Nomura AI Companies 70

EQUITY: INDEX SERVICES DEPARTMENT

Index rulebook

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Nomura AI Companies 70

The Nomura AI Companies 70 is an equally weighted index made up of 70 stocks of companies covered by the media in connection with business related to artificial intelligence.

Stocks for inclusion in the index are selected from all common stocks listed on exchanges in Japan with quantitative valuation indicators based on the results of searches for articles/reports from TV news, magazines, newspapers, and other media. "Artificial intelligence" and several related keywords selected with the use of AI are employed in the search for articles.

Index characteristics

- 70 stocks are selected with quantitative valuation indicators based on results of searches for articles reported via TV news, magazines, newspapers, or other media.

- By making it an equally weighted index, a flat rate of investment is made in not only large cap but also small cap artificial intelligence-related stocks.

- Stocks with excessively small market caps and low liquidity are excluded from consideration in view of investability.

- Constituent stocks and AI-related keywords used to search for articles are each reconstituted once a year.

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1. Periodic reconfigurations

1.1 Periodic reconfiguration date

Periodic reconfigurations take place once a year, on the first business day of December, and reconfiguration is carried out after the close of trading on the business day preceding the periodic reconfiguration date.

1.2 Periodic reconfiguration base date

The reconfiguration base date is the 15th of the month, two months before the periodic reconfiguration date[1] (or the preceding business day if the 15th is a non-business day). Constituent stocks and the number of shares in each constituent stock to be included in the index following its periodic reconfiguration are determined on the basis of calculations using data as of the reconfiguration base date.

1.3 Announcement of periodic reconfigurations

As a general rule, an announcement will appear on our website 10 business days before a periodic reconfiguration around 16:00 (JST), except in cases of unforeseen circumstances or when information cannot be confirmed.

Nomura Fiduciary Research & Consulting Co., Ltd. ("NFRC") Website:

https://www.nfrc.co.jp/SMI/jp/nmai/index.html (Japanese only)

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[1] This rule was adopted starting with December 2009 periodic reconfigurations. Periodic reconfigurations for December 2008 and before were performed using data from the last day of the month preceding the periodic reconfiguration date (or the preceding business day if the last day of the month was a non-business day).

2. Stock selection and index construction method

2.1 Stock selection universe

The universe of stocks eligible for inclusion in the index includes, out of all stocks listed on Japanese stock exchanges[2] as of the end of March in the year before the periodic reconfiguration base date, the top 98% of stocks in terms of free float–adjusted market cap as of the periodic reconfiguration base date. Of the stocks that were listed in or after April and before the end of September in the year before the periodic reconfiguration base date, those in approximately the top 85% in terms of free float–adjusted market cap and newly merged stocks are also included in the stock selection universe.

The index excludes stocks that meet the following criteria as of the periodic reconfiguration base date.

- Equities other than common stock
  As a general rule, only common stock is included in the stock selection universe. However, exceptions to this rule will be made if necessary.

- Stocks assigned for delisting
  Stocks assigned for delisting are not included in the universe.

- Stocks under supervision (examination) and stocks under supervision (confirmation)
  Stocks under supervision (examination) and stocks under supervision (confirmation) that are not part of the index composition immediately prior to regularly scheduled reconfigurations are not included in the universe.

- TOB target companies[3]
  Stocks that are the targets of tender offers (ie, TOBs) may be excluded from the universe of stock selection only if all of the following requirements are met:
  (1) The company conducting the tender offer plans to acquire all the outstanding shares in the target company; and
  (2) The company conducting the tender offer is planning to acquire all of the stock of the target company in exchange either for money or its own stock and the target company agrees to the offer.

- Listed investment trusts/REITs

- Foreign stocks
  Stocks listed on foreign sections of Japanese exchanges or stocks regarded as overseas companies are excluded, even if these stocks are traded in the Japanese market.

- Others
  Latent stock, warrants, and rights on them are excluded. The Bank of Japan is also excluded.

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[2] Tokyo Stock Exchange (Prime Market, Standard Market, Growth Market, TOKYO PRO Market), Nagoya Stock Exchange, Sapporo Securities Exchange, and Fukuoka Stock Exchange.
[3] This rule applies from the December 2016 periodic reconstitution.

2.2 Score calculation universe

Using data as of the periodic index reconfiguration base date, stocks within the stock selection universe that meet the following criteria are eligible for inclusion in the score calculation universe.

- From the stock selection universe, we select the top 90% of stocks in terms of average market turnover over the past 60 days.

2.3 Stock selection method

AI ranking score

(1) Searches for AI-related articles and reports are conducted for stocks in the score calculation universe. Searches target articles including both the stock's ticker code and "artificial intelligence," using the search parameter below.
Parameter for AI article searches: [stock ticker code] AND "artificial intelligence"

(2) We determine the AI article score for the most recent year for stocks in the score calculation universe based on the number of AI articles in the search results over the past year up to the day before the periodic reconfiguration base date. We then determine the AI article score for one year earlier based on the number of AI articles in the search results over the year from the periodic reconfiguration base date two years earlier through the day before the periodic reconfiguration base date one year earlier[4].

(3) We determine the AI ranking score by ranking the stocks in the score calculation universe (in ascending order) based on a weighted score calculated as (AI article score for the most recent year x 2) + (AI score for one year earlier).

Related keyword ranking score

(1) We conduct searches for articles and reports containing related keywords for stocks in the score calculation universe. Searches target articles that include both the stock's ticker code and a related keyword, but that do not include "artificial intelligence," using the search parameter below. We search for articles containing any of the keywords in the list of related keywords (combining all the keywords in the set using OR).

Parameter for related keyword searches:
[stock ticker code] AND [any keyword on the list of related keywords] NOT "artificial intelligence"

(2) We determine the related keyword article score for the most recent year for stocks in the score calculation universe based on the number of articles containing related keywords in the search results over the past year up to the day before the periodic reconfiguration base date. We then determine the related keyword article score for one year earlier based on the number of articles including related keywords in the search results over the year from the periodic reconfiguration base date two years earlier through the day before the periodic reconfiguration base date one year earlier[3].

(3) We determine the related keyword ranking score by ranking the stocks in the score calculation universe (in ascending order) based on a weighted score calculated as (related keyword article score for the most recent year $\times$ 2) + (related keyword article score for one year earlier).

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[4] Prior to the December 2016 periodic reconfiguration, we determined the AI article score for the most recent year based on the search results over the year beginning the day after the previous year's periodic reconfiguration base date through that year's periodic reconfiguration date and determined the score for one year earlier based on the search results over the year from the day after the periodic reconfiguration base date two years earlier through the periodic reconfiguration base date one year earlier.

Stock selection

(1) We select the top 10 stocks based on AI ranking score. If there are multiple stocks with scores putting them in the top 10, we select up to 70 stocks at those scores in order of average market turnover over the past 60 days.

(2) If the number of stocks selected by method (1) does not reach 70, we select the remainder from stocks not already selected, in order of the average score for AI ranking and relevant keyword ranking, to bring the total number of selected stocks to 70. If there are multiple stocks with average ranking scores putting them in the top 70, we select the top stocks based on AI ranking score. If the above criteria still yield multiple stocks with AI ranking scores putting them in the top 70, we select the top 70 stocks in order of average market turnover over the past 60 days. Average ranking scores are determined using the following formula.

Average ranking score = (AI ranking score + relevant keyword ranking score) ÷ 2

Fig. 1: Composition of the Nomura AI Companies 70
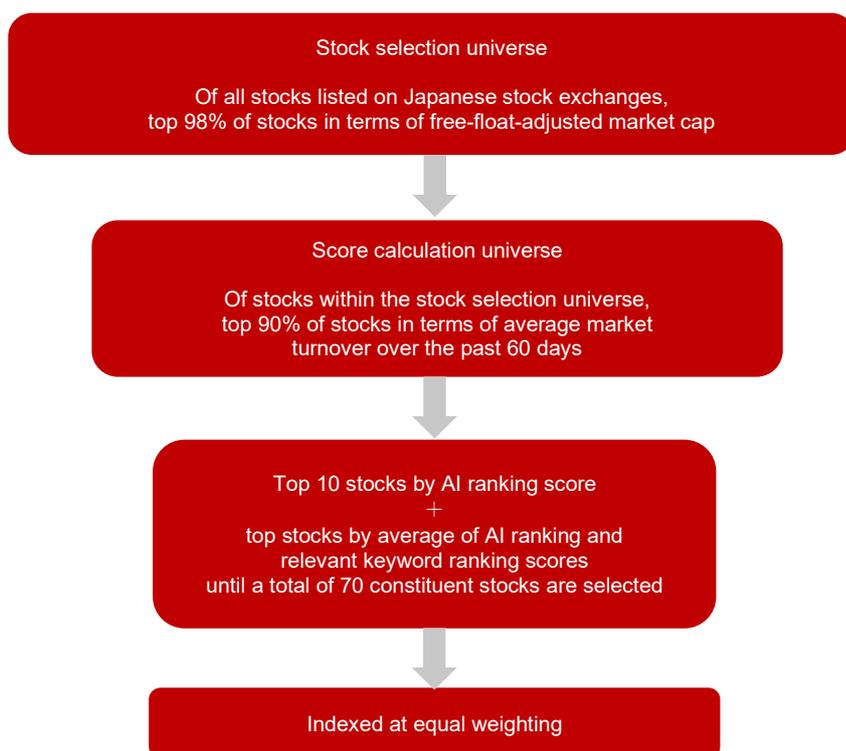
Note: See the main text of this report for details on exception handling and index construction methods.
Source: NFRC

2.4 Weighting of constituent stocks and number of shares per stock

On the date for periodically reconfiguring the index as set out in [1.2 Periodic reconfiguration base date], the 70 constituent stocks selected according to [2.3 Stock selection method] are weighted equally. The number of shares per stock on that day is calculated by dividing the market capitalization of the index on that day by the number of constituent stocks (ie,70) and then dividing that amount by the Nomura composite share price at the close of trading. Adjustments to the number of shares per stock are made in accordance with [4.4 Index maintenance] until the next periodic reconfiguration date.

Nomura composite share price

The Nomura composite share price is the name given to the share price on the stock exchange selected for each stock on the basis of trading frequency and volume over the preceding 60 trading days. As a general rule, the exchange is selected on a daily basis. The share price is selected according to the following order of precedence:

Contract price on selected exchange (see note) > standard price on selected exchange > Nomura composite share price on previous business day

Note: Priority is given to the final special quote price when the market closed with a special quote.

2.5 Search criteria

Articles are searched using Nikkei Telecom according to the following criteria:

(1) Search mode (include all words)

(2) Match mode (exact match)

(3) Search range (headlines, text, keywords, categories)

(4) Synonymous expansion, no thesaurus expansion

(5) Exclude obituaries and articles on personnel matters (Nikkei publications), articles consisting solely of numerical tables (Nikkei publications), and articles from the sports section (Nikkei publications)

(6) The category "newsflash" is excluded from the articles to be searched.

2.6 Reviewing and announcing related keywords

Related keywords may be reviewed annually on 15 June (or the preceding business day if the 15th is a non-business day). As a rule, the results will be announced on NFRC Website on 15 August (or the preceding day if the 15th is a non-business day). However, this will not apply in the event of unforeseen circumstances or when information cannot be confirmed. NFRC Website: https://www.nfrc.co.jp/SMI/jp/nmai/index.html (Japanese only)

Related keywords for possible addition or revision are selected[5] once a year.

Keywords are selected for their relevance to AI on the basis of (1) material on AI published by government departments and research organizations during the preceding five years from 1 April five years ago to 31 March of the current year and (2) internal criteria.

The following examples are related keywords selected in 2016 (Fig. 2).

Fig. 2: Related keywords selected in 2016

Deep learning, machine learning, big data, IoT, robotics, data mining,

sensor, cyber security, robot, autonomous driving

Note: Allowance is made for minor variations in how the Japanese equivalents of some of the above terms written in katakana are spelled.
Source: NFRC

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[5] Specific selection criteria are not disclosed for IP protection purposes.

3. Unscheduled reconfigurations

3.1 Response to stock swaps, stock transfers, mergers, etc[6]

Temporary exclusions of stocks from the index are avoided and the consistency of index constituents is maintained based on the following rules.

3.1.1 Stock swaps and absorption-type mergers

When a stock is delisted because it is about to become a wholly owned subsidiary or be merged into another company (hereinafter, merged company), it is included in the index after delisting but removed from the index on the listing change date (or on the following business day if this is a non-business day). Following its delisting, and until its removal from the index, the merged company's valuation is based on the market value of the company that will become the parent company or the surviving company multiplied by the exchange or merger ratio. Also, the index inclusion ratio of the parent company or surviving company is changed on the listing change date (or on the following business day if this is a non-business day) based on the exchange or merger ratio.

3.1.2 Stock transfers and consolidation mergers

When an unlisted parent company or surviving company in a merger (hereinafter, surviving company) assumes the operations of another company and becomes listed after a short period of time, the merged company is removed from the index on the new listing date of the surviving company (or on the following business day if this is a non-business day). The price used for the delisted merged company is the price on the day before its delisting. Also, the price used for the surviving company is the price on its new listing date. However, if the surviving company will not be included in the index after periodic reconfiguration, the merged company is removed from the index on the delisting date.

3.2 Removal of stocks

3.2.1 Designation as securities to be delisted

Stocks designated as securities to be delisted are removed from the index four business days later (or on the following business day if this is a non-business day). However, stocks that are listed on more than one market and not designated for delisting on one or more of the markets will not be removed.

3.2.2 Delisting

Stocks delisted for reasons other than those cited in 3.1 Response to stock swaps, stock transfers, mergers, etc are removed from the index on the delisting date.

3.2.3 Marked loss of eligibility for inclusion in stock selection universe

In the case of an event that is considered to put the constituent stock in violation of the criteria defined in 2.1 Stock selection universe, the stock may be removed from the index following an official announcement by the company in question, the stock exchange, or a government/regulatory agency. However, if the grounds for the stock's removal from the index no longer apply at a later date, it will stop being regarded as ineligible for inclusion in the stock selection universe at the time of the next periodic reconfiguration.

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[6] This rule applies from April 2002.

4. Index calculation

4.1 Index base date, base value, announcement date

The base date for the Nomura AI companies 70 is 30 November 2001 and the value of the index on the base date (base value) is 10,000.

Publication of index values starts on 18 January 2017.

4.2 Calculation of index values

To prevent index values from being affected by changes in market capitalization not related to market fluctuations, eg, changes in capital structure and index constituents, the index is calculated as follows[7] using base market capitalization. Subscript t indicates the current day and $t-1$ indicates the preceding business day.

Calculation of yen-denominated index values

- Index excluding dividends

$$\text{Base market cap}_t = \text{index market cap}_{t-1} + \text{adjusted market cap}_t$$

$$\text{Return}_t = \frac{\text{index market cap}_t}{\text{base market cap}_t} - 1$$

$$\text{Index value}_t = \text{index value}_{t-1} \times (1 + \text{return}_t)$$

- Index including dividends

$$\text{Base market cap}_t = \text{index market cap}_{t-1} + \text{adjusted market cap}_t - \text{adjusted total dividends}_t$$

$$\text{Return}_t = \frac{\text{index market cap}_t + \text{total dividentds}_t}{\text{base market cap}_t} - 1$$

$$\text{Index value}_t = \text{index value}_{t-1} \times (1 + \text{return}_t)$$

- Method for reflecting dividends

For the index including dividends, dividend data is reflected on the ex-dividend date. However, as the value of the dividend has not yet been determined on the ex-dividend date, the company's dividend forecast is used (if this is not available, the Toyo Keizai dividend forecast is used)[8] .In the event of a difference between the dividend forecast and the actual dividend, the base market capitalization is adjusted on the last business day of the month of the company's earnings announcement (if the company announces its earnings on the last business day of the month, the adjustment is made on the last business day of the following month). Also, if a dividend adjustment is required, the base market capitalization is adjusted on the last business day of the month when this becomes known (if this becomes known on the last business day of the month, the adjustment is made on the last business day of the following month).

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[7] Adjusted market capitalization in 4.2 Calculation of index values is calculated to reflect changes in market capitalization resulting from changes in the capital structure of index constituents or changes in market capitalization resulting from changes in the index constituents. Also, adjusted total dividends are calculated to reflect any differences between forecast and actual dividends that may occur.
[8] This rule applies starting from accounting periods ending end-December 2011. Actual dividends on ex-rights dates are used prior to this time.

- Indices based on dividends after tax

As dividends are subject to taxation, index values based on total dividends adjusted for tax are calculated using the following formula. Index values are calculated based on tax rates for Japanese residents[9].

$$\text{Tax adjusted base market cap}_t$$
$$= \text{index market cap}_{t-1} + \text{adjusted market cap}_t - \text{adjusted tax adjusted total dividends}_t$$

$$\text{Return}_t = \frac{\text{index market cap}_t + \text{tax adjusted total dividentds}_t}{\text{tax adjusted base market cap}_t} - 1$$

$$\text{Index value}_t = \text{index value}_{t-1} \times (1 + \text{return}_t)$$

Calculation of US dollar-denominated index values

US dollar-denominated index values are calculated using yen-denominated index values and the forex rate on the index base date, using the following formula. Index values excluding dividends and index values including dividends are calculated separately. The exchange rate used is the USD/JPY middle rate published by the BOJ (at 17:00).

$$\text{US dollar denominated index value} = \frac{\text{yen denominated index value} \times \text{forex rate on index base date}}{\text{forex rate}}$$

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[9] The tax rate for Japanese residents is 15.315% as of January 2017. Tax-adjusted total dividends are calculated by applying the tax rate on the business day before the ex-dividend date. The tax rate is revised on a quarterly basis (in January, April, July, and October).

4.3 Adjustment of base market capitalization

Base market capitalization is adjusted as follows if there are any changes in capital structure or index constituents (Fig. 3). However, base market capitalization is not adjusted to reflect changes in capital structure that do not involve payment, such as stock splits, reverse stock splits, and changes in face value, as these do not affect market capitalization.

Fig. 3: Timing of adjustments resulting from changes in capital structure

	Change in capital structure	Adjustment date	Share price used
Stock replacement	Stock transfer, stock swap, merger	Date of listing change	Previous day's price
	Corporate divestiture (company/division spinoff)	Ex-rights date	Not used[10]
	Stock replacement	Replacement date	Previous day's price
Capital increase	Rights offering	Ex-rights date	Issue price
	Gratis allocation of stock acquisition rights	Ex-rights date	Exercise price
	Gratis allocation of treasury stock	Ex-rights date	Previous day's price
	Public offering	Business day following payment date (listing date of new shares when settlement is on issuance date)	Previous day's price
	Capital increase via third-party placement	Five business days after date of listing change	Previous day's price
	Conversion of preferred stock	Last business day of month in which number of converted shares becomes known	Previous day's price
	Conversion of CBs	Last business day of month in which number of new shares for which rights were exercised becomes known	Previous day's price
	Exercise of stock acquisition rights		
	Corporate divestiture (new stock in continuing company)	Date of listing change	Previous day's price
Capital decrease	Retirement of treasury stock	Last business day of month following month of treasury stock retirement	Previous day's price
	Rights offering refusal	Last business day of month in which rights offering refusal is announced (or last business day of following month if announcement is within five business days of month-end)	Previous day's price
	Capital reduction with compensation	Effective date	Previous day's price
Other	Other adjustments	Other adjustments to base market capitalization, if required, are made on the last business day of the month of the disclosure of the relevant information (or the last business day of the following month if the disclosure is made within five business days of the month-end)	Previous day's price

Source: NFRC

[10] In the case of a corporate divestiture (company/division spinoff), the base market capitalization is adjusted for the reduction in capital. The reduction in capital is defined as follows:
(1) when the divesting entity does not announce the value of the divested division or of the shares of the divested (spun-off) company, capital is reduced by the amount by which the divesting entity's shareholders' equity is expected to be reduced and
(2) when the divesting entity does announce the value of the divested division or of the shares of the divested (spun-off) company, capital is reduced by the value of the division or the value of the divested company's shares multiplied by the total number of shares.

4.4 Index maintenance

Constituent stocks are replaced in periodic and unscheduled reconfigurations and when necessary for other reasons. In addition, when the following changes in capital structure result in a change in the number of shares outstanding for index calculation purposes, the index inclusion ratio is changed so that the number of shares in the stock that are included in the index does not change.

- Stock transfer, stock swap, merger[11]
- Rights offering
- Gratis allocation of stock acquisition rights
- Public offering
- Private placement
- Conversion of preferred stock
- Conversion of convertible bonds, exercise of stock acquisition rights
- Corporate divestiture (new stock in surviving company)
- Retirement of shares
- Rights offering refusal
- Capital reduction with compensation
- Other adjustments

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[11] When an index constituent becomes a wholly owned subsidiary (or merged company), the index inclusion ratio of the parent (or surviving company) is changed so that the total number of shares in the index remains the same as it was before, taking the exchange ratio (or merger ratio) into account.

5. Data publication services

Data for the Nomura AI Companies 70 index can be obtained via the following channels[12].

Index values will be published in the following media:

Bloomberg: NMRCJOAI <Index> (yen-denominated index excluding dividends)

NMRCJIAI <Index> (yen-denominated index including dividends)

NMRCNRAI <Index> yen-denominated index adjusted for tax on dividends (Net Total Return)

QUICK: NRIJ@

LSEG: .NAI70 (yen-denominated index excluding dividends)

.NAI70TR (yen-denominated index including dividends）

.NAI70NR (yen-denominated index adjusted for tax on dividends (Net Total Return))

Our website   https://www.nfrc.co.jp/SMI/jp/nmai/index.html (Japanese only)

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[12] Published data are all for reference only.

For further information on the index

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See the following link for details:

https://www.nfrc.co.jp/SMI/jp/guides/index.html

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- Conflicts of Interest Policy
- Index Calculation Policy
- Complaints Handling Policy