has been no change in the required margin of JPY20 million for 20 units of the position balance.

(Answer 7-(ii))

The margin in account after marking to market = Cash + Margin securities
= 0 + (JPY20 million − JPY1 million)
= JPY19 million

Unrealized profit and loss: (JPY99.40 − JPY100) × JPY100 million / JPY100 × 20 units = − JPY12 million

Profits/losses from futures settlements, etc.: JPY0

Margin in account = Margin on deposit after marking to market + Unrealized profits and losses + Profits and losses from futures settlements, etc.
= JPY19 million − JPY12 million + 0 = JPY7 million

Required margin = JPY20 million

Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY7 million − JPY20 million
= − JPY13 million

Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on

futures settlements, etc.
= 0 − JPY12 million + 0 = − JPY12 million

Answer: The shortfall in margin makes it necessary to deposit JPY13 million (of which JPY1 million may be in margin securities).

(Question 7-(iii))

10 units of 10-year JGBs are resold at JPY100.60. If the settlement price has dropped to JPY99.80 and there has been no change in the evaluation value of the margin securities, what type of change has there been in the surplus or shortfall of the margin? Assume a required margin of JPY10 million for the ten position balance.

(Answer 7-(iii))

The margin in account after marking to market = Cash + Margin securities
= 0 + JPY20 million = JPY20 million

Unrealized profit and loss: (JPY99.80 − JPY100) × JPY100 million / JPY100 × 10 units= − JPY2 million

Profits/losses from futures settlements, etc.: (JPY100.60 − JPY100) × JPY100 million / JPY100 × 10 units
= JPY6 million

Margin in account = Margin on deposit after marking to market + Unrealized profits and losses + Profits and losses from futures settlements, etc.
= JPY20 million − JPY2 million + JPY6 million = JPY24 million

Required margin = JPY10 million

Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY24 million − JPY10 million
= JPY14 million

Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on futures settlements, etc.
= 0 − JPY2 million + JPY6 million
= JPY4 million

Answer: The surplus in the margin makes it possible to withdraw margin securities equivalent to JPY10 million and JPY4 million of cash. The JPY4 million of cash withdrawn by the customer is processed as JPY6 million profit on the settlement of a futures contract and JPY2 million unrealized loss.

(Question 7-(iv))

10 units of 10-year JGB futures are resold at JPY99.50. If the settlement price has gone up to a JPY100.20 and there has been no change in the valuation of the margin securities, how will the surplus/shortfall of the margin change? Assume a required margin of JPY10 million for the ten position balance.

(Answer 7-(iv))

The margin in account after marking to market = Cash + Margin securities
= 0 + JPY20 million = JPY20 million

Unrealized profit and loss: (JPY100.20 − JPY100) × JPY100 million / JPY100 × 10 units = JPY2 million

Profits/losses from futures settlements, etc.: (JPY99.50 − JPY100) × JPY100 million / JPY100 × 10 units
= − JPY5 million

Margin in account = Margin on deposit after marking to market + Unrealized profits and losses + Profits and losses from futures settlements, etc.
= JPY20 million + JPY2 million − JPY5 million = JPY17 million

Required margin = JPY10 million

Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY17 million − JPY10 million
= JPY7 million

Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on futures settlements, etc.
= 0 + JPY2 million − JPY5 million
= − JPY3 million

Answer: The shortfall in cash makes it necessary to deposit JPY3 million (all in cash). This JPY3 million deposit in cash and the unrealized JPY2 million earnings will cover the JPY5 million loss on the settlement of the futures. After the money is deposited, it is possible to withdraw margin securities equivalent to JPY10 million.

○ Calculation of Margin (Index Futures Transaction)

(Question 8)

Mr. A bought 20 units of TOPIX futures at 1,600 points. The clearing index value on the contract date is 1,600 points, and the total required margin deposit is JPY20 million. He makes up the entire margin in margin securities instead of cash.

Assume that on the day following the contract date, the clearing index value and evaluation price of the margin securities have changed as described in (i) through (iv) below. Calculate the surplus or shortfall of margin and divide it into cash and margin securities (ignoring brokerage commissions, taxes and other costs).

(Question 8-(i))

The TOPIX futures clearing index value has gone up to 1,607 points and the margin securities have an evaluation loss of JPY1 million. Given these conditions, how has the surplus /shortfall of the margin changed? Assume that there is no change in the required margin deposit of JPY20 million for 20 units of the position balance.

(Answer 8-(i))

The net margin after marking to market = Cash + Margin securities
= 0 + (JPY20 million − JPY1 million)
= JPY19 million

Unrealized profits and losses: (1,607 − 1,600) points × JPY10,000 × 20 units= JPY1.4 million

Profits/losses from futures settlements, etc.: JPY0

Margin in account = Margin on deposit after marking to market+ Unrealized profits and losses+ Profits and losses from futures settlements, etc.
= JPY19 million + JPY1.4 million + 0
= JPY20.4 million

Required margin = JPY20 million

Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY20.4 million − JPY20 million
= JPY400,000

Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on futures settlements, etc.
= 0 + JPY1.4 million + 0 = JPY1.4 million

Answer: The surplus cash margin (JPY1.4 million) makes it possible to withdraw JPY400,000, and if JPY1 million of margin securities were deposited, another JPY1 million of cash could be withdrawn.

(Question 8-(ii))

If the clearing index value for TOPIX futures has dropped to 1,593 points but the margin securities experienced a JPY1 million valuation gain, how will the surplus/shortfall of the margin change? Assume that there is no change in the required margin deposit of JPY20 million for 20 units of the position balance.

(Answer 8-(ii))

The margin in account after marking to market = Cash + Margin securities
= 0 + (JPY20 million + JPY1 million)
= JPY21 million

Unrealized profit and loss: (1,593 − 1,600) points × JPY10,000 × 20 units = − JPY1.4 million

Profits/losses from futures settlements, etc.: JPY0

Margin in account = Margin on deposit after marking to market+ Unrealized profits and losses+ Profits and losses from futures settlements, etc.
= JPY21 million − JPY1.4 million + 0 = JPY19.6 million

Required margin = JPY20 million

Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY19.6 million − JPY20 million
= − JPY400,000

Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on futures settlements, etc.
= 0 − JPY1.4 million + 0 = − JPY1.4 million

Answer: The shortfall in cash makes it necessary to deposit JPY1.4 million in cash, which is to be used to cover such an unrealized loss of JPY1.4 million. After that, margin securities equivalent to JPY1 million could be withdrawn.

(Question 8-(iii))

10 units of TOPIX futures are resold at 1,605 points. Although the clearing index value has gone up to 1,603 points, as long as there has been no change in the evaluation value of the margin securities, what type of change has there been in the surplus or shortfall of the margin? Assume that the required margin deposit for the ten-future position has been calculated at JPY10 million.

(Answer 8-(iii))

The margin in account after marking to market = Cash + Margin securities
= 0 + JPY20 million = JPY20 million
Unrealized profit and loss: (1,603 − 1,600) points × JPY10,000 × 10 units = JPY300,000
Profits/losses from futures settlements, etc.: (1,605 − 1,600) points × JPY10,000 × 10 units = JPY500,000
Margin in account = Margin on deposit after marking to market + Unrealized profits and losses + Profits and losses from futures settlements, etc.
= JPY20 million + JPY300,000 + JPY500,000
= JPY20.8 million
Required margin = JPY10 million
Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY20.8 million − JPY10 million
= JPY10.8 million
Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on futures settlements, etc.
= 0 + JPY300,000 + JPY500,000 = JPY800,000

Answer: The surplus in the margin makes it possible to withdraw margin securities equivalent to JPY10 million and JPY800,000 of cash. The JPY800,000 of cash that can be withdrawn by the customer is processed as a JPY300,000 cash withdrawal and JPY500,000 received as the profit on the settlement of a futures contract.

(Question 8-(iv))

10 units of TOPIX futures are resold at 1,596 points. The clearing index value has dropped to 1,592 points; however, there has been no change in the valuation of the margin securities. In this case, how has the

surplus/shortfall in the margin changed? Assume that the required margin deposit for the ten-future position has been calculated at JPY10 million.

(Answer 8-(iv))

The margin in account after marking to market = Cash + Margin securities
= 0 + JPY20 million
= JPY20 million

Unrealized profit and loss: (1,592 − 1,600) points × JPY10,000 × 10 units = − JPY800,000

Profits/losses from futures settlements, etc.: (1,596 − 1,600) points × JPY10,000 × 10 units = − JPY400,000

Margin in account = Margin on deposit after marking to market + Unrealized profits and losses + Profits and losses from futures settlements, etc.
= JPY20 million − JPY800,000 − JPY400,000 = JPY18.8 million

Required margin = JPY10 million

Amount of surplus/shortfall in the margin = Margin in account − Required margin
= JPY18.8 million − JPY10 million
= JPY8.8 million

Cash surplus/shortfall = Cash margin on deposit + Unrealized profits and losses + Profits and losses on futures settlements, etc.
= 0 − JPY800,000 − JPY400,000 = − JPY1.2 million

Answer: The shortfall in cash makes it necessary to deposit JPY1.2 million (all in cash). This JPY1.2 million deposit in cash is processed as the unrealized loss of JPY800,000 and the JPY400,000 loss on the settlement of the futures. After the money is deposited, it is possible to withdraw JPY10 million of margin securities.

2. Options Transactions

○ Long Straddle (Index Options Transaction)

(Question 1)

Along with buying 10 TOPIX call options with a strike price of 1,100 points at a 50-point premium, Mr. A buys 10 TOPIX put options with a strike price of 1,100 points at a premium of 58 points.

How much would the profit or loss arising from the whole transaction be if the TOPIX SQ price went to 1,250 points (ignoring brokerage commissions, taxes and other costs)?

(Answer 1)

{(1,250 − 1,100) − 50} points × JPY10,000 × 10 units = JPY10 million (long call options)

− 58 points × JPY10,000 × 10 units = − JPY5.8 million (long put options)

JPY10 million − JPY5.8 million = JPY4.2 million

Answer: A profit of JPY4.2 million

○ **Short Strangle (Index Options Transaction)**

(Question 2)

Along with writing 10 TOPIX call options with a strike price of 1,200 points at a premium of 55 points, Mr. A also writes 10 TOPIX put options with a strike price of 1,150 points at a premium of 70 points.

If the TOPIX SQ price goes to 1,250 points, how much will his profit and loss be in the whole transaction (ignoring brokerage commissions, taxes and other costs)?

(Answer 2)

{55 − (1,250 − 1,200)} points × JPY10,000 × 10 units= JPY500,000 (short call options)

70 points × JPY10,000 × 10 units = JPY7 million (short put options)

JPY7 million + JPY500,000 = JPY7.5 million

Answer: A profit of JPY7.5 million

○ **Vertical Bear Put Spread (Index Options Transaction)**

(Question 3)

Along with writing 10 TOPIX put options with a strike price of 1,200 points at a premium of 60 points, Mr. A buys 10 TOPIX put options with a strike price of 1,250 points at a premium of 75 points.

How much will he profit or lose in the whole transaction if the TOPIX SQ price goes to 1,100 points (ignoring brokerage commissions, taxes and other costs)?

(Answer 3)

{60 − (1,200 − 1,100)} points × JPY10,000 × 10 units = − JPY4 million (short put options)

{(1,250 − 1,100) − 75} points × JPY10,000 × 10 units = JPY7.5 million (long put options)

− JPY4 million + JPY7.5 million = JPY3.5 million

Answer: A profit of JPY3.5 million

○ **Vertical Bull Call Spread (Options Transaction on Index Futures)**

(Question 4)

Along with buying 10 TOPIX call options with a strike price of 1,150 points for a premium of 60 points, Mr. A writes 10 TOPIX call options with a strike price of 1,200 points for a premium of 45 points.

How much will he profit or lose in the whole transaction if the TOPIX SQ price goes to 1,200 points (ignoring brokerage commissions, taxes and other costs)?

(Answer 4)

{(1,200 − 1,150) − 60} points × JPY10,000 × 10 units = − JPY1 million (long call options)

{45 − (1,200 − 1,200)} points × JPY10,000 × 10 units = JPY4.5 million (short call options)

− JPY1 million + JPY4.5 million = JPY3.5 million

Answer: A profit of JPY3.5 million

○ Long Butterfly Spread (Index Options Transaction)

(Question 5)

Along with writing 10 TOPIX call options with a strike price of 1,200 points at a premium of 55 points and 10 TOPIX put options with a strike price of 1,200 points at a premium of 60 points, Mr. A buys 10 TOPIX put options with a strike price of 1,150 points at a premium of 40 points and 10 TOPIX call options with a strike price of 1,250 points at a premium of 35 points.

How much will he profit or lose in the whole transaction if the TOPIX SQ price goes to 1,210 points (ignoring brokerage commissions, taxes and other costs)?

(Answer 5)

{55 − (1,210 − 1,200)} points × JPY10,000 × 10 units = JPY4.5 million (short call options)

60 points × JPY10,000 × 10 units = JPY6 million (short put options)

− 40 points × JPY10,000 × 10 units = − JPY4 million (long put options)

− 35 points × JPY10,000 × 10 units = − JPY3.5 million (long call options)

JPY4.5 million + JPY6 million − JPY4 million – JPY3.5 million = JPY3 million

Answer: A profit of JPY3 million

○ Synthetic Long (Index Options Transaction)

(Question 6)

Along with buying 10 TOPIX call options with a strike price of 1,200 points at a premium of 55 points, Mr. A writes 10 TOPIX put options with a strike price of 1,200 points at a premium of 40 points.

How much will he profit or lose in the whole transaction if the TOPIX SQ price goes to 1,300 points (ignoring brokerage commissions, taxes and other costs)?

(Answer 6)

{(1,300 − 1,200) − 55} points × JPY10,000 × 10 units = JPY4.5 million (long call options)

40 points × JPY10,000 × 10 units= JPY4 million (short put options)

JPY4.5 million + JPY4 million = JPY8.5 million

Answer: A profit of JPY8.5 million

○ **Calculation of Profit and Loss (Index Options Transaction)**

(Question 7)

Mr. A purchases 10 units of 1,000-point TOPIX call options at a 40-point premium. Afterwards, TOPIX goes up and the SQ price reaches 1,080 points. At this point, if he exercises the option to secure the profits, what will the profits be? Assume that purchase fees and settlement fees are JPY11,000 and JPY16,000, respectively.

(Note) Consider the brokerage commission, consumption taxes and other costs. 10% consumption tax applies.

(Answer 7)

Premium at time of purchase = 40 points × JPY10,000 × 10 units = JPY4 million

Amount received upon exercise = SQ value − strike price

= (1,080− 1,000) points × JPY10,000 × 10 units

= 80 points × JPY10,000 × 10 units

= JPY8 million

(i) Profit on trade: JPY8 million − JPY4 million = JPY4 million

(ii) Purchase fees: JPY11,000 + consumption tax = JPY12,100

(iii) Settlement fees: JPY16,000 + consumption tax = JPY17,600

(iv) Final profit: JPY4 million − JPY12,100 − JPY17,600 = JPY3,970,300

Answer: A profit of JPY3,970,300

Attachment Transactions of Japanese Financial Futures and Options Listed Overseas

Japan's financial and capital markets are international markets, on a level with those of New York and London. In the midst of this active global exchange of capital, is a rapid movement toward internationalizing the world's major finance and capital markets. In other words, overseas financial futures and options are being listed on Japan's exchanges and Japan's financial futures and options are being listed on overseas exchanges.

The Japanese financial futures and options that are currently listed overseas and the exchanges they trade on are as follows:

(1) Japanese Government Bond (JGB) Futures Transaction

SGX (Singapore; mini-JGB futures transactions since October 1993)

(2) Nikkei 225 Futures/Options Transaction

SGX (Singapore; JPY-denominated futures transactions since September 1986, and options transactions since March 1992)

CME (Chicago; USD-denominated futures transactions since September 1990 and JPY-denominated futures transactions since February 2004)

(3) TOPIX Futures Transaction

TAIFEX (Taiwan; TWD-denominated futures transactions since December 2015)

CME (Chicago; JPY-denominated futures transactions since February 2018 and USD-denominated futures transactions since November 2022)

The basic trading system is the same on all exchanges, although there are some minor differences between Japanese and overseas exchanges in areas such as the margin systems.

Japanese securities companies and banks have been allowed to offer domestic brokering of financial futures and options listed overseas. In particular, this is not limited to brokering Japanese financial futures listed overseas, but includes the brokering of some of the world's most well-known financial futures and options, such as the U.S. T-Bond futures and Eurodollar interest-rate futures/options, etc.

2 OTC Derivatives Transactions

2 1 OTC Derivatives Transactions

Over-the-counter derivatives (hereinafter referred to as "OTC derivatives" in Chapter 2, Section 2) can be broadly classified into six categories as follows from the perspective of their underlying assets: (i) equity derivatives, (ii) interest rate derivatives, (iii) foreign exchange (Forex) derivatives, (iv) credit derivatives,

(v) commodity derivatives (commodities mean, for example, crude oil, minerals, agricultural products, etc.), and (vi) weather derivatives and disaster (catastrophe) derivatives.

The JSDA defines "specified OTC transactions of derivatives, etc." as being "those OTC derivatives transactions, etc. (FIEA, art. 2, para. 8, item 4) which fall within the category of OTC derivatives transactions, etc. (as defined in Article 3, Item 5 of the JSDA's Articles of Association (hereinafter referred to as the "Articles of Association")) but do not fall within any of (i) transactions which involve the rights set forth in each item of Article 2, Paragraph 2 of the FIEA that are deemed to be securities pursuant to the said paragraph, (ii) securities-related derivatives transactions, etc. (Articles of Association, art. 3, item 4), (iii) OTC financial futures transactions, etc. (Articles of Association, art. 3, item 6, Cabinet Office Ordinance on Financial Instruments Business, art. 79, para. 2, item 2 and FIEA Enforcement Order art. 16-4, para. 1), (iv) currency index options transactions, etc. (transactions prescribed in Article 2, Paragraph 22, Item 4 of the FIEA, which pertain to a currency, or intermediary, brokerage or agency services thereof), or (v) crypto-and other asset-related over-the-counter transactions of derivatives, etc. (transactions prescribed in Article 185-24, Paragraph 1 of the FIEA or intermediary, brokerage or agency services thereof)" (Articles of Association, art. 3, item 7), and includes these within the scope of self-regulation together with securities-related OTC derivatives transactions, etc.

[OTC Derivatives Transactions Covered Under the Scope of the Self-Regulation of the JSDA]

I. Securities-related OTC derivatives
  (i) Equity derivatives

II. Specified OTC derivatives, etc.
  (i) Interest rate derivatives
  (ii) Foreign exchange derivatives
  } Excluding those that are OTC financial futures transactions, etc. and currency index options transactions
  (iii) Credit derivatives
  (iv) Weather derivatives, disaster (catastrophe) derivatives, etc.

Among these transactions, those conducted between professional dealers are excluded from the scope of regulation for the financial instruments business and therefore also excluded from the scope of self-regulation by the JSDA (except for OTC securities derivatives transactions).

Below, we have provided an overall summary of the basic forms of OTC derivatives.

2 2 Securities-Related OTC Derivatives Transactions

Although the securities-related OTC derivatives include options on bonds as underlying assets, this section deals mainly with equity derivatives.

The term "equity derivatives" is a general term that refers to those derivatives which have a risk of fluctuation in the prices of individual shares or a share index. The method of settlement is a cash settlement if the underlying assets consist of a share index, and if the underlying assets are individual shares, the scheme would be one in which settlement in-kind (physical settlement) is made entirely or in part, meaning that delivery of the shares will be made and received. In general, if the underlying assets of a derivative are purely a reference index

such as a share index or interest rate, then the settlement is made in cash, while if the underlying assets are securities (such as common or class shares or bonds), currency or goods (commodities), the settlement will either be in cash or by delivery.

Although share options (including warrants and so-called "Stock Options"), class shares (preferred shares that may be converted to common shares) and convertible bonds (CBs) contain equity options in economic terms, the FIEA treats them as securities and does not call them derivatives. However, options whose underlying assets are CBs and preferred shares are categorized as OTC securities derivatives.

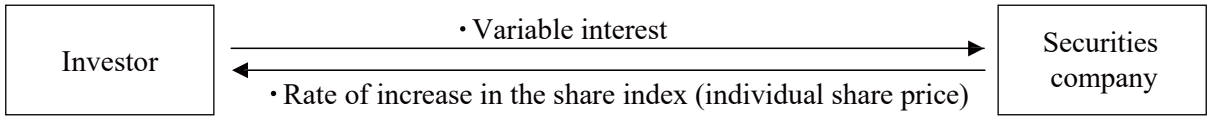
(i) Total Return Swaps (Equity Swaps)

Total return swaps (TRS) are swap transactions in which investors (financial institutions) and securities companies exchange the performances of variable interest and assets. These swaps are the exchange (swap) of the total return from assets such as stocks and bonds (= capital gain/loss (price change) + income gain (dividend and coupon)) with a floating interest rate, such as LIBOR. A TRS for which the reference indicator is equity (share index or individual share price) is called an equity swap. The investor pays a variable interest to the securities company, and can receive the rate of increase in the share index (or individual share) from the securities company. If a share index (or individual share) falls, the investor will pay the rate of decline to the securities company. Since the payment and receipt will be carried out by netting, the investor will be able to use only a small amount of funds to obtain the same economic effect in a share index (or individual share).

There are also opposing schemes in which the investor will receive a variable interest from the securities firm and pay the rate of increase in the share index (or individual share) to the securities firm. In this event, the investor can hedge the risk of a decline in the price of the share price index (or individual share). Since TRS deals with performances only, there is no need to transfer the underlying assets themselves.

Furthermore, in the case of a TRS that uses futures instead of actual assets (excess return swap), no variable interest would be paid. As the performance of the futures becomes an excess return, this transaction results in a one-sided cash flow that is determined depending on whether the performance is positive or negative. It is also possible to conduct the same transaction in the form of a share index forward contract, instead of TRS.

Chart 2-10 Equity Swap



[Case]

A "business corporation" shall carry out equity swap transactions with a "securities company" for the purposes of hedging or speculation. If the objective is to hedge it is assumed that the performance will be paid, and if the objective is to speculate it is assumed that the performance will be received.

If the transaction is made for the purpose of hedging, the performance on the customer's side is short, and therefore when share prices increase in the future, the customer in this case will experience a valuation loss on the TRS in which it will pay the rate of the increase in the share index (or the individual share) and receive the variable interest, but a valuation gain will also occur in the share index (or individual share) which is the actual position that the customer holds. These will offset each other, and as a result, the customer will not incur a

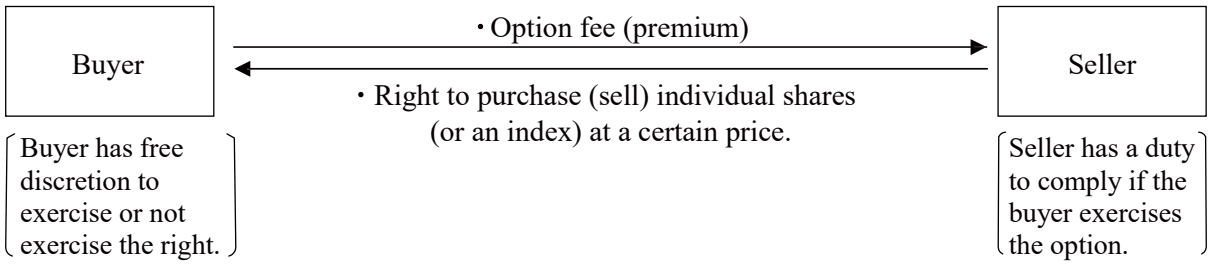
major loss.

If, however, the transaction is made for speculative purposes, the investor will incur a risk of increasing losses in association with a decline in the index (or individual share price) in the same manner as investing in individual shares.

(ii) Individual Securities Options, Index Options

The structure of "individual securities options" and "index options" are fundamentally the same as options that are listed on an exchange, but are also transactions that are heavily tailored to meet the needs of the transacting parties, including "options in issues for which options are not listed on an exchange", "options with extended periods of time" and "options of which the strike price shall be XX% of the current stock price".

Chart 2-11 Individual Securities Options, Index Options



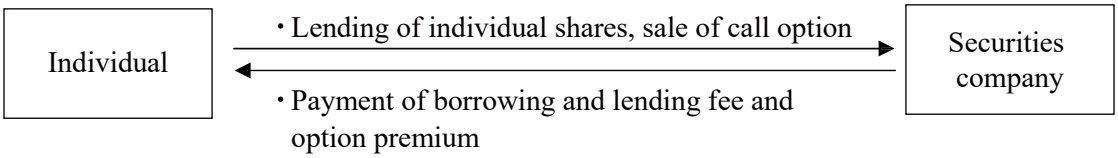
[Case]

A "securities company" will engage in an options transaction in individual shares together with a share borrowing and lending transaction, with a client that is a "business corporation" or an "individual."

The client will lend the shares that it holds and by selling a call option will be able to obtain both the borrowing and lending fee and the option premium, thereby enabling effective use of the shares that it holds. Nevertheless, if the price of these shares rises above a certain level (the strike price), the client will be required to sell the shares to the "securities company," at that price level (the strike price).

In reverse, the "securities company," as a compensation for paying the option premium, will be able to purchase the shares at a certain price level (the strike price) if the shares rise to at least that level.

Chart 2-12 Example of Individual Securities Option



This transaction is referred to as a share borrowing and lending transaction with a rider clause, or a conditional share borrowing and lending transaction, and is a transaction which began as one that at least in form was classified as a share borrowing and lending transaction during the days prior to removal of the prohibition against OTC options transactions by securities companies, while at the same time creating the economic effect of a derivative. Since trading in OTC options has now been deregulated, securities companies can be divided into three patterns (a) those who treat these transactions as derivative transactions after explicitly stating in the contract with the customer that these transactions are derivative transactions, (b) those

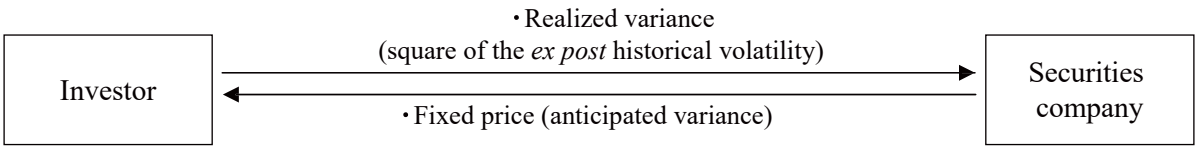
who treat these transactions as the simultaneous conduct of a share borrowing and lending transaction and a derivative transaction, and (c) those who continue to treat these transactions as share borrowing and lending transactions with a rider clause.

(iii) Variance Swaps

A "variance swap" is a swap transaction (also referred to as a forward transaction) in which an investor (financial institution) exchanges with a securities firm, etc. a realized value of price volatility of a share index such as the Nikkei Average (or an individual share) for a fixed price, or vice versa. The future value of (a fair) variance contained in the market prices (of all strike prices) of options in the relevant index (or the individual shares) is set at a fixed price, and is exchanged with the *ex post* variance in price (the realized variance) after the expiration of a certain predetermined period of observation. The variance is equivalent to the square of the volatility. Volatility swaps also exist, but in theory, the variance is considered to make a better theoretical construction of pricing (log contract). In recent years, volatility indices such as VIX have become popular, and VIX futures and options have also been listed in the United States (only VIX futures in Japan).

Although options are used to hedge the vega risk (the risk of fluctuation in volatility), use of a variance swap enables hedging to be carried out in a more direct manner because there is little delta risk. It is conducted using the payment and receipt of net margins and this is an excellent tool to transfer vega risk.

Chart 2-13 Variance Swap



[Case]

An "investor" carries out a variance swap with a "securities company," receiving the fixed and paying the variance, for the purpose of hedging or speculation. In the event of hedging, it is assumed that an option position is held, in this case the investor has bought an option (vega long) and executes a delta hedge but still needs to hedge the vega. If the market becomes more volatile than at the time of entering into the contract then a valuation loss will be incurred in the variance swap in this case, but the customer will also have a valuation gain in the option position, and these will offset so that in all likelihood the customer will not incur a major loss.

In the event of a transaction for speculative purposes, there is a risk of increased losses as a result of greater market volatility.

A volatility index (VIX) calculated from the prices of listed options on an exchange is well known as a recent topic regarding volatility. By using all option prices regarding the strike prices on the OTM side for the nearest two contract months, the fixed price for a variance swap for each contract month of the log contract can be obtained. The VIX can be obtained by taking the square root of that price by linear interpolation (convex combination).

In Japan, the Nikkei 225 VI is known as this type of index. Futures of this index are listed as Nikkei 225 VI Futures. In addition, there are also swap transactions such as correlation swaps and dividend swaps

(dividend indices and dividend index futures are listed on the market). In addition, there are also variance swaps referring to financial indices other than equities.

2 3 Specified OTC Derivatives Transactions

(1) Interest Rate Derivatives

Interest rate derivatives constitute the major portion (around seventy percent) of the total balance of OTC derivatives (on a notional principal basis). Interest rate swaps can be said to be the most basic form of these, followed by swap options (swaptions) and options in forward discount bonds (cap or floor) as plain vanilla interest options. These are each expressed as an interest option against a swap rate or LIBOR (reference index). Interest rate options referencing daily compounding RFRs display an effect similar to average options. Products such as interest forward transactions (FRA) are also handled, and having a lineup of the three standard transactions of swaps, forwards and options constitutes a necessary condition for a derivative market to function. This section discusses interest rate derivatives in the same currency.

In the examples indicated in this section, LIBOR, etc. is used as a reference interest rate for swaps and options as it had been in the past, although LIBOR is no longer used in practice after the cessation of its publication. LIBOR was abolished (permanent cessation) for the Japanese Yen, British Pound, Euro, and Swiss Franc in the beginning of 2022, and for the US Dollar in the beginning of July 2023. While new transactions are conducted based on risk-free rates (RFR), LIBOR fallback provisions apply to existing transactions. RFRs include TONA for the Japanese Yen, SOFR for the US Dollar, SONIA for the British Pound, ESTR for the Euro, and SARON for the Swiss Franc.

(i) Interest Rate Swaps

An interest rate swap is a transaction in which Party A and Party B exchange a variable interest rate and a fixed interest rate, or a variable interest rate and a different variable interest rate, or a fixed interest rate or variable interest rate with a certain index (reference index) in the same currency. The principal is not exchanged. Naturally, there are no interest rate swaps in which fixed interest rates in the same currency are exchanged.

Since the most basic interest rate swap is a swap that exchanges a fixed interest rate with a variable interest rate, this is referred to as a plain vanilla swap. The fixed side of the cash flow is referred to as the fixed leg, and the variable side of the cash flow is referred to as the variable leg. As shown in Chart 2-14, the party receiving the fixed interest and paying the variable interest (Party A) is referred to as “Receive” and the party that pays the fixed interest and receives the variable interest (Party B) is referred to as “Pay.”

The principals are not exchanged in an interest rate swap, but since in a virtual sense the principals of the variable side and the fixed side will mutually offset at maturity, this is the same as the value of the original swap (here the counterparty risk is not taken into consideration). At this time the fixed leg is equivalent to the cash flow of a fixed interest bond, and the variable leg is equivalent to the cash flow of a variable (floating) interest bond (in all cases this is a virtual principal, referred to as a “Notional Principal Amount”). The swap rate in the market is determined using this relationship.

Conventionally, the most common was a swap between a fixed interest rate and LIBOR. A variety of rates

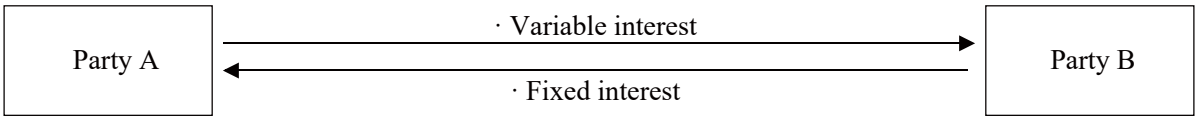
may be used as the variable rate to be exchanged, including risk-free rates (RFRs) such as TONA and SOFR, LIBOR, and IBORs such as TIBOR, EURIBOR, and BBSW. Common types of swap between variable interest rates of LIBOR are: (i) a Constant Maturity Swap (CMS), for example, an exchange between the five year swap rate and 6M LIBOR; and (ii) **tenor swap**, for example, an exchange between 3M LIBOR and 6M LIBOR. An Overnight Interest Swap (OIS), which has been promoted since the collapse of Lehman Brothers, is also a type of interest rate swap. However, LIBOR-related interest rate benchmarks will fall back in January 2022 or thereafter (for USD LIBOR, in July 2023 or thereafter) (for details, see Chapter 1, "5 Swap Transactions (2) Interest Rate Used as a Benchmark").

If the fixed interest rate is the **par swap rate** on the initial date, the initial market price of the swap is zero; otherwise, the upfront premium is adjusted.

The variable rate is fixed on the **reference date (reset date)** in each term, referred to as fixing or reset, and is used to pay or receive the cash flow on the corresponding date (the payment date). Normally, in an interest rate swap, an IBOR is "determined first," so that the IBOR that is reset (fixed) two business days prior to the current payment date will be paid on the next payment date. On the other hand, there is another type of swap, an arrear swap, for which the reference indicator is reset a few business days prior to the payment date. In addition to "following," "modified following" is also a common practice, in which payment will be made on the following business day if a payment day falls on a holiday, provided that if the following business day is in the following business month the payment shall be made on the previous business day. There are other irregular forms, and numerous business day calendars (*e.g.*, business days in "London-NY-Tokyo"). Caution is required in the negative interest rate environment. For example, if the IBOR is negative, receipt of interest at the variable rate is in effect equal to payment (of the absolute value of the IBOR). Some swap agreements adopt a zero floor (a negative interest rate is treated as zero).

The use of LIBOR as a benchmark interest rate has already been abolished, and financial institutions are required to choose one of the following two options, namely, introduce a replacement rate calculated based on a certain formula (LIBOR fallback) or transition to transactions using a risk-free rate (RFR). However, it should be noted that both are "fixed in arrears" unlike IBOR (see Chapter 1 "5 Swap Transactions (2) Interest Rate Used as a Benchmark" and Chapter 1, Conclusion, 2. International Regulatory Reforms for Derivatives Transactions, (5) Interest Rate Benchmark Reforms" for details).

Chart 2-14 **Interest Rate Swap (Plain Vanilla)**



(Example) Cash Flows in Interest Rate Swaps

Payment Date	Amount Paid by Company A (Received by Company B)	Amount Received by Company A (Paid by Company B)
Mar. 20, 2016	JPY1 billion ×JPY6M LIBOR(%)×182/360	JPY1 billion ×2%×182/365
Sep. 20, 2016	JPY1 billion ×JPY6M LIBOR(%)×184/360	JPY1 billion×2%×184/365
…	…	…
Sep. 20, 2020	JPY1 billion ×JPY6M LIBOR(%)×184/360	JPY1 billion×2%×184/365

(Example) Terms of Interest Rate Swaps

Notional principal	JPY1 billion	Receive, fixed/Pay, variable	Company A
Start date	Sep. 20, 2015	Receive, variable/Pay, fixed	Company B
Maturity date	Sep. 20, 2020	Variable interest rate	JPY6M LIBOR (Act/360)
Payment date	Mar. 20 and Sep. 20 each year	Fixed interest rate	2% (Act/365)

[Case]

A "business corporation" (Company B) that has borrowed funds at a variable interest rate from a bank will engage in an interest rate swap with a "securities company" (Company A) paying a fixed interest and receiving a variable interest, and thus have the funding cost fixed in order to hedge against the risk that its future interest liability will increase with rises in interest rates. The "securities company" engages in hedge transactions between businesses as necessary.

If, in contradiction to the customer's expectation, the market interest rate declines, a loss will occur in the payment of fixed interest and receipt of variable interest in the swap position of the customer in the case being discussed, but the customer will also enjoy the advantage of a decline in the interest rates on the "variable interest debt" in its actual position. Consequently, these will offset, thereby in all probability preventing the customer from incurring a major loss.

[Explanation of Terms]

Overnight Index Swap

An overnight index swap (OIS) is a kind of interest rate swap. Unlike a LIBOR swap, the applicable interest rate is set in arrears and the amount calculated at a daily compounding risk-free rate (FRR; floating interest rate) is exchanged with the amount calculated at a daily compounding overnight index swap (OIS) rate (fixed interest rate). If the maturity is less than one year, the fixed leg is exchanged with the variable leg on the maturity date. The fixed leg is an amount calculated by the formula: notional principal × fixed interest rate ×calculation period. The same formula applies to the variable leg, with the variable interest rate expressed as:

$$\left(\prod_{i=1}^{m}\left(1+r_i\frac{\delta_i}{d}\right)-1\right)\frac{d}{n}$$

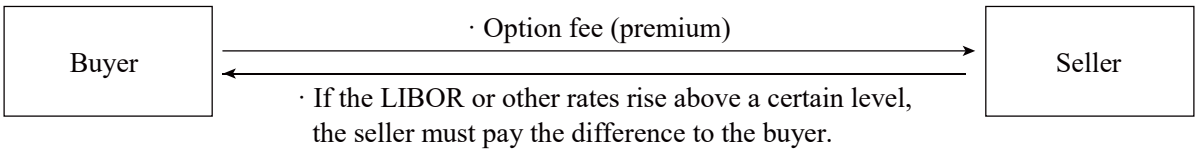
(m: the number of business days in the calculation period; n: the actual number of days in the calculation period; r_i: RFR applicable on the *i*th business day; δ_i: the actual number of days on which r_i applies; d: the number of days in one year). If the maturity is one year or more, the exchange between the fixed leg and the variable leg takes place through the abovementioned procedure for each year until the maturity date. Act/365 (d=365) applies to TONA OIS, whereas Act/360 (d-360) applies to SOFR and EFFR OIS. As RFRs are fixed in arrears, the variable interest rate is not fixed until the calculation period ends, and interest is paid immediately after that (two business days after the fixing). In the calculation period, the interest rate is fixed on a daily basis, and in valuation, it will be the combination of the fixed part and the forward rate.

(ii) Cap

A "cap" is a call option on a variable interest rate (such as LIBOR). More precisely, a European call with a maturity date on each reset date is referred to as a caplet. The cap is an accumulation of caplets. The buyer pays the premium (the option fee) and if the LIBOR or other variable rate rises above a certain level (referred to as a "strike rate" ("exercise rate"), the buyer will thereby be able to obtain the difference between the variable rate and that level, thereby enabling the buyer to hedge the risk of an increase in interest rates. Premiums can be paid at the beginning of the transaction (upfront premiums) or paid in installments.

When compared to the interest rate swap discussed above, a cap has the disadvantage that even if the LIBOR or other rate should rise, the hedging effect cannot be obtained until the rate rises to a certain level. Nevertheless, if the rate should fall in contrast to expectations, the advantages can be obtained.

Chart 2-15 Cap



(Example) Cash Flows in Cap Transactions

Payment Date	Amount Paid by Company A (Received by Company B)	Amount Received by Company A (Paid by Company B)
Sep. 20, 2015	Premium (upfront)	
Mar. 20, 2016		JPY1 billion × max {JPY6M LIBOR(%) – 1%, 0} × 182/360
Sep. 20, 2016		JPY 1billion × max {JPY6M LIBOR(%) – 1%, 0} × 184/360
…	…	…
Sep. 20, 2020		JPY1 billion × max {JPY6M LIBOR(%) – 1%, 0} × 184/360

(Example) Terms of Cap Transactions

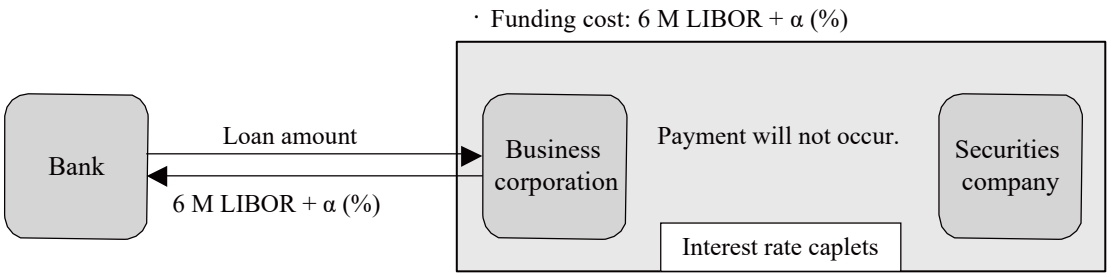
Notional principal	JPY1 billion	Cap buyer	Company A
Start date	Sep. 20, 2015	Cap seller	Company B
Maturity date	Sep. 20, 2020	Yen variable interest rate	JPY6M LIBOR (Act/360)
Payment date	Mar. 20 and Sep. 20 each year	Strike rate	1%

[Case]

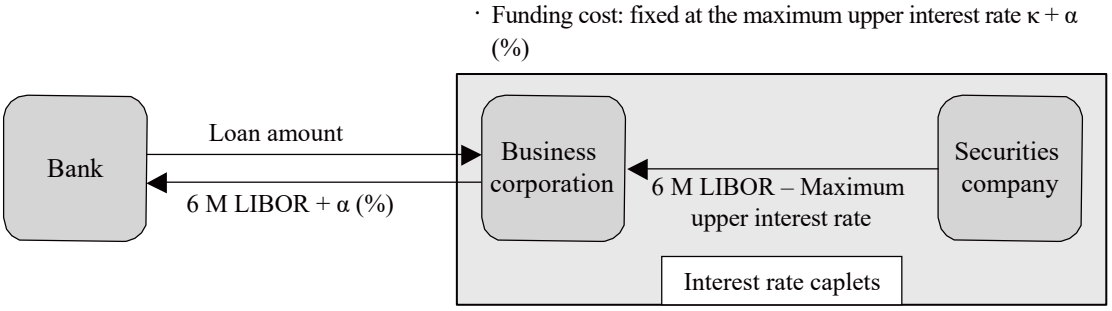
A "business corporation" (buyer) that has borrowed at a variable rate will engage in an interest cap transaction with a "securities company" (seller) in order to hedge against the risk that its future interest liability will increase with rises in interest rates.

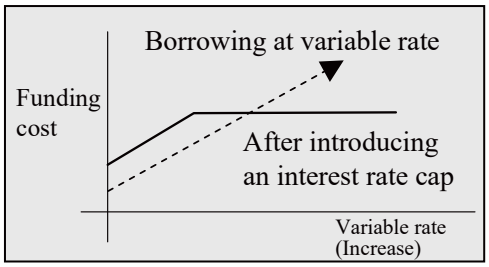
Chart 2-16 Example of Cap

• If the 6 Month LIBOR is less than the maximum upper interest rate:



• If the 6 Month LIBOR is greater than or equal to the maximum upper interest rate:





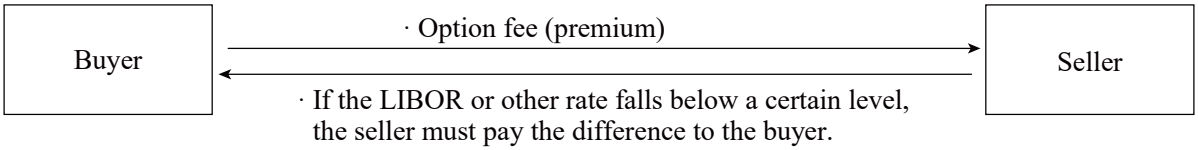
- The maximum upper interest rate κ is the strike rate of the cap.
- A cap transaction is trading of caplets in each term in the contract period.

(iii) Floor

While a cap is a transaction to hedge against a future rise in interest rates, a floor is a hedge transaction to prepare against a decline in interest income receivable from retained interest assets in the event of a future decline in market interest rates. The buyer pays the premium and if the LIBOR or other variable rate falls below a certain level (referred to as a strike rate), the buyer will thereby be able to obtain the difference between the variable rate and that level, thereby enabling the buyer to hedge the risk of a decline in interest rates.

The floor is a collection of European puts (floorlets) that correspond to each period.

Chart 2-17 Floor



After the permanent cessation of LIBOR, LIBOR fallbacks or RFRs apply to caps and floors. Attention should be paid to the characteristics of interest rates fixed in arrears.

(iv) Swaptions

A swaption is an options transaction in which the right to make a swap that is to start in the future is traded. By paying the premium, the buyer is guaranteed the terms, such as a fixed rate, under which an interest rate swap will carried out during a prescribed period of time in the future. In contrast to a forward start swap, if the swap value is negative at the time of the maturity of the swaption, the buyer simply does not exercise its option (there is no requirement to pay a cancellation or other charge). In the last few years, due to the changes in the market convention, the payment of premium has shifted from the traditional "upfront premium" to "forward premium." In addition, RFR-based swaptions started to be traded.

In a swaption, the fixed rate in a swap transaction that is to start in the future within the contract becomes the strike rate (the exercise rate). There are two types of swaptions, one in which a fixed interest rate is received and a variable rate is paid (a receiver's swaption), and one in which a fixed rate is paid and a variable rate is received (a payer's swaption).

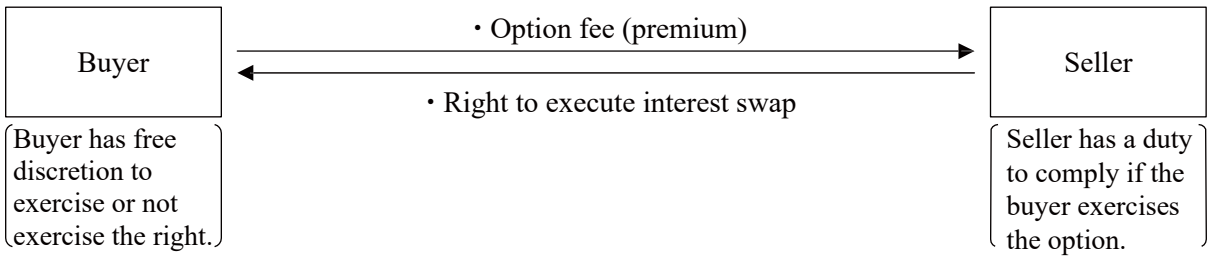
If, for example, a buyer purchases an interest rate swap of paying a fixed interest and receiving a variable (floating) interest (a payer's swaption), and a future long term interest rate exceeds the strike rate (so that the present value of the swap at that time is positive), the buyer will exercise the right and start the swap transaction. Thus, for the buyer a payer's swaption is a call option for a swap rate (in the same manner a receiver's swaption is a put option for a swap rate).

A combination of a swaption with an interest rate swap will result in a cancellable swap, which is an interest rate swap that can be cancelled early (at the time of the expiration of the swaption, S).

A cancelable swap (with a maturity date T) is also referred to as an extendable interest rate swap with T − S (> 0) (using put and call parity in connection with the swaption starting at S and with the swap maturity at T − S).

A Bermudan swaption is a swaption that can be exercised on any of the predetermined exercise days. A swap which is made cancellable on any day by incorporating this type of swaption is called multi-callable swap.

Chart 2-18 Swaption (Swap Option)



[Case]

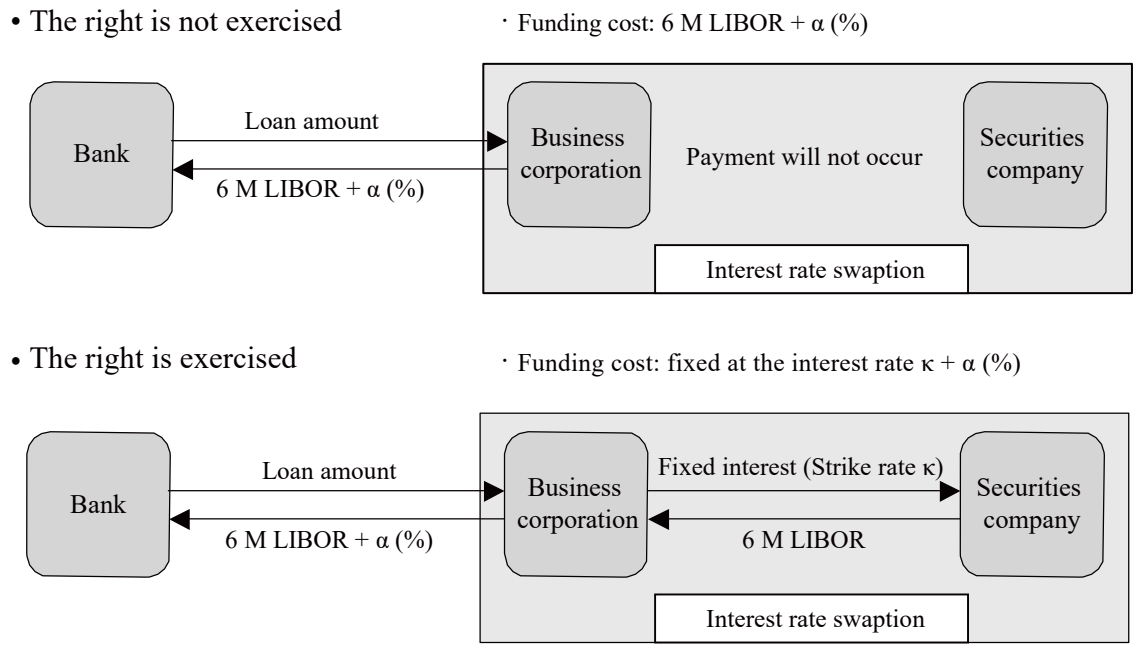
A "business corporation" that has borrowed at a variable rate will engage in an interest rate swaption transaction with a "securities company" in order to hedge against the risk that its future interest liability will increase with rises in interest rates. The "business corporation" purchases from the "securities company" the right to exercise an interest rate swap in the form of paying a fixed interest and receiving a variable interest which is to start at a certain time in future.

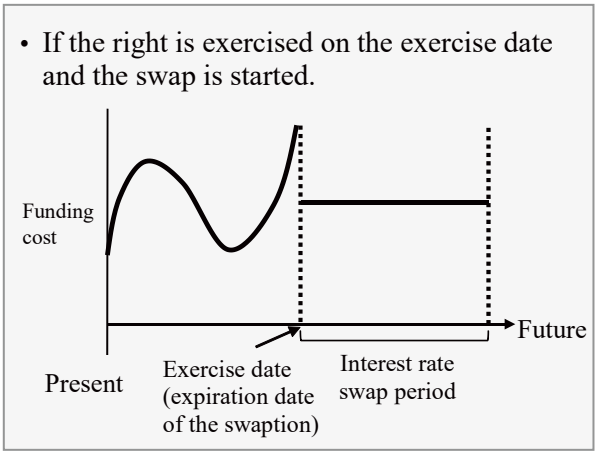
The "business corporation" incurs the cost of paying the option premium, but if future market interest rates increase, the business corporation can exercise the option and thereby reduce the increase in interest

payable. If the market interest rates should decline, the business corporation can choose not to exercise the option, and thereby obtain the advantages from that decline.

If, in contradiction to the customer's expectation, a decline in the market interest rate is experienced after the exercise of the option (*i.e.*, after the interest rate swap transaction has commenced), the customer in this case will incur a valuation loss in its interest rate swap position (paying a fixed interest, receiving a variable (floating) interest). Nevertheless, the customer will also have a valuation gain in its variable (floating) interest borrowing which is its underlying position, and consequently, the two would offset, thereby in all probability preventing the customer from incurring a major loss.

Chart 2-19 Example of Swaption (Swap Option)





· If the market interest rate declines, the right will not be exercised, thereby obtaining the advantage of a reduced interest rate. (An advantage not available with an interest rate swap.)

· Nevertheless, if the right is exercised, it is possible to hedge all of the risk of further increases in market interest rates (which is an advantage over an interest cap). On the other hand, if market interest rates decline, the advantage of this decline cannot be obtained (which is less advantageous than an "interest cap").

(2) Foreign Exchange Derivatives

The currency swaps that took place in the 1970s are said to have been the first swaps in the world (the first publicly announced currency swap was executed between IBM and the World Bank in 1981). Currency swaps are also basic OTC derivatives, and have a large total balance when viewed on a global scale. Moreover, currency options are traded in many different types including exotic options.

In some cases, interest and currency derivatives are combined, since the volatility and coefficients of correlation between domestic interest rates, foreign interest rates and exchange rates are significant factors when a variable rate of the exchange rate is stated (as a financial index in a derivative). Swaps that refer to foreign interest rates and options that have foreign currency assets as their underlying assets include those that are composites with a relation to foreign exchange.

In the examples indicated in this section, LIBOR is used as a reference interest rate as it has been previously but it will not be used after the cessation of its publication.

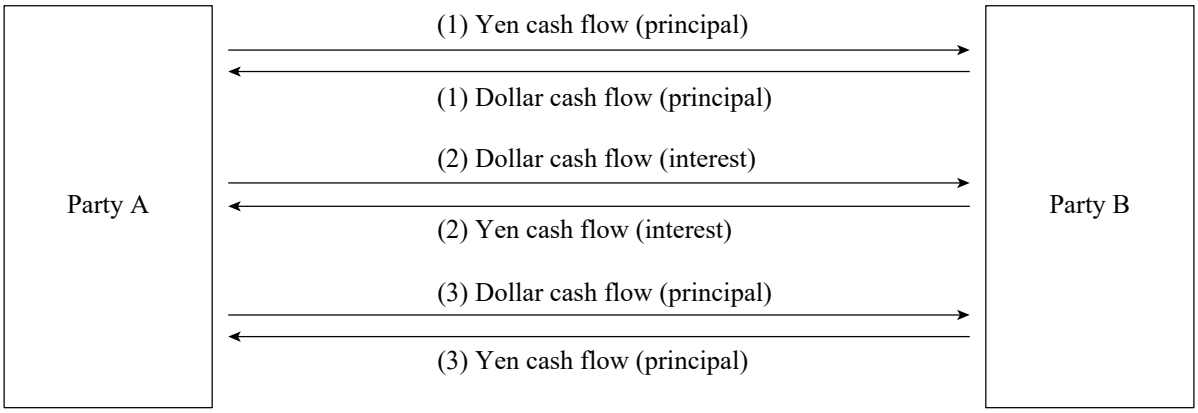
(i) Currency Swaps

A currency swap (cross-currency swap; CCY swap) is a transaction in which Party A and Party B exchange the cash flows of differing currencies (principal and interest) at an exchange rate that is agreed in advance. In the case of yen-dollar swaps, payment during the swap period is made by an exchange between yen-3M LIBOR and dollar-3M LIBOR, with a fixed amount of basis spread α being added to the leg on the yen side (usually $\alpha < 0$). This is also called a cross currency basis swap.

The exchange of the principal takes place at the initial time of the contract and at the end of the contract period (with the direction of the exchange at the start of the transaction being the reverse of the direction at the end of the contract period). A coupon swap refers to when only the interest will be exchanged, without any exchange of principal. Following the abolition of LIBOR, transactions of exchange between TONA and SOFR have been increasing.

In an ordinary currency swap, the principal of each of the two currency legs is fixed: dollar principal = yen principal / initial exchange rate (USD/JPY). Another type of currency swap is a mark-to-market swap for which the yen principal is fixed, whereas the dollar principal is reset at the spot exchange rate (USD/JPY) at the respective points in time every three months. Generally, a gap (basis) is generated between the forward exchange rate drawn from a currency swap and a so-called forward exchange transaction.

Chart 2-20 Currency Swap



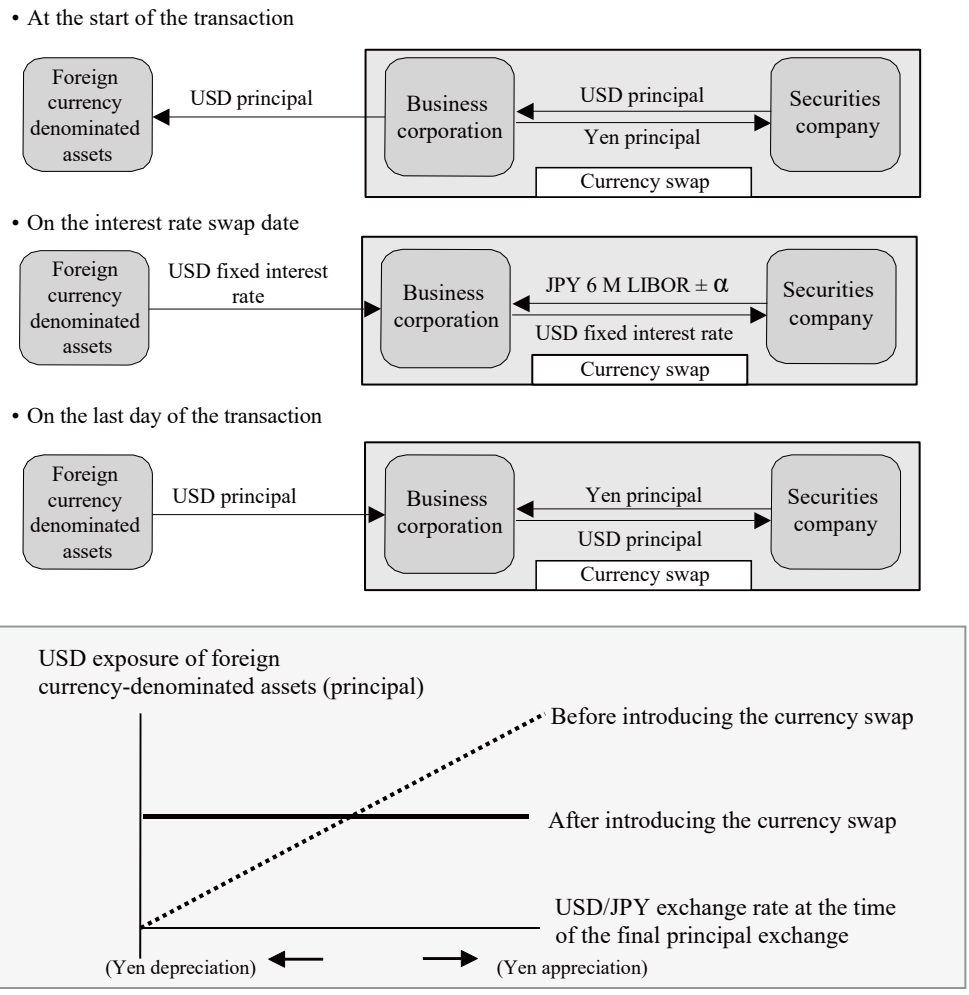
[Case]

A "business corporation" that has foreign currency denominated assets such as foreign currency bonds will enter into a currency swap with a "bank," etc. for the purpose of fixing the amount that it will receive in yen (in order to hedge against inflation in the value of the yen). In Chart 2-19, the "business corporation" would be "Party A," and the "bank," etc. would be "Party B". Then (i) at the time of acquiring the foreign bond assets the principal would be exchanged, and (ii) at the time of payment of interest on the foreign bond

assets the interest would be exchanged and (iii) at the time of redemption the principal would be exchanged again.

If, in contradiction to the customer's expectation, the foreign exchange market changes to a weakening of the yen and a strengthening of the foreign currency, the customer in this case will incur a valuation loss on its currency swap position (paying the foreign currency cash flow, receiving yen cash flow). Nevertheless, the customer will also have a valuation gain in its foreign currency denominated assets which is its underlying position, and consequently, the two would offset thereby, in all probability preventing the customer from incurring a major loss.

Chart 2-21 Example of Currency Swap



[Explanation of Terms]

(i) Basis Swap

A swap that exchanges two variable interest rates is referred to as a basis swap. Typical examples include (i) currency swaps in which variable interest rates with the same period between differing currencies are exchanged (*e.g.*, receive Yen LIBOR 3M ±α, pay US Dollar LIBOR 3M; RFR is fixed in arrears (TONA v.s. SOFR)), and (ii) a tenor swap in which variable interest rates between the same currency with different periods are exchanged (*e.g.*, receive Yen LIBOR 3M ±α, pay Yen LIBOR 6M). Here, α is called the basis (a fixed level for each year) and usually represented by bp (1bp = 1/100%).

(ii) Foreign Exchange Swap

It may be somewhat confusing, but "currency swap" and "**foreign exchange swap (FX swap)**" are different types of transactions. The latter refers to a transaction in which a spot transaction and a forward transaction (in the same amount and under opposite conditions of sale) are conducted simultaneously. A spot foreign exchange is a transaction on the assumption that the delivery is made two business days after the conclusion of the contract, and a forward foreign exchange is a transaction on the assumption that the delivery is made three or more business days (in one month, three month, etc.) after the conclusion of the contract.

"T/N" (Tomorrow/Next) refers to a transaction which starts on the business day following the contract date and ends two business days after the contract date, and "S/N" (Spot/Next) refers to a transaction which starts on the spot day (two business days after the contract date) and ends on the business day following the spot day. A forward transaction which is settled by a difference instead of the delivery of foreign currency is called a non-deliverable forward (NDF).

In addition to currency swaps, forward and options contracts involving foreign exchange are popular, and there are various types of swaps including, for example, currency swaps with Bermudan options that can be terminated before maturity, etc. Currency options, etc. are not included in the category of specified OTC transactions of derivatives, etc. prescribed in the Articles of Association.

[Reference]

There are various types of currency options transactions, including exotic options. The major special terms for exotic options are as listed in the following table.

Chart Special Terms (Exotic Options)

Special Term	Details
Standard barrier (KI/KO)	Knock-Out (KO) clause: The contract expires if a financial indicator reaches a barrier price even once during a certain period. Knock-In (KI) clause: The contract takes effect if a financial indicator reaches a barrier price even once during a certain period. * A knock-out event and a knock-in event are mutually exclusive (only one or the other could occur). * Variations can be made by combining multiple barrier clauses. The event monitoring may be conducted through discrete time reference or continuous time reference.
Digital	A predetermined amount of money is paid if a financial indicator reaches a prescribed threshold, and no payment is made if not.
Average	This option makes reference to the average of a financial indicator over a period (Asian). The average may be arithmetic or geometric.
Look back	This option makes reference to the highest (or lowest) value of a financial indicator over a period.
Quant	This option makes reference to a financial indicator at a fixed exchange rate (*e.g.*, pay in US dollars at the yen interest rate or the current price of Nikkei 225). If a conversion into yen is made, the option is called a composite option.
Forward start	This option starts at a future date. It also means an option that resets the performance of a financial indicator to ATM on a regular reference date.
Compound	This is an option on an option (*e.g.*, combination of options, an option using an option as the underlying asset).
Callable	A term by which a contract can be terminated prior to maturity. It is called Bermudan if it can be exercised at any of the discrete exercise days, and called American if it can be exercised on any discretional day.
Range accrual	Payment is made in proportion to the number of days for which a financial indicator stays within a certain range during the term (*e.g.*, the period of staying within the range / the period to maturity × notional principal).
Worst (best) of	This option makes reference to the worst (or best) performance of a financial indicator's performances.
TARN (TArget Redemption Note)	Payment stops when the total amount of interest paid in the past exceeds a threshold.

These clauses are used not only for derivatives related to foreign exchange but also those related to interest rate or equity as financial indicators (including hybrid products).

(3) Credit Derivatives

Through the mid-20th century, financial products that took on the credit risk of an individual company were

limited to shares and corporate bonds (*i.e.,* exemplified by high yield bonds in the US, otherwise known as junk bonds), and diversification of investment was the only risk management scheme available at the time. Towards the end of the last century, however, the development of the derivatives market made it possible to extract and hedge against various risk factors such as foreign exchange risk and interest risk, making credit risk more apparent. For this reason, credit derivatives were developed as a financial technique to hedge the credit risk, and have grown since the last part of the previous century. Transactions such as credit default swaps are typical examples and have experienced tremendous growth in the total of their notional principals until around 2007. This growth only represents the increase in the number of CDS transactions and does not mean that the "total amount" of credit risks has increased. Since writers (sellers) of CDS cannot buy back the same CDS, they hedged the credit risk by concluding new CDS contracts. For example, when CDS trade is conducted n times under the same conditions (n = odd number; 1−1+1−1+....+1), the balance is + 1 if it is netted out but it is n times the notional principal in gross.

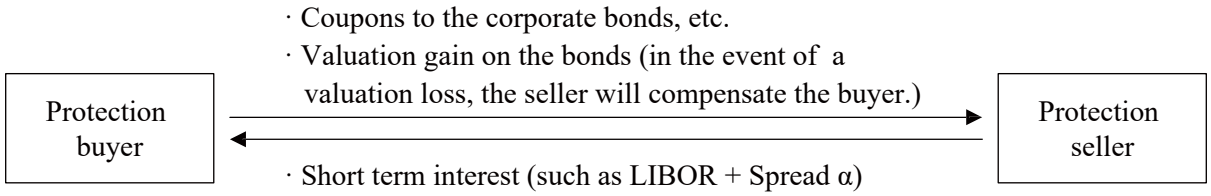
(i) Total Return Swaps (TRS)

A "total return swap (TRS)" is a swap transaction in which the purchaser of protection (the protection buyer) pays the seller of the protection (the protection seller) coupons and capital gains from reference assets such as bonds, during the transaction period, and in exchange receives the amount of capital loss as well as a short-term interest (LIBOR, etc. + spread α) calculated on the basis of the notional principal.

If a default occurs in the bonds, etc. (reference assets), during the transaction period, the protection seller will take back the relevant asset at face value, thereby indemnifying the protection buyer against a valuation loss.

For the protection buyer a TRS offers the benefit of obtaining the same economic effect as selling bonds, etc. that it holds (not only the credit risk but all risks of the bonds, etc. are shifted to the protection seller). Moreover, since the payment and receipt of funds is carried out by netting, the protection seller can obtain the same economic effect for a small amount of funds as in the case of holding the bonds, etc. themselves.

Chart 2-22 Total Return Swap



[Reference]

As with an equity swap, a TRS does not entail any initial investment amount at the start of the term or any redemption of principal. When futures are used, the performance would be on the basis of excess return, and therefore short-term interest would not be included. TRS is a broad concept, so it can also be used for purposes other than credit derivatives. The variable leg to regulate a total return can be used as an indicator of the performance of an investment strategy index that uses not only individual assets such as bonds and CBs but also multiple assets including real estate and commodities. In addition, TRS can be in the form of a variable annuity (VA) in which a mortality rate is considered.

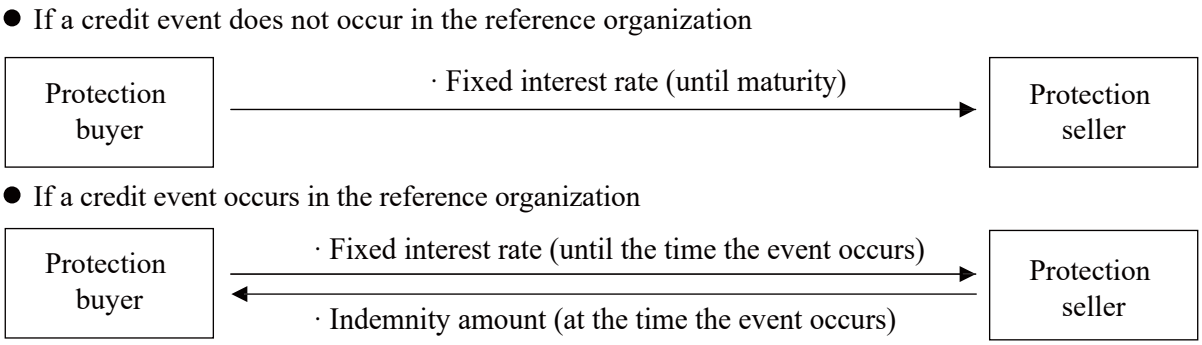
(ii) Credit Default Swap (CDS)

A **credit default swap (CDS)** is a derivative in which a payout occurs in the event of the occurrence of a credit event. The purchaser of the protection (the **protection buyer**, meaning the person who hedges the credit risk) periodically pays the seller (the **protection seller**, meaning the person who takes the credit risk) a fixed interest rate (referred to as the *premium* or *insurance premium*), and in exchange will receive from the seller the amount equivalent to a loss incurred in the event that the reference organization suffers a credit event (the default day) during the contract period (usually five years). In the event of a default on individual bonds, the bonds themselves will be turned over to the seller (settlement in-kind) or settled in the net cash difference. The purchaser pays the seller "accrued interest" for the period from the previous interest payment date until the default day. If a credit event does not occur, the transaction will automatically terminate and the premiums paid will be a net expense. A CDS has the same economic effect as a total return swap (TRS) at the time of default of the reference organization, but is a transaction only involving credit risk, and has higher liquidity than a TRS.

From its economic effect a CDS can be said to be a type of "life insurance for the reference organization" in the sense that in exchange for paying a premium the amount equivalent to a loss can be received if such occurs. However, it differs from insurance in some points, such as quick settlement after default. Although a credit default swap (CDS) is referred to as a swap, it has a greatly different nuance from swaps that refer to something other than credit. In a CDS, the fixed leg has numerous fixed interest rate payments, while the cash flow of the variable leg only occurs once, if at all, at the time of default, and will not happen at all if there is no default through maturity.

Let us here consider the case of a CDS in which the reference organization is a company. The protection buyer will periodically pay a fixed interest rate and in exchange will receive the benefit of protection against the credit risk of the reference organization.

Chart 2-23 **Credit Default Swap**



Special Term	Details
Maturity	5 years
Coupon	Any of 25, 100 and 500 (bp)
Return rate	35 – 40%
Interest payment date	The 20th day of March, June, September and December (*following)

The protection seller receives the benefit of earning the premium as income, but if a credit event occurs the protection seller will be required to pay the relevant amount of indemnity. While this appears to be a debt

guarantee, the reference organization and the protection seller have no relationship with each other, which is a feature of a CDS. For this reason, the premiums will be determined mainly on the basis of the creditworthiness of the reference organization, and will also be affected by counterparty risk.

By the large-scale standardization of CDS transactions called the "Big Bang" which was introduced in 2009, auction settlement where the price of bonds upon delivery and the amount of net cash settlement are determined by an auction held by the ISDA became standard. In addition, the specification (fixed interest rate and interest payment date, etc.) of new CDS transaction agreements became standardized, and the netting (offset) between buy and sell became easier than before. Furthermore, since the fixed interest rate is standardized, the upfront premium is adjusted so that the market value of CDS would be zero on the day the trading starts. In terms of valuation, the "survival probability" and credit spread are related to each other, that is, as the reference organization's default becomes more likely to happen, the survival probability declines, the spread expands, and the premium increases.

[Case]

An "institutional investor" (such as a life or casualty insurer) engages in credit risk investment as the "seller" in a CDS (protection seller) for speculative purposes, as part of its credit investment. A "bank" transfers the credit risk as the "buyer" in a CDS (protection buyer) for hedging purposes for its credit portfolio.

[Explanation of Terms]

(i) Credit Event (CE)

The exact conditions of a credit event (CE) are determined through agreement between the parties to the transaction, but in the master agreement (in the English language) of ISDA that is used in the transaction, stipulation is made of (i) bankruptcy or insolvency, (ii) default, and (iii) debt restructuring (including waiver of interests or extension of payment on principal, etc.).

(ii) Premium Leg and Protection Leg

The cash flow of CDS differs greatly from other swaps. In an interest rate swap (receiving of fixed interest), the cash flow is the cash flow from the fixed leg minus the cash flow from the floating rate, but in a CDS, the payment of CDS premium continues (until the default of the reference entity or the arrival of the maturity T), like a kind of a premium. This is called the premium leg (or fixed leg). If a default occurs, the protection seller compensates the loss. This is called the protection leg (or default leg).

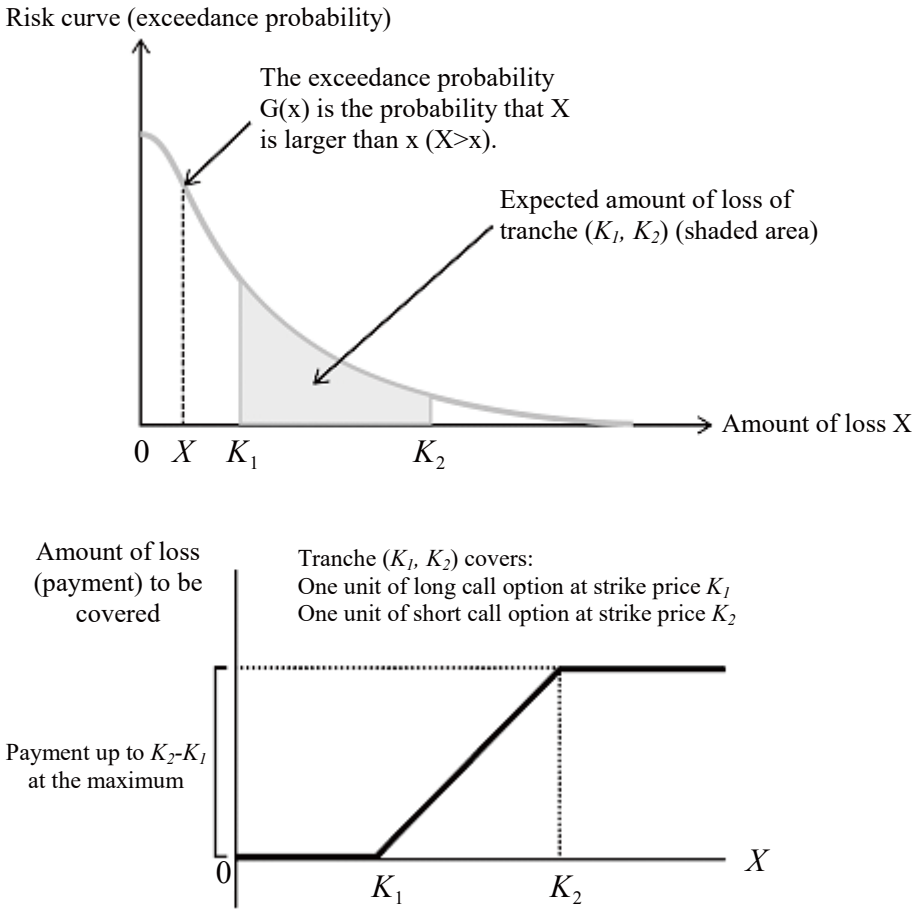
(iii) CDO

A collateralized debt obligation (CDO) is a type of securitized product, or more specifically, securities that are issued, and backed (in the form of collateral assets) by a pool of loan receivables or bonds (corporate bonds) or credit default swaps (CDS). In order to cover any loss arising from the default, a CDO is sliced into tranches (call option spreads which take the amount of expected loss as the underlying assets, that is, synthesis of long/short call options) and coupons are set for each tranche. These are greatly influenced by the default correlation between the underlying securities. Correlation is a key factor for a CDO in which subprime loans are securitized, and for CDO^2 (CDO of CDO) in which a mezzanine tranche of a CDO (equivalent to an insurance layer) is further securitized. Since the sub-prime issue came to the surface, the correlation has rapidly intensified and prices of these instruments have suffered a major decline, posing the issues of the moral hazards of rating companies and financial institutions as well as technical problems that are now undergoing scrutiny.

(4) Weather Derivatives and Disaster (Catastrophe) Derivatives (Insurance Derivatives)

Since before the introduction of credit derivatives discussed in the preceding section, the indemnity against default had been considered to be a kind of insurance. "Insurance" is a means to cover any loss that may arise from events such as illness, accidents or disasters that occur infrequently, and "reinsurance" is a means to transfer insurance risk, Today, OTC derivatives can be organized to cover such 'insurance risk'.

Chart 2-24 Coverage of Insurance and Reinsurance Risks



As indicated in Chart 2-24, the amount of payment to be covered by insurance shows a payoff function of a call option spread. Unlike financial derivatives, delta hedging by the underlying assets is impossible (for example, temperature is not tradable). Therefore, the pricing theory for the insurance premium is slightly different from that of financial derivatives. However, some parts are similar to insurance, and the CDO tranche is a call option spread on the amount of loss from default (when the amount of loss X from the default of a credit portfolio comes between the attachment point (K_1) and the detachment point (K_2), an amount equivalent to $X - K_1$ is paid).

By considering the premium for insurance derivatives to be an insurance premium, it is possible to obtain an economic effect from insurance derivatives that is similar to that from insurance, but in contrast to insurance, the objective is not to indemnify against an actual loss, and consequently, a settlement is paid from the casualty insurance company (hereinafter referred to as the "casualty insurer") if certain conditions are met, even if no actual loss has occurred. In order words, X is a financial indicator, not the amount of loss, and a payoff based on a formula that makes reference to X is to be paid on a due date. For this reason, it is not necessary to investigate the relationship between the abnormal climate conditions, etc. and the loss, or the amount of loss, and therefore, a

payment is instantaneous and highly convenient.

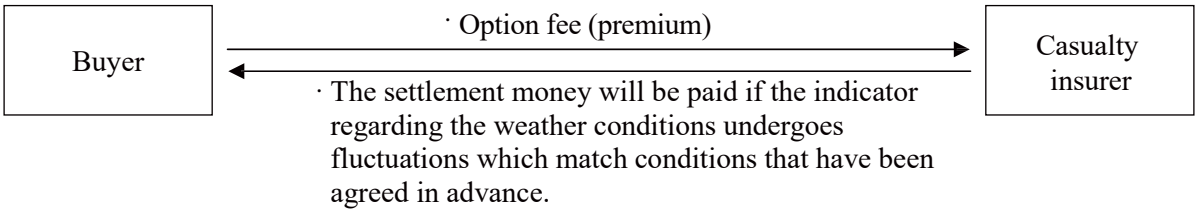
Let us take a look at some "insurance-like" derivatives.

(i) Weather Derivatives

Weather derivatives are a type of derivative that came to be handled during this century. The FIEA clearly stipulates that figures relating to the results of climate forecasts can be deemed to be a type of "financial indicator." A payoff is given as a function of a financial indicator. In other words, a settlement is paid if an indicator related to the weather fluctuates in a manner such that it conforms to the agreed conditions.

In the United States, traditionally, weather derivatives that use the reference indicators of average temperature such as cooling degree day (CDD) and heating degree day (HDD), have been traded. The background for this is the existence of a free market for electricity. As CDD and HDD are linked with power and energy consumption by cooling and heating, they can be used as a tool for hedging electricity price fluctuations. In Japan, on the other hand, weather derivatives are commonly used as insurance to reduce the risk of a decline in operating profits of a business corporation that is caused by abnormal or unseasonable weather conditions such as hot summer, rainfall and snowfall.

Chart 2-25 Weather Derivatives

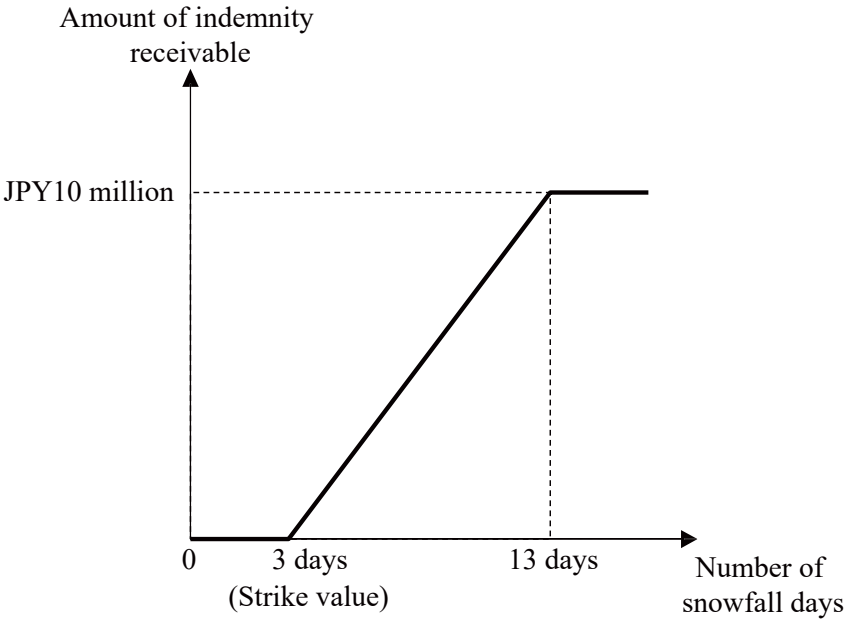


A variety of reference indicators are used in weather derivatives, including temperature, snowfall and rainfall. The weather derivatives frequently contracted in Japan are those using the number of snowfall days or the number of rainfall days as a reference index (financial index). Nevertheless, the Japan Meteorological Agency will not recognize a snowfall day (or a rainfall day) unless a specified amount of snow (or rain) has fallen at a predetermined point of observation.

[Case]

The buyers of the weather options are operating companies in the apparel industry, the leisure industry or another industry that is easily affected by weather conditions, as well as power companies and gas companies. The seller of the weather options would be a casualty insurer.

Chart 2-26 Guarantee Money (Payoff) of Weather Derivatives



Observation Period:	December 1 through February 28 (3 months)
Days to Be Observed:	Saturdays, Sundays and Holidays in the Observation Period (total 33 days)
Observation Index:	Volume of snowfall (number of days of at least 5 cm of snowfall among the observation days) (hereinafter "snowfall days")
Strike Value:	3 days
Indemnity Amount:	JPY1 million per day
Maximum Indemnity Payable:	JPY10 million
Payoff:	If the number of days of snowfall exceeds the strike value (3 days), the amount obtained by subtracting the strike value from the number of days of snowfall, and then multiplying the remainder by the indemnity amount (JPY1 million per day) shall be paid to a limit of the maximum indemnity payable (JPY10 million). The amount payable will be zero if the number of snowfall days is equal to or less than the strike value (payoff = min {max (number of snowfall days − 3, 0) × JPY1 million, JPY10 million}).

(ii) Disaster Derivatives

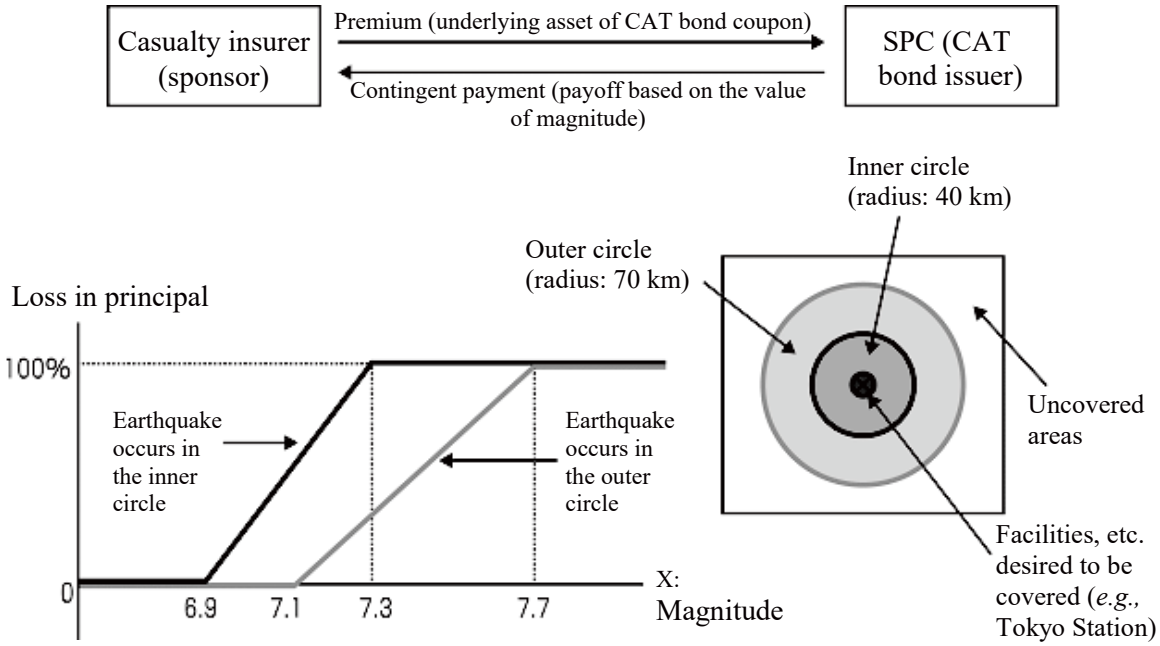
Disaster (catastrophe) derivatives over a catastrophic event cover extremely rare events like a major disaster that occurs once in several decades or several hundred years. These are also governed by the law of small numbers, and are difficult to diversify (concentration is high). While they are weather derivatives, they appear to be close to casualty insurance. Normally, reinsurance is used to shift excessive insurance risk that is above a credit limit, but in recent years study has been conducted into alternative risk transfer (ART) which transfers insurance risk by accessing capital markets. Disaster derivatives are one vehicle by which this is carried out, and there are also mechanisms such as commitment lines and contingent capital as methods of obtaining emergency financing.

An earthquake option is a risk hedging product against a decline in sales or damage as a result of an earthquake. In contrast to insurance, it is not designed to indemnify against an actual loss, and consequently, a settlement is paid, even if no actual loss has occurred. For this reason, it is not necessary to investigate the relationship between the earthquake and the loss, or the amount of loss, thereby increasing convenience.

However, the buyer of the earthquake option would face not only the risk that the settlement will not cover the actual amount of loss, but also the credit risk of the casualty insurer that is the counterparty to the transaction, that is, the risk that because of a deterioration of the credit condition of the casualty insurer, the casualty insurer will become unable to cope with the exercise of rights by the customer. In this event, the buyer will lose the profits that it would have gained if the contract had been performed, and may also lose the option premiums that it has paid.

Let us consider a CAT option that uses the magnitude of an earthquake as a financial indicator (the amount of loss in the principal of the CAT bond is liked with the magnitude).

Chart 2-27 CAT Option (Loss in Principal)



[Case]

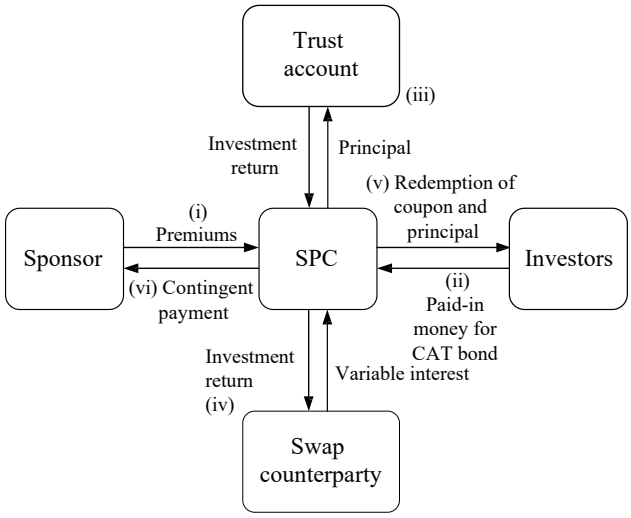
A casualty insurer receives an "earthquake insurance premium" from a business corporation, and pays the premium (minus fees) to a SPC. When a huge earthquake occurs, the SPC (the issuer of CAT bonds) makes payment to the casualty insurer (contingent payment) and CAT bond investors incur loss in principal equivalent to such payment.

[CAT (Catastrophe) Bonds]

A CAT bond is a structure bond wherein the investors take a risk of loss in principal in exchange for receiving a high rate of coupon payment. It has the following characteristics: (a) as it is issued by the SPC (special purpose company), it is insulated (bankruptcy remote) from the credit risk of an originator (the casualty insurer); and (b) the interest rate is hedged through TRS, etc. in order to protect it against risks other than earthquakes. However, unlike other types of securitized products, it does not have a portfolio of backed

assets which pools the cash flow from numerous assets of the same type and with a high degree of independence of assets, but it is an investment for which the concentration of risk is extremely high and deconcentration is difficult. In fact, in the wake of the Great East Japan Earthquake, the entire principal of CAT bonds in one out of two cases was lost.

Chart 2-28 CAT Bond Scheme (TRS)



(i) Sponsor enters into a financial contract with SPC.

(ii) SPC issues CAT bonds to Investors.

(iii) SPC invests the paid-in money in JGB bonds, etc. and puts them into a trust account for security.

(iv) Investment return is swapped with a LIBOR-based variable interest by the Swap Counterparty (total return swap, TRS).

(v) SPC pays the premiums received from the Sponsor and the variable interest to Investors.

(vi) When a trigger event takes place, the SPC pays a predetermined amount to the Sponsor. In this case, Investors incur a loss in principal of their paid-in money.

Chapter 3 Derivatives Transactions and Articles of Association and Various Rules of the Association

Derivatives Transactions and Articles of Association and Various Rules of the Association

Rules Concerning CFD Transactions

These Rules Concerning CFD Transactions establish matters to be complied with in CFD transactions between an Association Member and a customer or the intermediary, brokerage or agency service thereof in order to contribute to investor protection (art. 1).

The outline of these Rules is as follows:

(1) Definition

The "CFD" in "CFD transaction" stands for "Contract for Difference," and "CFD transaction" generally refers to a net settlement transaction depositing a margin which is settled by the difference between the transaction price at the time of commencement of the transaction referencing the price of securities or securities index and the transaction price at the time of termination of the transaction. These Rules define CFD transactions as transactions meeting all of the requirements (i) through (iv) below, and a CFD transaction is a concept that includes over-the-counter (OTC) CFD transactions (CFD transactions with securities companies, etc. on negotiation basis) and CFD transactions listed on an exchange (art. 3, item 1):

(i) Futures transactions or forward transactions concerning securities, etc. (meaning securities and securities index; the same applies hereinafter);

(ii) Transactions which are conducted with an individual (excluding business execution partners, etc. upon conducting transactions as business execution partners, etc.);

(iii) Net settlement transactions which are settled by the difference between the contract price and the settlement price, and which do not involve the delivery or receipt of the actual securities; and

(iv) Transactions that do not fall under conventional futures transactions currently listed on an exchange (Nikkei 225 futures, TOPIX futures, etc.).

These Rules define "conventional futures transactions currently listed on an exchange" as transactions falling under all of (a) through (c) below:

(a) Market derivative transactions or foreign market derivatives transactions prescribed by the FIEA;

(b) Transaction that has a deadline and is liquidated when such deadline comes, and cannot be continued; and

(c) Transactions which the person operating a financial instruments market or a foreign financial instruments market does not use in the name or the explanation of the instrument the words "CFD" or "Contract for Difference."

(2) Prohibited Actions for Solicitation

An Association Member must not conduct the following acts with respect to the solicitation of CFD transactions (excluding OTC CFD transactions) for a customer other than professional investors (each item of art. 4, para. 1):

(i) Duty to Confirm the Intention to Accept Solicitations

When concluding a contract pertaining to CFD transactions (excluding OTC CFD transactions), soliciting a customer without confirming that the customer is willing to have such solicitation before starting the solicitation.

(ii) Prohibition of Re-Solicitation

Continuing solicitation even after the customer who received the solicitation of a contract pertaining to CFD transactions (excluding OTC CFD transactions) expresses its intention not to conclude such contract (including the case where the customer expresses its intention to no longer receive the solicitation).

(Note) Under the FIEA and related regulations (FIEA, art. 38; FIEAEO, art. 16-4), the provisions concerning the prohibition of uninvited solicitation, duty to confirm the customer's intention to accept solicitation, and prohibition of repeated solicitation shall apply to an act of soliciting an individual to conclude a contract for OTC derivatives transactions (including OTC CFD transactions).

(3) Loss Cut Transactions

(i) Preparation of Management System of Loss Cut Transaction

An Association Member must, upon conducting OTC CFD transactions with a customer, prepare and implement a sufficient management system for conducting loss cut transactions(Note 1) meeting the following requirements:

- After satisfying the requirements set forth in (ii) for each OTC CFD transaction, determining the loss-cut level in order that the loss of the customer may not exceed the amount of margin (guarantee money or securities deposited by the custom; the same applies hereinafter) in consideration of the price fluctuation risk and the liquidity risk;
- Reflecting an arrangement with the customer on the Loss-Cut Transaction in a contract with the customer;
- At each point during the transaction hour, confirming that the real deposit amount concerning a customer's OTC CFD transaction(Note 2) does not fall short of the loss cut base amount(Note 3) (such confirmation is referred to as "loss cut checking"), and executing a loss-cut transaction if the amount falls short;
- When performing the loss-cut checking, calculating the real deposit amount each time the loss-cut checking is conducted and the loss-cut base amount at least at a certain timing on the same business day, and based on the transaction amount that reflects the price of securities relating to the OTC CFD transaction or the value of securities index relating to the OTC CFD transaction at that timing; and
- Reporting the situation where the Loss-Cut Transaction is executed, to the board of directors or its equivalent on a regular basis or as necessary.

An Association Member must conduct Loss-Cut Checking at intervals of ten minutes or shorter (art. 6).

(Notes) 1. A loss cut transaction means a transaction for settlement mandatorily executed by an Association Member if the amount of losses that will be incurred upon settlement of a customer's position reaches a certain level.
2. The real deposit amount means the amount of margin, etc. deposited by the customer and adding or subtracting the appraisal profit or loss from the customer's transactions.
3. The loss cut base amount means the transaction amount (= price of the securities, etc. × quantity) multiplied by the loss cut level (see (ii) below).
In the case an Association Member performs loss-cut checking on more than one OTC CFD Transaction that are conducted with the same customer, the real deposit amount and the loss-cut base amount may be calculated on a lump-sum basis in the transactions in each Item for the same customer in accordance with the four transaction categories set forth in (ii) below (art. 8, para. 1).
In the case referred to above, if the customer has conducted a sale, etc. and a purchase, etc. of the same securities or securities indicators, the larger of the total transaction amount of OTC CFD transaction relating to the sale, etc. of such securities and the total transaction amount of OTC CFD transaction relating to the purchase, etc. of such securities may be considered as the transaction amount of OTC CFD Transactions relating to the same securities or securities indicators (art. 8, para. 2).

(ii) Setting of Loss Cut Level

These Rules set the minimum level of the loss cut level for calculating the loss cut base amount in accordance with the four transaction categories(Note) of OTC CFD transactions below (art. 7):

[Individual Share-Related OTC Derivative Transactions]

a. Transactions for which the intervals between the instances of loss cut checking by the Association Member are one minute or shorter ····· 2%
b. Transactions for which the intervals between the instances of loss cut checking by the Association Member are longer than one minute ····· 4%

[Stock Index-Related OTC Derivative Transactions]

a. Transactions for which the intervals between the instances of loss cut checking by the Association Member are one minute or shorter ····· 1%
b. Transactions for which the intervals between the instances of loss cut checking by the Association Member are longer than one minute ····· 2%

[Bond-Related OTC Derivative Transactions]

a. Transactions for which the intervals between the instances of loss cut checking by the Association Member are one minute or shorter ····· 0.4%
b. Transactions for which the intervals between the instances of loss cut checking by the Association Member are longer than one minute ····· 0.8%

[Other Securities-Related OTC Derivative Transactions]

a. Transactions for which the intervals between the instances of loss cut checking by the Association Member are one minute or shorter ····· 2%

b. Transactions for which the intervals between the instances of loss cut checking by the Association Member are longer than one minute ····· 4%

(Note) The four transaction categories above are based on the categories provided for in Article 117, Paragraph 20, Items 1 through 4 of the FIBCOO.

<Example of Loss Cut Checking>

For example, the results of loss cut checking at (i) and (ii) with respect to the transaction below are as follows, assuming that loss cut checking is made every minute.

In a CFD transaction that is an individual share-related OTC derivative transaction, a customer:
- Bought 10 units of issue A at a price of JPY100,000; and
- Deposited JPY200,000 as margin.

(i) If the loss cut checking was made when a price falls to JPY90,000:
- Real deposit amount:
  JPY200,000 (deposited margin) − JPY100,000 (appraisal loss) = JPY100,000
- Loss cut base amount: (JPY90,000 × 10 units) × 2% = JPY18,000

→[Results] The real deposit amount does not fall below the loss cut base amount, so there is no need to conduct a loss cut transaction.

(ii) If the loss cut checking was made when a price falls to JPY81,000:
- Real deposit amount:
  JPY200,000 (deposited margin) − JPY190,000 (appraisal loss) = JPY10,000
- Loss cut base amount: (JPY81,000 × 10 units) × 2% = JPY16,200

→[Results] The real deposit amount falls below the loss cut base amount, so a loss cut transaction must be conducted.

(4) Establishment of Internal Rules

When an Association Member conducts CFD transactions, or conducts intermediary, brokerage, or agency service thereof, it must establish and comply with internal rules that describe the concrete handling of each provision, and inspect, on a regular basis, that such internal rules are properly followed under the responsibility of the internal administration supervisor (art. 9).

(5) Margin Ratio Rules Under the FIEA and Related Regulations

Under the regulations provided in these Rules as well as the FIEA and related regulations (FIEA, art. 38; FIBCOO, art. 117), an Association Member must not allow a customer to continue a securities-related OTC derivative transaction including an OTC CFD transaction unless the Association Member requires the customer deposit a margin in an amount calculated at the ratio set forth for each transaction category below or a higher ratio, and to promptly deposit any shortage if the real deposit amount is found to fall short of the required amount of margin, as a result of marking to market every business day:

- **Individual share-related OTC derivatives transaction:……20%**
- **Stock price index-related OTC derivatives transaction:…… 10%**
- **Bond-related OTC derivatives transaction:…… 2%**
- **Other securities-related OTC derivatives transaction:……20%**

Exercise

Class-1 Examination

The questions contained here are not identical to those used for actual examinations. They have been prepared to assist with examination preparations, in order to enable the user to understand the format of questions presented.

The term “Association Member” or “Regular Member” used in these questions refers to an association member or regular member of the Japan Securities Dealers Association (JSDA). In addition, the term “financial instruments business operator, etc.” is also used to refer to an association member of the JSDA.

Exercise (Class-1 Examination)

Ⅰ. Read the following statements and mark each statement with "○" if it is true or with "×" if it is false.

[Financial Instruments and Exchange Act]

Q1. A financial instruments clearing organization refers to a company licensed by the Prime Minister that is engaged in the functions of extending loans of the cash or securities necessary to settle margin transactions by utilizing the settlement scheme of the financial instruments exchange market operated by the financial instruments exchange.

Q2. A sale of securities borrowed from another, or the entrustment or acceptance of such sale is not subject to the short sale regulations.

Q3. A listed company, etc. that is required to file an annual securities report must submit an annual securities report to the Prime Minister for each business year, within one month from the end of the business year.

[Laws Relating to Solicitation and Sales of Financial Instruments]

Q4. When a business operator handling personal information prescribed in the Act on the Protection of Personal Information acquires personal information stated in a contract or other document, etc. in connection with the conclusion of a contract or otherwise acquires personal information from the person, the business operator shall expressly indicate the purpose of utilization in advance.

[Articles of Association and Various Rules of the Association]

Q5. If an Association Member has compensated any loss upon examination and confirmation by the incident confirmation committee, such Association Member shall be exempted from the obligation to report such case to the Director-General of the Local Finance Bureau.

Q6. A notification of a Phoenix Issue must be made by a Regular Member who intends to be a Handling Member of such issue, together with the explanatory notes on business conditions, etc. and other necessary documents, at least five business days prior to the date when the offering of quotations for the said issue begins.

Q7. An Association Member must keep the notices and other information materials provided by the issuer of the foreign securities which the Association Member is entrusted by a customer with the custody of, and must allow the customer to peruse such notices and information materials and deliver them at the customer's request.

[Articles of Incorporation and Various Regulations of the Exchanges]

Q8. In a regular transaction of share certificates at the Tokyo Stock Exchange, trades commence at the ex-dividend or ex-rights price five business days before the record date for shareholders eligible for dividends (including interim dividends) or the record date for share options and other rights.

Q9. In order to prevent investors from incurring unexpected losses due to volatile fluctuations in securities prices, the Tokyo Stock Exchange limits the daily price fluctuation in sale and purchase of securities.

Q10. Under the Japanese clearing organization system, the interposition of the clearing organization enables a settlement method called DVP (Delivery Versus Payment) which eliminates principal risk (referring to the risk that the purchaser does not pay the agreed price for the securities upon delivery of the securities by the seller, or the risk that the purchaser, who has paid the agreed price for the securities, is unable to acquire the securities or take back the principal of the payment in whole when the seller does not deliver the securities), by making the settlement of securities mutually conditional upon the receipt of funds.

[Equity Business]

Q11. A financial instruments business operator may conduct a sale of a listed securities certificate on its own account without being required to clearly indicate such sale to the exchange if the sale is a short sale but the selling price does not fall below the latest quote announced by the exchange.

Q12. Settlement of when-issued transactions takes place on the fifth business day counting from the final day for transactions.

Q13. As an example of calculation of the margin deposit for a margin transaction, when the contract price of the listed shares to be traded is JPY800,000, the minimum required amount of margin deposit is JPY300,000.

[Bond Business]

Q14. The creditworthiness and characteristics of government bonds (except for GX Economy Transition Bonds) differ depending on the difference in the law governing their issuance (*e.g.*, the Public Finance Act).

Q15. There are three types of bond borrowing and lending transactions depending on whether or not they are collateralized: “uncollateralized bond borrowing and lending transactions,” “bond borrowing and lending transactions collateralized by margin securities” and “cash collateral bond borrowing and lending transactions.”

Q16. Convertible-type bonds with share options are bonds with share options that can be detached from the bonds and sold separately.

[Investment Trusts and Investment Corporations Business]

Q17. In the case of an investment trust under instructions from the settlor, the trustee gives instructions on investment of the investment trust property.

Q18. An ETF (exchange-traded fund) can be purchased and cashed out at a price based on the base value like other securities investment trusts.

Q19. The disclosure-related regulations of the Financial Instruments and Exchange Act do not apply to foreign investment trusts publicly offered in Japan.

[Stock Company Law in General]

Q20. Even when one share is split into multiple shares, the substantive value per share remains the same.

Q21. Shares of stock for which dividends are to be paid out of the remaining surplus following the payment of dividends at a certain rate to other classes of shares of stock are referred to as deferred shares.

Q22. A stock company may not impose restrictions on the transfer on all of its shares.

[Financial Statements and Company Analysis]

Q23. A balance sheet represents a company’s business performance during a fixed term interval of time.

Q24. Between companies with identical net profit for the term, the company which has a smaller amount of stated capital will be regarded as having a higher ratio of net profit to stated capital.

Q25. In general, the lower a company’s equity ratio, the better its financial condition is considered to be.

[Taxation of Securities Transactions]

Q26. Under the final tax return non-filing system, a taxpayer has the discretion, when filing his or her final tax return, to either include in, or exclude from his or her gross income, etc. those items of income to which the system is applicable when computing taxable income and the amount of taxes owed.

Q27. Specified bonds include national government bonds and local government bonds.

Q28. The maximum amount of the dividend tax credit is limited to the total tax owed by the taxpayer, and the taxpayer can claim a refund for any excess credits.

[Sales Operations]

Q29. In relation to the code of ethics that an Association Member is required to have, if an investor intends to make an investment that is inappropriate in terms of the purpose of investment or amount of available funds, officers or employees of the Association Member may make an investment decision on behalf of such investor, using their authority or position within the company as well as comparatively superior usable information that is available to them.

Q30. Since the investment decisions of investors shall be under the investors' own responsibility, sales representatives shall not provide advice even if an investor tries to engage in investments that are clearly unsuitable in light of the investor's assets or income.

Q31. If you make a clerical mistake, you should first ask the customer to accept the wrong order, and then report the mistake to, and seek instruction from, the internal administrator.

[Derivatives Transactions]

Q32. In derivatives transactions for securities, when investors have sold the derivatives product they do not yet own, such a state is called "long."

Q33. In JGB futures transactions, settlement can be made through a method of exchanging the bonds designated by the Osaka Exchange as deliverable bonds and the payment for the issues, which is referred to as delivery settlement.

Q34. Underlying assets for 5-year JGB futures are fictitious bonds (standardized bond products) with a maturity of 5 years, an annual interest rate of 5% and a trading unit of JPY100 million at par.

Q35. In a total return swap transaction, the protection buyer pays the protection seller's coupons and capital gains from reference assets such as bonds during the transaction period, and in exchange receives the amount of capital loss as well as short-term interest calculated on the basis of the notional principal.

Ⅱ. Answer the following questions in accordance with the instructions given in each question.

[Financial Instruments and Exchange Act]

Q36. Choose the two false statements from the statements below:

1. A transaction of derivatives carried out on a financial instruments market in accordance with the requirements and by using methods prescribed by the operator of the financial instruments market is called a market transaction of derivatives, and a transaction of derivatives carried out outside a financial instruments market or a foreign financial instruments market is called an over-the-counter transaction of derivatives.
2. When a financial instruments business operator, etc. receives an order from a customer for the sale and purchase of securities or an over-the-counter transactions of derivatives, the business operator must clarify in advance to the customer whether the business operator itself will consummate the sale and purchase or the transaction as a counterparty or whether it will undertake the intermediation, brokering or agency with respect thereto.
3. Officers or employees of financial instruments business operators, etc. are prohibited from engaging in the purchase and sale, etc. on the basis of special information which they have obtained knowledge of by taking advantage of their business position.
4. If share certificates, etc. are purchased from 11 or more persons off-market within 60 days and the ownership ratio of the share certificates, etc. after the purchase exceeds 3%, such purchase must be made by a tender offer in principle.
5. Certificates issued by a foreign person which have the characteristics of share certificates are not included in the scope of securities covered by a statement of large-volume holdings.

[Articles of Association and Various Rules of the Association]

Q37. Choose the two correct statements from the statements below:

1. An advertisement or other indication may be placed at employees' discretion if the content of such advertisement or other indication is confirmed by more than one employee.
2. In principle, a Regular Member designated by the JSDA as an Operating Member must not perform the procedure to include an investor in a shareholders community, unless the investor so requests.
3. In order to be designated as a Phoenix Issue, securities must be subject to restrictions on the transfer imposed by the issuer no later than the date of designation.
4. When an Association Member distributes share certificates to retail customers at the time of initial public offering, it must determine all customers eligible for such distribution by drawing.
5. An Association Member must engage in transactions of foreign securities with customers in accordance with the agreement on foreign securities trading account, except when brokering sales in response to a tender offer.

[Equity Business]

Q38. Choose the two correct statements from the statements below:

1. Foreign shares that are eligible to be traded in margin transactions are limited to those listed on a financial instruments exchange market in Japan.
2. The interest rate to be applied to standardized margin transactions in listed shares may be determined by agreement between a customer and a financial instruments business operator.
3. Each time a customer with a margin transaction account places a buy/sell order as a margin transaction, he/she must instruct a financial instruments business operator that the transaction is to be done as a margin transaction.
4. The term of repayment for a standardized margin transaction is within three months.
5. The full amount of security deposit for standardized margin transactions in listed shares must be paid in cash.

[Equity Business]

Q39. The cum rights market price of a certain share prior to a 1:1.6 split was JPY1,800. If the ex-rights market price was JPY1,500, how much did the price increase over the cum rights market price of JPY1,800? Choose the one correct option from the options below.

1. JPY300
2. JPY600
3. JPY900
4. JPY1,080
5. JPY1,380

[Equity Business]

Q40. Choose the one option from the options below which indicates the correct Price/Cash Flow Ratio (PCFR) for the following company (one closing per year):

(Note) Assume that there is no change in the total number of outstanding shares and the values on the balance sheets between the end of the previous term and the end of the current term. Figures appearing in the options have been rounded down to the first decimal place.

Capital	JPY40 billion
Total number of outstanding shares	800 million shares
(Net) profit for the current term	JPY12 billion (after tax)
Depreciation Expenses	JPY4 billion
Share price (market price)	JPY680

(PCFR)

1. 17.0 times
2. 34.0 times
3. 45.3 times
4. 68.0 times
5. 85.0 times

[Bond Business]

Q41. Choose the two options from the options below which correctly describe “convertible-type bonds with share options”:

1. The issue price is sometimes set higher than the face value.
2. The coupon rates are set higher than those for straight bonds.
3. There are two types of maturity: 5 years and 10 years.
4. There is one denomination for each issue.
5. All issues adopt bullet maturity amortization.

[Bond Business]

Q42. Choose the one option from the options below which indicates the correct premium over parity of the following convertible-type bond with share options:
(Note) Figures appearing in the options have been rounded down to the second decimal place.

Conversion price	JPY2,500
Market price of the convertible-type bond with share options	JPY115
Market price of the share into which the bond is to be converted	JPY2,000

1. -43.75%
2. -8.00%
3. 8.69%
4. 30.43%
5. 43.75%

[Bond Business]

Q43. Choose the one option from the options below which indicates the correct simple yield to maturity of a coupon bond with an annual coupon rate of 1.2%, eight years remaining until maturity, and a purchase price of JPY105:
(Note) Figures appearing in the options have been rounded down to the third decimal place.

1. 0.547%
2. 0.575%
3. 1.142%
4. 1.738%
5. 1.825%

[Investment Trusts and Investment Corporations Business]

Q44. Choose the two correct statements from the statements below regarding an investment trust managed under instructions from the settlor.

1. Establishment of the investment trust property is one of the main types of business that the investment trust settlor company conducts.
2. Administration of the investment trust property is one of the main types of business that the investment trust settlor company conducts.
3. Delivery of prospectuses and management reports to clients is one of the main types of business that the trustee company conducts.
4. Handling of the offering of the investment trust and trading is one of the main types of business that the trustee company conducts.
5. The trustee company becomes the titleholder of the investment trust property and administers it in its own name while keeping such property separate from its own assets.

[Incidental Businesses]

Q45. Choose the one false statement from the statements below regarding the description of the "agency service relating to cumulative investment business" that a financial instruments business operator may engage in as an agent of another financial instruments business operator, etc.

1. Receiving of applications for cumulative investment
2. Receiving payments
3. Receiving applications to cancel cumulative investment contracts
4. Returning securities
5. Acting as an agent for purchasing securities

[Stock Company Law in General]

Q46. Choose the two incorrect statements from the statements below:

1. A person who has been an employee of a company's subsidiary over the past ten years is not eligible to be an outside director of that company.
2. Proxy voting is permitted in order to pass a resolution at the board of directors.
3. A company with the board of directors does not have to appoint a representative director.
4. A company auditor may not concurrently hold a position as an executive officer of a subsidiary company.
5. The election and dismissal of an accounting advisor is made by resolution of a shareholders meeting.

[Basic Knowledge of Economics, Finance and Fiscal Policy]

Q47. Choose the two correct statements from the statements below:

1. Gross Domestic Products (GDP) is a widely used index that represents the country's comprehensive economic activities in three facets, *i.e.*, production, distribution and income.
2. Currency has the following basic functions: a measurement of value, a means of exchange, and a means of preserving value.
3. Among interbank markets, secured call markets deal with only next day funds (overnight transactions).
4. The Basic Discount Rate and Basic Loan Rate are the standard interest rates applied to loans to private financial institutions by the Bank of Japan.
5. If the House of Councilors does not vote within 60 days after receipt of the draft budget from the House of Representatives, the budget is automatically adopted.

[Financial Statements and Company Analysis]

Q48. Choose the two options from the options below which correctly describe the financial status of a company when the amounts (in millions of yen) in its balance sheet and profit and loss statement are as follows:
(Note) Figures appearing in the options have been rounded down to the second decimal place.

(Excerpt from the balance sheet)

	Preceding term	Current term
Current assets	7,500	8,000
Fixed assets	8,500	9,000
Current liabilities	4,500	5,000
Fixed liabilities	6,500	6,500
Net assets	5,000	5,500

(Excerpt from the profit and loss statement)

	Current term
Sales	17,000
Sales cost	9,000
Selling expenses and general and administrative expenses	7,500
Non-operating profits and losses	100
Extraordinary profits and losses	−100
Corporation tax, etc.	300

1. The ratio of (net) profit to total capital for the current term is 1.17%.
2. The ratio of ordinary profit to total capital for the current term is 3.63%.
3. (Net) profit margin on sales for the current term is 3.52 %.
4. The current ratio for the current term is 62.50%.
5. The equity ratio for the current term is 32.35%.

[Taxation of Securities Transactions]

Q49. As indicated in the following table, an individual (resident) purchased 11,000 shares of Company A stock (listed shares) during the period from April of a given year through July of the same year and sold 3,000 of such shares in June of the same year, both in cash transactions through a financial instruments business operator.

Choose the one option from the options below which indicates the correct amount of capital gain from this sale:

(Note) Assume that the individual made no other sale or purchase of securities in that given year. No consideration is given regarding any commissions or other expenses.
In calculating the acquisition value, any fraction less than JPY1 must be rounded up.

Month	Sale or Purchase	Unit Price	Number of Shares
April	Purchase	JPY2,500	2,000 shares
May	Purchase	JPY2,000	5,000 shares
June	Sale	JPY2,600	3,000 shares
July	Purchase	JPY2,400	4,000 shares

1. JPY960,000
2. JPY1,089,000
3. JPY1,092,000
4. JPY1,371,000
5. JPY1,374,000

[Basic Knowledge Concerning Securities Markets]

Q50. Choose the two false statements from the statements below:

1. Individuals (final fund providers) supply funds to companies, etc. (final fund recipients) by buying securities issued by the latter via securities markets. This is categorized as indirect financing.
2. The primary market is where investors obtain new securities that are issued in the first instance, either directly from the issuer or through a broker.
3. The secondary market is a market where the securities that have already been issued and obtained by the primary investors are then sold on (traded) to a second or third investor.
4. Secondary distribution of already-issued securities for which solicitation similar to that for new issuance is conducted is subject to the requirement of statutory disclosure as in the case of solicitation for sale (offering) of newly-issued securities.
5. Under the book-entry transfer system based on the Act on Book-Entry Transfer of Company Bonds, Shares, Etc., shareholders can choose to receive dividend payments for shares, etc. directly from the Japan Securities Depository Center (JASDEC).

[Derivatives Transactions]

Q51. Choose the two false statements from the statements below:

1. The strike price of options is referred to as premiums.
2. European type options can be exercised only on the expiration date.
3. In options transactions, when the relationship between the strike price and the price of the underlying assets is such that positive earnings are produced when the options are exercised, the situation is called out-of-the-money.
4. Long straddle is a position in which both call options and put options of the same strike price are purchased in identical amounts as a package. This strategy is used when we anticipate the market to move dramatically.
5. Long strangle is a strategy used when we purchase calls and puts with different strike prices, expecting that the market price will move far enough to go outside of the range of both strike prices.

[Derivatives Transactions]

Q52. Choose the one option from the options below which indicates the combination of the correct statements regarding trading of options on securities:

A. The writer of the options, in exchange for the initial premium received, is under an obligation to honor the agreement if the options are exercised in the future; in other words, the writer assumes the obligation to make a payoff in return for receiving the premium.
B. For call options, the higher the strike price as compared to the price of the underlying assets, the higher the option premiums; whereas for put options, the higher the strike price, the lower the option premiums.
C. For both call options and put options, the premium goes down when volatility increases.

(Options)
1. A and B
2. A only
3. B and C
4. B only
5. C only

[Derivatives Transactions]

Q53. An investor buys JPY1 billion at face value in 10-year JGB futures of JPY100. The corresponding margin requirement is JPY60 million and the entire amount is deposited in margin securities, not cash. If, on the following day, the settlement price of 10-year JGB futures has dropped to JPY95.50 and the margin securities have experienced a JPY2 million loss in valuation, how much more of the margin needs to be deposited? Choose the one correct option from the options below.

(Note) Assume that there has been no change in the required margin of JPY60 million for 10 units of the open position balance.

1. JPY13 million
2. JPY25 million
3. JPY30 million
4. JPY45 million
5. JPY47 million

[Derivatives Transactions]

Q54. Along with buying 10 TOPIX call options with a strike price of 1,700 points for a premium of 55 points, a customer wrote 10 TOPIX put options with a strike price of 1,700 points for a premium of 40 points.

Suppose the customer continues to hold the options until the final settlement day and the Special Quotation (SQ) of TOPIX becomes 1,800 points, what then would the total profit and loss of these transactions be? Choose the one option from the options below which indicates the combination of the correct results:

(Note) For the purpose of this calculation, commissions and taxes are not taken into account.

1. A profit of JPY500,000
2. A profit of JPY1,500,000
3. A profit of JPY5,500,000
4. A profit of JPY8,500,000
5. A profit of JPY10,500,000

[Derivatives Transactions]

Q55. Choose the one option from the options below which indicates the combination of the correct terms to fill in the entries marked by (i), (ii) and (iii) in the following statements:

A credit default swap is a derivative in which a payout occurs in the event of occurrence of a [(i)]. The protection buyer (the [(ii)] the risk) pays the seller a premium and in exchange will receive from the seller the amount equivalent to a loss incurred in the event that the reference company suffers a [(i)] during the contract period.

In the event of a default on individual bonds, the bonds themselves will be turned over to the seller or settled in the [(iii)].

1. (i) protection (ii) person who hedges (iii) settlement in-kind
2. (i) protection (ii) person who hedges (iii) net cash difference
3. (i) credit event (ii) person who hedges (iii) net cash difference
4. (i) credit event (ii) person who takes (iii) settlement in-kind
5. (i) credit event (ii) person who takes (iii) net cash difference

Answer Sheet for Class-1 Exercise

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