

Nikkei Stock Average Index Guidebook

Nikkei Inc.

- This document is the index guidebook of the Nikkei Stock Average calculated and published by Nikkei Inc (Nikkei). The document is drawn up by Nikkei and it would be changed or modified corresponding to the revision of the index calculation rule etc.
- Copyright of this document is owned by Nikkei, and any copies, reprints and reproduction of this document are prohibited without the prior approval of Nikkei. This document is prepared solely for the understanding of the index that Nikkei calculates and publishes, and it is not to be construed as a solicitation or an offer to buy or sell any securities or related financial instruments.
- This English document is a translation of the original document dated December 30 2011 in Japanese and may not be an entirely accurate translation of the original Japanese document. In any case where differences arise between the English version and the original Japanese version, the original Japanese document will prevail.

(July 18, 2017 version)

1: Summary

(1)Introduction

The Nikkei Stock Average (Nikkei225) is used around the globe as the most popular benchmark of the Japanese Stock Market. It is comprised of 225 stocks listed on the Tokyo Stock Exchange First Section. This is an adjusted price index where its continuity is maintained by “Dow” method as well as the rules to integrate Japanese specific trading practices into the calculation.

The 225 constituent stocks are reviewed periodically by the liquidity in the market and sector balance. By calculating with highly liquid stocks, the index is aimed at fulfilling two objectives, one is to maintain its long-term continuity and the other is to reflect the changes in the industry structure

The index started on September 7, 1950. However, it was retroactively calculated back to May 16, 1949 when the Tokyo Stock Exchange reopened for the first time after the Second World War. The index has been calculated by Nikkei since 1970 although it had been calculated initially by the Tokyo Stock Exchange.

(2)Name

(Japanese)

Official: 日経平均株価 (Nikkei Heikin Kabuka)

Abbreviation: 日経平均 (Nikkei Heikin) , 日経 225 (Nikkei 225)

(English)

Official: Nikkei Stock Average

Abbreviation: Nikkei Average, Nikkei225

2: Constituents Management

In principle, constituents of the Nikkei225 are reviewed based on the following rules. There are two types of changes in the constituents. One is the “Periodic Review” conducted once a year, and the other is the “Extraordinary Replacement” where the vacancies of the constituents created by delisting or other reasons are filled.

Current rules were announced on April 15, 2000 and became effective from April 24 of the same year. There have been some minor modifications to date. This document is intended for explanation of the rules. Official text is found in the updated version of “Nikkei Stock Average Constituents Selection Rules” attached hereto, which supersedes the explanation below.

(1) Necessary Conditions of the constituents

Stocks (old share, domestic) listed on the Tokyo Stock Exchange First Section. However, non-ordinary shares such as ETFs, REITs, preferred stocks, preferred securities or tracking stocks are excluded.

(2) Periodic Review

Constituents are reviewed once a year at the beginning of October. Deletions and additions are announced before the effective date with some notification period. The purpose of this review is to maintain the market representativeness of the constituents. Stocks with high market liquidity are added and those with low liquidity are deleted. At the same time, to take changes in the industry structure into account, the balance of the sectors, in terms of the number of constituents, is considered.

(Procedure of the review)

① Assessment of the liquidity

Liquidity of a stock is assessed by the two measures, “trading value” and “magnitude of price fluctuation by volume” which is calculated as $(\text{High price}/\text{Low price}) / \text{Volume}$.

② Deletion and Addition due to Liquidity

Among stocks on the Tokyo Stock Exchange First Section, top 450 stocks in terms of the liquidity assessed in ① above are selected to form the “high liquidity group”. Those constituents not in the high liquidity group are deleted. Those non-constituent stocks which are in the top 75 of the high liquidity group are added.

③ Deletion and addition by the sector balance

Nikkei has an industry classification system where there are 36 industries. For index operation purposes, these 36 industries are re-classified into 6 sectors. They are “Technology”, “Financials”, “Consumer Goods”, “Materials”, “Capital Goods/Others”, and “Transportation and Utilities”.

Constituents are deleted and added to balance the number of constituents among these sectors. By considering the result of the procedure ② above, the sector balance is adjusted to make the total number of the constituents to be 225. More specifically,

- i) Among the 450 stocks, half number of those that belong to a sector is designated as the “Appropriate number of stocks” for such a sector.
- ii) Compare the actual number of constituents in the sector with its “Appropriate number”. If the actual is larger, then delete from such sector. If the actual is smaller, then add to such sector. Stocks to be deleted are selected from stocks with the lower liquidity and stocks to be added are selected from stocks with the higher liquidity.

④ Final decision

Stocks selected by the procedures above are “Candidates” for addition and deletion. They are presented to the committee comprised of academics and market professionals. Based on the comments from the committee, Nikkei Inc. will finally determine and announce the changes.

(3) Extraordinary Replacement

① Events of subjects

Stocks delisted from the Tokyo Stock Exchange First Section due to the following events are deleted from the index.

- i) Designated to “securities to be delisted”, i.e. “Seiri Meigara” or delisted due to bankruptcy, including filing for Corporate Reorganization Act, Civil Rehabilitation Act, or liquidation
- ii) Delisted due to corporate restructuring such as merger, share exchange or share transfer
- iii) Designated to “securities to be delisted” or delisted due to excel debt or other reasons
- iv) Transfer to the Second Section

The constituents designated to “securities under supervision”, i.e. “Kanri Meigara” become deletion candidates. However, decision to delete such candidates will be made by examining the sustainability and the probability of delisting for each individual case.

② Rules to choose stocks to be added (principal rules)

When a constituent is deleted because of the reasons above, a stock to be added will be selected, in principle, from the same sector in the “high liquidity group” in the order of liquidity and non-constituents.

③ Rules to choose stocks to be added (exceptional rules)

Notwithstanding ② above, following rules may apply when a deletion is known in advance.

- i) When such deletion is scheduled close to the Periodic Review, additional stocks may be selected in a part of the periodic review process.
- ii) When multiple deletions are scheduled in a short period, additions may not be selected one by one using the rules above, but using the Periodic Review procedure by assessing the liquidity and the balance of the sectors.

④ Rules to choose stocks to be added (exception for individual stock)

Notwithstanding ② above, procedures as exemplified below may be applied in case of corporate restructuring. Application of this procedure is determined for each case.

- i) Under the following cases, a stock of a company which will succeed the substance of the delisting company will be added in principle, where such company must be listed or will be listed within a short period on the Tokyo Stock Exchange First Section.
 - Stock of a surviving company in mergers (constituent is merged by non-constituent)
 - Stock of a newly established company by stock exchange or transfer (shares of a constituent is exchanged with those of the new company, i.e. its parent company)
- ii) When a company is split and multiple companies maintain listing on the Tokyo Stock Exchange First Section, a stock of a company which succeeds the major operation will become a constituent.

⑤ Effective dates for constituent changes

In principle, constituents are changed on the day when the event to delete the constituents takes place. However, to make the news of the constituents change widely known, time may be taken before the changes become effective, especially when the event such as bankruptcy happens suddenly. Additions are made after some period in principle.

(4) Notes for the constituents management

① About Periodic Review

i) Results of the Periodic Review are applied on the first trading day of October in principle. However, when there are delistings or new listings of the succeeding companies under the corporate restructuring and the constituents must be changed close to this date, changes to the index may be made in accordance with the schedule of delistings / new listings.

ii) There is no limit to the number of constituents change in the Periodic Review.

② About Extraordinary Replacement

Extraordinary Replacement is intended to fill the vacancy made by deletion due to a specific event. There is no case to use this procedure to add a new constituent (and delete current constituent).

③ General matters

For both Periodic Review and Extraordinary Replacement, deletion and addition are made effective on the same day to keep the number of constituents at 225. However, when necessary, as exemplified below, the index may be calculated with less than 225 constituents. Divisor is adjusted at times when constituents are deleted or added to maintain the continuity of the index..

i) When a constituent is delisted by share exchange or transfer and the succeeding company such as the newly formed parent company or an unlisted company which becomes the parent by receiving the shares may be listed in a short period. If such a succeeding company becomes a constituent, it is added to fill the vacancy after the deletion.

ii) When a constituent shall be deleted due to sudden announcement of bankruptcy or designation to the “security to be delisted”, i.e. “Seiri Meigara”, such constituent will be deleted promptly. However, to make such a change widely known, addition will be made after a short period (approximately 2 days). Exact schedule are announced for each case.

3: Calculation method

The Nikkei225 is calculated as a weighted price average where the sum of the constituent stock prices adjusted by the presumed par value is divided by the divisor.

Adjusted stock price = stock price x 50(yen) / presumed par value (yen)

Nikkei Stock Average = sum of Adjusted stock price / Divisor

(1) Selection of the prices

Prices to be used for the calculation are selected in the following order of priority.

1.Special Quote or sequential trade quote 2.Traded price 3.Base price

Take an example the index value at the close of the market. Usually, closing index is calculated by the last traded price of each constituent. However, if a constituent stock closes trading with special quote, such special quote is used to calculate the closing index even if it had a traded price intraday. Special quote is declared by the Tokyo Stock Exchange. Since the Nikkei225 is composed of liquid stocks, prices by the above definition 1 or 2 tend to be used intraday, and usually those by the definition 2, and occasionally those by the definition 1 are used for the closing index.

When there are no prices by the definition 1 or 2 during a day, “3. Base price” is used. This is obtained based on the priority order of ex-rights theoretical price, the last special quote price or sequential trade quote price up to the preceding day, and the latest traded price up to the preceding day.

In most cases, the price used for the calculation of the closing index on the preceding day becomes the “Base price”. However, the exception case is that there are not any prices and quotes on a day when a stock goes ex-right (split, for example). Since the price on the day of ex-right is significantly changed from the prices on the preceding day for non-market reasons, the “ex-rights theoretical price” is used for the calculation.

The theoretical price is calculated based on the price (i.e. special quote or sequential trade quote, or closing price) used for the calculation on the preceding day. For example, if the closing price on the preceding day was 1000 yen for a constituent and it goes 1 to 1.1 split today, the theoretical price for today is 909 yen ($=1000 / 1.1$) and this is the base price for this constituent.

Also note that ex-dividend is not treated as a ex-right for the calculation of the Nikkei225.

(2) Presumed par value

Although Japanese stocks had “Par value” in the past, such system was abolished by the revision of the Commercial Law enforced as of October 2001. Even after the abolishment of the system, many of the stock prices are formed based on the ex-par value such as 50, 500, or 50,000 yen. For example, stocks traded by unit of 1 share (ex-par value tends to be 50,000 yen) and stocks traded by a unit of 100 or 1000 shares have different price levels. It is not appropriate to use the price of such

different levels as they are to calculate the index. For this reason, Nikkei uses “presumed” par value which succeeds the ex-par value, and adjust the constituent prices to the presumed par value of 50 yen base.

Notes on the presumed par value.

① Most of the constituents have presumed par value of 50 yen, which means their original prices are simply used for the calculation. There are several stocks which have presumed par value not equal to 50. The latest presumed par value lists is [here](#).

② If a stock has a presumed par value other than 50 yen, such price is adjusted to 50 yen par. For example, NTT Docomo has a presumed par value of 50,000 yen. The price used for the calculation becomes $1/1000 (= 50 / 50000)$ of the observed price in the market.

③ Nikkei announced “Measures to large scale reverse splits” on June 7, 2005. According to the announcement, in principle, the presume par value is changed to keep the level of the price unchanged when a stock goes a large scale split or reverse split. When a stock with presumed value of 50 yen goes 1 to 2 split, the presumed par value will be changed from 50 to 25 ($=50/2$) yen.

In some cases such as a split of 1 to 3, the presumed par value will not be a dividable number, such as $50 / 3$ yen. However, when the price is adjusted to 50 yen par value base, its adjusted price will be 3 times as the original price ($50 / (50 / 3) = 3$) and does not leave a fraction.

④ Before the rules set in ③ above, divisor had been changed in case of the change in the stock price due to non-market reasons such as stock split. However, by large scale splits or reverse splits, levels of the stock prices change widely and the continuity of the index can not be warranted if the index is adjusted by the divisor. For this reason, presumed par value is changed to keep the stock price level unchanged and so, the divisor is not adjusted. Changes in the presumed par value are announced for each case.

⑤ Example of presumed par value change

Suppose a constituent A has a price of 300,000 yen and the presumed par value of 50,000 yen. Price of the stock A for the calculation is adjusted to 300 yen ($=300,000 \times 50 / 50,000$). If the stock A goes a split of 1 to 1000, theoretical price will be 300 yen on condition that the presumed par value is not changed, the price for the calculation will be 0.3 ($=300 \times 50 / 50,000$). Divisor will be modified in accordance with its price change and the weight of stock A in the index will become

much smaller.

In contrast, if the presumed par value is changed in proportion to the split, i.e. 50 yen (=50,000 / 1000), the price of stock A in the index stays at 300 yen, which is the same price as the pre-split. Divisor need not be changed in this case.

(3) Divisor

The Nikkei225 is calculated as adjusted price average where the weight is based on the presumed par value, which reflects the Japanese market conventions. This is basically an arithmetic average and the denominator used to be a number of constituents initially. Since then, there have been stock splits, reverse splits and changes in the constituents, and the denominator has been adjusted to maintain the continuity in the index. This denominator is called the “Divisor”. Adjusting the divisor in the index is the nature of the “Dow” method and the Nikkei225 is called a “Dow adjusted average”. This is named after Charles Dow who pioneered the “Average stock price” in 1896 although his price was just an average and it was 1928 when editors of the Wall Street Journal actually started to adjust the divisor. The DJIA (Dow Jones Industrial Average) uses the same methodology for its calculation.

When a stock goes split or reverse split, the level of stock price changes. Also, when constituents are changed, the sum of stock prices (=numerator) changes by the prices of additions and deletions. If the denominator is not changed in such cases, the index today will be different from the closing index on the previous day even if the prices of all individual constituents are the same.

To keep the index unchanged from such non-market events, the divisor is also changed. For the Nikkei225, presumed par value may be changed for large scale splits and reverse splits. Divisor is not changed in such cases.

Points on the divisor change

① Divisor is changed when the following events happen.

i) Changes in the constituents

ii) Corporate action such as split, reverse split, paid-in capital increase. However, when the split or the reverse split is in the large scale, presumed par value may be adjusted and the divisor may not be changed.

② Calculation of the divisor change is as follows.

Divisor tomorrow = Divisor today x sum of base prices for the next day constituents /
sum of “closing prices” of today’s constituents

For base prices, see 3-(1) above.

“Closing prices” indicate the prices used to calculate the closing index

Base prices for the next day constituents

i) Stocks included today and next day in the index whose prices are NOT changed for non-market reasons :

Use prices for the calculation on the today’s index closing;

ii) Stocks included today and next day in the index whose prices are CHANGED for non-market reasons :

Use theoretical prices based on today’s prices, i.e. ex-rights theoretical prices (ex-dividend is not treated as the ex-rights);

For the base prices for the next day constituents when the presumed par value is changed, the base price will be the same as the closing price and so, the divisor needs not be changed.

iii) Stocks to become new constituents from next day

Use prices to obtained by i) or ii), supposing that the stocks are constituents today

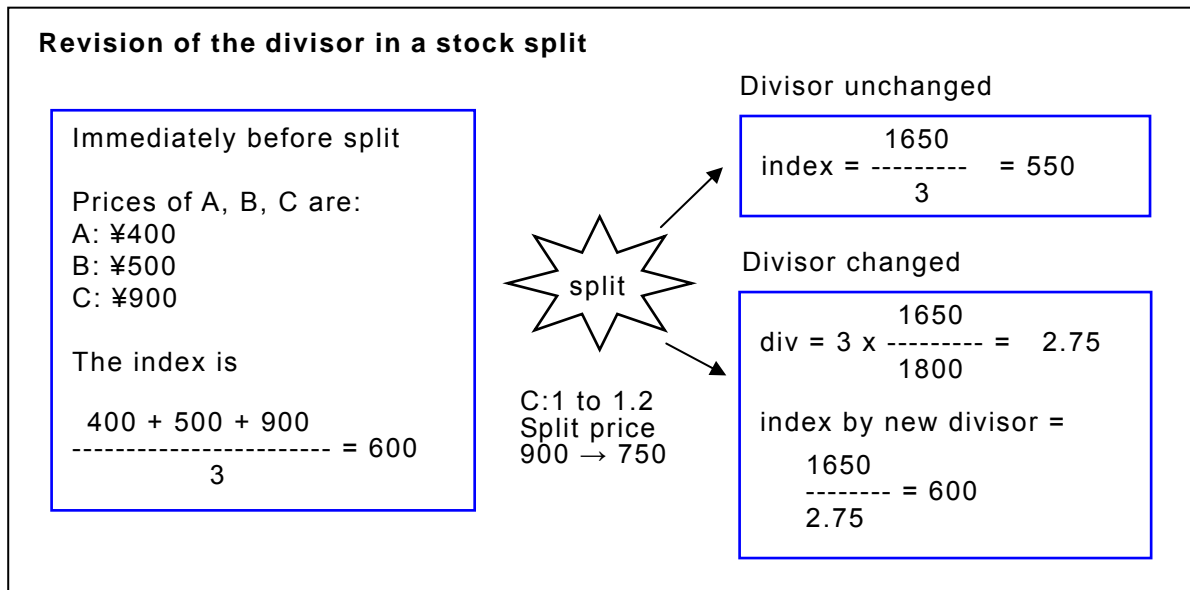
③ 4th digit is rounded to make the divisor to have 3 digits after the decimal point.

④ Example of the divisor change

i) For stock splits

Suppose there are only three constituents -- A, B and C. Stock A trades for 400 yen, B for 500 yen and C for 900 yen. The presumed par value of these stocks is 50 yen, which means these original prices are used for the calculation. The combined price of the stocks is 1,800 yen and the initial divisor is 3, putting the index at 600. If stock C splits 1 to 1.2, the theoretical price changes to 750 yen (900/1.2). Without a revision to the divisor, the new total would be 1,650 yen, yielding a lower index of 550. The lower index is due to C’s stock split and does not reflect actual price fluctuations in the market. In this case, looking only at the index can be misleading because it does not tell us whether the overall market is actually falling or not

To prevent this distortion, the divisor is revised down in proportion to the ratio of 1,650 to 1,800 ($3 \times 1,650/1,800$) to 2.75. The new divisor keeps the index at 600, giving it continuity.



ii) For constituents change

Use the same example of stock A, B, and C as in i) above. Suppose stock A is delisted and deleted from the index and stock D is added, price of which is 1,000 yen and the presumed par value is 50 yen. This changes the aggregate price of stock B, C and D to 2,400 yen. If the divisor is not adjusted (=3), the index will yield 800, by 200 yen up from 600. This is due to the constituent change and does not mean the movement of the market. The new divisor shall be 4 (= 3 x 2400 / 1800) to maintain the continuity of the index at 600 (=2400 / 4).

(4) Miscellaneous

① Calculation day and time:

Trading day and hours for stocks on the Tokyo Stock Exchange

② Calculation intervals:

Every 5 seconds since July 18, 2017. From January 4, 2010 to July 14, 2017, 15 seconds intervals and before then, 1 minute intervals. The opening price is currently calculated at 5 seconds past 9 am.

③ Digits after the decimal point

2 (3th digit is rounded)

④ Real time (Intraday) calculation

Intraday calculation started on Monday, March 25, 1985 (1 minute intervals). Since then there are open, high, low, close index. Before, there were only close of the day.

4: Others

(1) Index License

The Nikkei Stock Average is a copyrighted material calculated in a methodology independently developed and created by Nikkei Inc. (“Nikkei”) and Nikkei is the sole exclusive owner of the copyright and other intellectual property rights in the Nikkei Stock Average itself and the methodology to calculate the Nikkei Stock Average.

Commercial use of the Nikkei Stock Average must be licensed by Nikkei. Such uses include, but not limited to, provision of derivative products such as futures and options, creation and marketing of linked funds or linked securities, or distribution of the index for the data and analytic services.

(2) Disclaimer

Nikkei has no obligation to publish the Nikkei Stock Average continuously, and Nikkei is not responsible for any error, delay or omission in the Nikkei Stock Average. Nikkei is entitled to change the details of the Nikkei Stock Average and to suspend or stop the calculation and the announcement of the index.

Although, in principle, the Nikkei Stock Average is calculated and maintained in accordance with the information provided here, Nikkei has discretion to take measures Nikkei deems appropriate when the events which are not covered in this document happen or under the circumstances where it is difficult to continue to calculate the index using the current rules

In addition, the specifications described may be amended without notice. Nikkei does not assume any loss or damage caused by the use of this document.

This English document may not be an entirely accurate translation of the original Japanese document. In any case where differences arise between the English version and the original Japanese version, the original Japanese document will prevail.

(3) Contact

Index Business Office, Nikkei Inc.

Tel: +813-6256-7341, mail: index@nex.nikkei.co.jp

Appendix : Change history of Index Guidebook

December 30, 2011 version	Initial version
July 18, 2017 version	Due to the calculation intervals change(every 5 sec.), revise the description in “3:Calculation method (4) Miscellaneous”

Nikkei Stock Average Constituents Selection Rules (Since February 1, 2002)

Stocks are added to or deleted from the Nikkei Stock Average (Nikkei225) in accordance with the following rules. These rules shall become effective from February 1, 2002. These rules are subject to change to make index better follow the market and to deal with necessary changes in the markets, economic substance, or regulations.

1: Constituents

The Nikkei225 is calculated with 225 market representative stocks from the Tokyo Stock Exchange First Section.

By calculating with highly liquid stocks, the index is aimed at fulfilling two objectives, one is to maintain its long-term continuity and the other is to reflect the changes in the industry structure.

2: Rules of the Periodic Review

Constituents are reviewed annually in accordance with the following rules. Results of the review become effective on the first trading day of October and there is no limit to the number of constituents reshuffled.

(1) Assessment of the liquidity (“High Liquidity Group”)

Choose highly liquid stocks from the Tokyo Stock Exchange First Section and group them as the “High Liquidity Group”. The measures to assess the liquidity are :

- ① Trading value of the preceding 5 years
- ② Magnitude of price fluctuation by volume in the preceding 5 years.

Top 450 (double the constituent count for the index) most liquid stocks in terms of two measures constitute the “High Liquidity Group”.

(2) Deletion of low liquidity constituents (absolute criteria for deletion)

Those constituents not in the High Liquidity Group (ranked 451 or lower) are deleted from the index.

(3) Addition of high liquidity stocks (absolute criteria for addition)

Of the “High Liquidity Group” stocks, those ranked 75th or higher and not currently in the list of the constituents are added to the index.

(4) Deletion/Addition based on the sector balance (relative criteria)

① The 450 most liquid issues will be categorized into six industrial sectors – Technology, Financials, Consumer Goods, Industrial Materials, Capital Goods/Others and Transportation/Utilities. The “Appropriate number of the constituents” is defined as half of the number of stocks in each sector.

② After the changes by (2) and (3) are considered, a rebalancing is conducted if any of the sectors are over-represented or under-represented. Degree of representation is evaluated by comparing the actual number of constituents in the sector against the “Appropriate number”.

i) For over-represented sectors, current constituents in the sector are deleted in the order of the liquidity (low liquidity first) to correct the overage.

ii) For under-represented sectors, non-constituent stocks are added from the “High Liquidity Group” in the order of the liquidity (high liquidity first) to correct the shortage.

③ The six-sector breakdown is based on the Nikkei industrial classification of 36 industries. Each sector may be regrouped if a change in industrial structure makes adjustment necessary.

i) Technology

Pharmaceuticals, Electric Machinery, Automobiles & Auto parts, Precision Instruments, Communications

ii) Financials

Banking, Other Financial Services, Securities, Insurance

iii) Consumer Goods

Fishery, Foods, Retail, Services

iv) Materials

Mining, Textiles&Apparel, Pulp & Paper, Chemicals, Petroleum, Rubber, Glass&Ceramics, Steel, Nonferrous Metals, Trading Companies

v) Capital Goods / Others

Construction, Machinery, Shipbuilding, Transportation Equipment, Other Manufacturing, Real Estate

vi) Transportation / Utilities

Railway&Bus, Land Transport, Marine Transport, Air Transport, Warehousing,

3: Extraordinary Replacement Rules

(1) Deletion for special reasons

Constituents removed from the Tokyo Stock Exchange First Section due to the reasons below and others are deleted from the index.

- i) Designated to “securities to be delisted” or delisted due to bankruptcy, including filing for Corporate Reorganization Act, Civil Rehabilitation Act, or liquidation
- ii) Delisted due to corporate restructuring such as merger, share exchange or share transfer
- iii) Designated to “securities to be delisted” or delisted due to excel debt
- iv) Transfer to the Second Section

The constituents designated to the “securities under supervision” become deletion candidates. However, decision to delete such candidates will be made by examining the sustainability and the probability of delisting of the individual case.

(2) Procedure to add new constituents

When a constituent is deleted because of the reasons of (1) above, a stock to be added will be selected, in principle, from the same sector in the “High Liquidity Group” in the order of liquidity.

Notwithstanding the preceding paragraph, following rules may apply depending on the timing and circumstances of the deletion.

- ① When such deletion is scheduled close to the Periodic Review, additional stocks may be selected in a part of the periodic review process.
- ② When multiple deletions are scheduled in a season other than the Periodic Review, additions may be selected using (3) and (4) of Periodic Review Rules by assessing the liquidity and the balance of the sectors.

(3) Timing of the constituents change

In principle, constituents are changed on the day when the event to delete the constituents takes place. However, to make the news of the constituents change widely known, time may be taken before the changes become effective, especially when the event such as bankruptcy happens suddenly. Also, additions are made after some period of time in principle.

(4) Special rules for additions

As the types of corporate reorganization diversify, procedures as exemplified below, which follows the reality better, may be applied to choose the stocks to be added. Application of these special rules is determined for each case.

① Under the following cases, a stock of a company which will succeed the substance of the delisting company will be added in principle, provided such company must be listed or will be listed within a short period in the Tokyo Stock Exchange First Section.

- i) Stock of a surviving company in mergers where a constituent is merged and delisted.
- ii) Stock of a newly established parent company by share transfer or a new parent company receiving shares from a constituent by exchange.

② When a company is split and multiple companies maintain listing in the Tokyo Stock Exchange First Section, a stock of a company which succeeds the major operation will become a constituent.

4: Special procedures to implement constituents changes

For both “2. Periodic Review” and “3. Extraordinary Replacement”, deletion and addition are made effective on the same day to keep the number of constituents at 225. However, when necessary, as exemplified below, additions are made after the deletions and during such period, the index may be calculated with less than 225 constituents. Divisor is adjusted at times when constituents are deleted or added to warrant the continuity.

① When a constituent is delisted by share exchange or transfer and the succeeding company such as the newly formed parent company or an unlisted company which becomes the parent by receiving the shares become listed in a short period of time.

② When a constituent is deleted due to sudden announcement of bankruptcy or designation to the “security to be delisted”, and such constituent is promptly deleted but the new constituent is added after a short period of notice.

5: Decision of the deleting and adding stocks

After consultation with academics and market professionals, Nikkei Inc. decides and announces the list of deleting and adding stocks.