

Nikkei Stock Average Index Guidebook

Nikkei Inc.

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(June 15, 2020 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 as a “Securities to be delisted”
- ii) Delisted due to corporate restructuring such as merger, share exchange or share transfer
- iii) Transfer to the Second Section

A constituent designated as “a security under supervision” remains to be a constituent at the time of designation. However, Nikkei may replace such a constituent with a

pre-announcement when it is highly inappropriate to keep the stock as a constituent, e.g. probability of delisting is extremely high.

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, for each reason under 3(1), constituents are deleted and added as follows.

The effective date is announced for each event.

- i) Designated as a “Security to be delisted”: five business days after the designation.
- ii) Delisted due to corporate restructuring such as merger, share exchange or share transfer and
- iii) Transfer to the Second Section: effective date of the event.

In case that a constituent designated as a stock under supervision is deemed as highly inappropriate and will be deleted, the announcement will be made approximately two weeks before its effective date. Even if such a constituent is designated as a stock to be delisted before the pre-announced effective date, the pre-announced effective date survives.

(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.

- 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.

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.

$$\text{Adjusted stock price} = \text{stock price} \times 50(\text{yen}) / \text{presumed par value (yen)}$$
$$\text{Nikkei Stock Average} = \text{sum of Adjusted stock price} / \text{Divisor}$$

(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 had been 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 was 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, Tokyo Electric Power Company Holdings has a presumed par value of 500 yen. The price used for the calculation becomes $1/10 (= 50 / 500)$ 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.

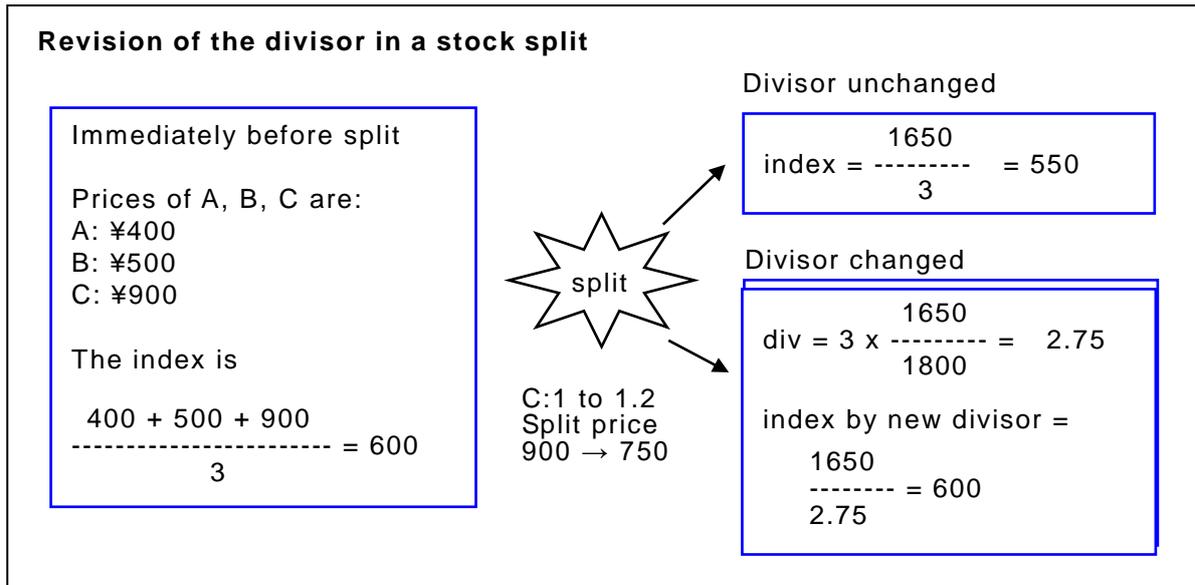
④ Example of the divisor change

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 ($= 3 \times 2400 / 1800$) to maintain the continuity of the index at 600 ($=2400 / 4$).

(4)Miscellaneous

①Calculation day and time:

Trading day and hours for stocks on the Tokyo Stock Exchange

②Calculation 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

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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”
June 15, 2020 version	<ul style="list-style-type: none"> - Revise the description in “2: Constituents Management (3)Extraordinary Replacement ①Events of subjects and ⑤Effective dates for constituent changes” - Delete an example in “2: Constituents Management (4)Notes for the constituents management ③General matters” - Revise an example in “3: Calculation method (2)Presumed par value”