

Nikkei Stock Average Index Guidebook

(Tentative Version, to be effective from October 1, 2021)

Nikkei Inc.

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(July 5, 2021 creation)

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 and calculated as an adjusted price weight index.

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. It was retroactively calculated back to May 16, 1949 which is the day the Tokyo Stock Exchange reopened for the first time after the Second World War. The index has been calculated and published by Nikkei since 1970, succeeding it from 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 reshuffled based on the following rules. There are two types of changes in the constituents. One is “Periodic Review” conducted once a year, and the other is “Extraordinary Replacement” where the vacancies of the constituents created by delisting or other reasons are filled.

Current rules were originally announced on April 15, 2000 and became effective from April 24 of the same year. There have been some amendments to date. This section is a summary of the constituents management and the official text is found in the “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 with a base date at the end of July, and the result becomes effective in 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 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.

④Final 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

①Reasons for deletion

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.

②Rules 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 time of 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 is 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 are 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 of constituent changes

In principle, for each reason under 3(1), constituents are deleted and added as follows. The exact 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 on 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) The maximum number of the constituents changed is 3. However, constituent change due to corporate reorganization near the time of periodic review is not included in the limit of 3.

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.

- A constituent company may be delisted when it establishes a parent company by a share transfer or becomes a subsidiary of an unlisted company by a share exchange. If a new parent company is deemed to be succeeding the business of the delisted company, such a new company may become a new constituent if it becomes listed. In such a case, during the period between delisting of the original company and listing of the new succeeding company, the index may be calculated with constituents less than 225.

3: Calculation method

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

$$\text{Adjusted stock price} = \text{stock price} \times \text{price adjustment factor}$$
$$\text{Nikkei Stock Average} = \text{sum of Adjusted stock price} / \text{Divisor}$$

(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
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Take an example of 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, 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 for 1 to 1.1 split today, the theoretical price for today is 909.1 yen ($=1000 / 1.1$) and this is the theoretical price for this constituent.

Also note that ex-dividend is not treated as an ex-right for the calculation of the

Nikkei225.

(2) Price Adjustment Factor

Price adjustment factor (PAF) is a number which adjusts price of the constituents. PAFs are set and revised as follows.

① Setting PAF

The PAF of a stock to be added to the Nikkei 225 is 1. However, the value other than 1 (0.1 to 0.9) may be assigned provided that the price of such stock exceeds 1% of the sum of constituent prices. It is set at the highest value which does not exceed 1% of the sum of the prices by 0.1 interval.

$$\text{PAF} = \frac{\text{sum of Adjusted stock price of the constituents} \times 1\%}{\text{the stock price of the new constituent}}$$

Note) PAF is evaluated on the base date and rounded down to the nearest 0.1.

When a stock of a newly established holding company is added replacing the delisting original company, value other than 1 may be set in accordance with the ratio of stock transfer, etc. in the establishment of the holding company.

Also note that if the stock price of the new constituent fluctuates drastically after the base date until the effective date of the change, the PAF may be adjusted. In this case, such an adjustment will be announced at least 5 business days before the effective date in principle.

② Revising PAF

PAF is revised under the following situation.

- Large-scale stock split or reverse split

When a constituent goes for a large-scale stock split or reverse stock split, PAF is revised to keep the price level of such a constituent unchanged. However, since the PAF has only 1 digit after the decimal point, above adjustment calculation might result in a fraction. Also, if a result of calculation is less than 0.1, PAF will be set as 0.1. In these cases, the adjusted price before and after the split/reverse split are different. Such difference will be adjusted by divisor. Revision of PAF under large scale stock split or reverse split will be announced at least 5 business days before the effective date in principle.

[Note]

Japanese stocks used to have “par value”, which was abolished in October 2001. Before October 2001, stock prices were adjusted to the par value of 50 yen, which was a standard par value in the market. After abolishment of par value, “presumed” par value, which modeled after the “par value” was defined, and the stock prices were adjusted to presumed par value of 50 yen. At the time of introduction of the price adjustment factor (October 1, 2021), the price adjustment factor was set, in principle, based on then prevailing presumed par value so that the adjusted price by both methods are the same.

(3) Divisor

The Nikkei225 is calculated as adjusted price average where the weight is based on the price adjustment factor. This is basically an arithmetic average and the denominator was 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 of the index. This denominator is called the “Divisor”.

When a stock goes for a 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 changed. The price adjustment factor may also be changed for large scale splits and reverse splits to keep its continuity.

Points on the divisor change are as follows.

① Divisor is recalculated 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 a large scale, the price adjustment factor may also be adjusted. The divisor may not be changed so long as the adjusted price is unchanged before and after such split/reverse split.

② Calculation of the divisor change is as follows.

$$\text{Divisor tomorrow} = \text{Divisor today} \times \frac{(\text{sum of "base price for the next day constituents"})}{(\text{sum of "closing price of today's constituents"})}$$

“Closing price of today’s constituents”: the price used to calculate the closing index on the last day before an event (= today).

“Base price for the next day constituents”:

- i) For stocks continue to be constituents over the event and the price of which are NOT changed by non-market reasons :
Same price as the “closing price of today’s constituents”.
- ii) For stocks continue to be constituents over the event and the price of which are CHANGED by non-market reasons :
Ex-rights theoretical price (ex-dividend is not treated as the ex-rights) multiplied by the price adjustment factor for the next day. (*)
- iii) For stocks to become new constituents from the next day:
Price obtained by i) or ii)

(*) When the price adjustment factor is changed in line with a large-scale stock split/reverse split, the price change triggered by the split/reverse split is offset and the base price for the next day will be the same as the closing price today unless the calculation of the new price adjustment factor results in a fraction, i.e. non-zero second digit under the decimal which is rounded down.

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

(4) Miscellaneous

① Calculation day and time:

On trading day and during trading hours of the Tokyo Stock Exchange

② Calculation intervals:

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

③Digits after the decimal point:

2 (3th digit is rounded)

④Real time (Intraday) calculation:

Intraday calculation started on Monday, March 25, 1985 (1-minute interval). Since then there are open, high, low indices in addition to the close.

4: Others

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(3) Contact

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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 ① Events of subjects and ⑤ Effective dates for constituent changes” • Delete an example in “2: Constituents Management (4)Notes for the constituents management ③ General matters” • Revise an example in “3: Calculation method (2) Presumed par value”
October 1, 2021 version (tentative)	<ul style="list-style-type: none"> • Revise “2: Constituents Management,(4) Notes, ① About Periodic Review” (maximum number of constituent change is added) • Replace “3: Calculation Method, (2) Presumed par value” by “3: Calculation Method, (2) Price Adjustment Factor” • Revise “3: Calculation Method, (3) Divisor, ② Calculation of the divisor change • Replace “Presumed par value” by “Price adjustment factor” throughout the text. Delete and revise explanations of the presumed par value.