

Nomura Robot Companies 70 index

EQUITY QUANTITATIVE RESEARCH (INDEX)

Index rulebook

Nomura Robot Companies 70

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

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

Index characteristics

- 70 stocks are selected with quantitative valuation indicators based on the results of searches for articles/reports in TV news, magazines, newspapers, and other media.
- Because it is an equally weighted index, a flat rate of investment is made in both large-cap and small-cap robot-related stocks.
- Stocks with an excessively small market cap or low liquidity are excluded from the stock selection universe in view of investability.
- Constituent stocks and the robot-related keywords used to search for articles are each reviewed once a year.

The rebalancing band method is used to limit frequent replacements of stocks in periodic reconfigurations of the index

Global Markets Research

19 March 2019

Research analysts

Japan index products

Index Operations Dept. - NSC

idx_mgr@jp.nomura.com
+81 3 6703 3986

Japanese version published on
March 19, 2019

Production Complete: 2019-03-19 11:11 UTC

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1. Periodic reconfigurations

1.1 Periodic reconfiguration date

The periodic reconfiguration date is the first business day of December every year, 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 day of the month that is two months before the month of the periodic reconfiguration date¹ (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.

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 stock selection universe includes, out of all stocks listed on Japanese stock exchanges² as of the end-March preceding 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 preceding 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 stock selection universe 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 stock selection universe.

- **Stocks under supervision (examination) and stocks under supervision (confirmation)**

Stocks under supervision (examination) and stocks under supervision (confirmation) that are not included in the index immediately before the periodic reconfiguration are not included in the stock selection universe.

- **TOB target companies³**

Stocks that are the target of tender offers (ie, TOBs) may be excluded from the stock selection universe only if all of the following requirements are met:

(1) the tender offer close date falls between the stock selection universe determination date (the periodic reconfiguration base date) and the periodic reconfiguration date;

(2) the company conducting the tender offer plans to acquire all the outstanding shares in the target company; and

(3) 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.

² Tokyo Stock Exchange (1st Section, 2nd Section, Mothers, JASDAQ, TOKYO PRO Market), Nagoya Stock Exchange, Sapporo Securities Exchange, and Fukuoka Stock Exchange.

³ This rule applied from the December 2018 periodic reconfiguration.

2.2 Score calculation universe

Using data as of the periodic reconfiguration base date, stocks in the stock selection universe (see 2.1 Stock selection universe) that meet the following criteria are eligible for inclusion in the score calculation universe.

(1) Sector-based screening

Stocks in the stock selection universe that come under the "banks", "securities and commodities futures", "insurance", and "other financing business" sectors (based on the Tokyo Stock Exchange's 33 sector classifications) are excluded.

(2) Screening based on liquidity criteria

Following the sector-based screening, stocks that meet the criteria of being in the top 90% of stocks in terms of average market turnover over the past 60 days are included in the score calculation universe.

2.3 Stock selection method

Robot ranking score

- (1) Searches for articles containing the word "robot" are conducted for stocks in the score calculation universe. Searches target articles including both the stock's ticker code and the word "robot," using the search parameter below.

Parameter for robot article searches: [stock ticker code] AND "robot"

- (2) We determine the robot article score for the most recent year for stocks in the score calculation universe based on the number of articles containing the word "robot" in the search results over the year up to the day before the periodic reconfiguration base date. We then determine the robot article score for one year earlier based on the number of articles containing the word "robot" 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) We determine the robot ranking score by ranking the stocks in the score calculation universe (in ascending order) based on a weighted score calculated as (robot article score for the most recent year x 2) + (robot score for one year earlier).

Related keyword ranking score

- (1) We also conduct searches for articles 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 the word "robot," 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 "robot"

- (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 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) 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 x 2) + (related keyword article score for one year earlier).

Stock selection⁴

- (1) We select the top 10 stocks based on robot ranking score. If there are multiple stocks with scores putting them in the top 10, we select up to 150 stocks at those scores in order of average market turnover over the past 60 days.
- (2) If the number of stocks selected in (1) does not reach 150, we select the remainder from stocks not already selected as candidates, in order of the average of the robot ranking score and the related keyword ranking score, starting with the lowest, to bring the total number of stocks selected as candidates to 150. If there are multiple stocks with average ranking scores putting them in the top 150, we select the top stocks based on robot ranking score. If the above criteria still yield multiple stocks with robot ranking scores putting them in the top 150, we select the top 150 stocks in order of average daily market turnover over the past 60 days. Average ranking scores are determined using the following formula.

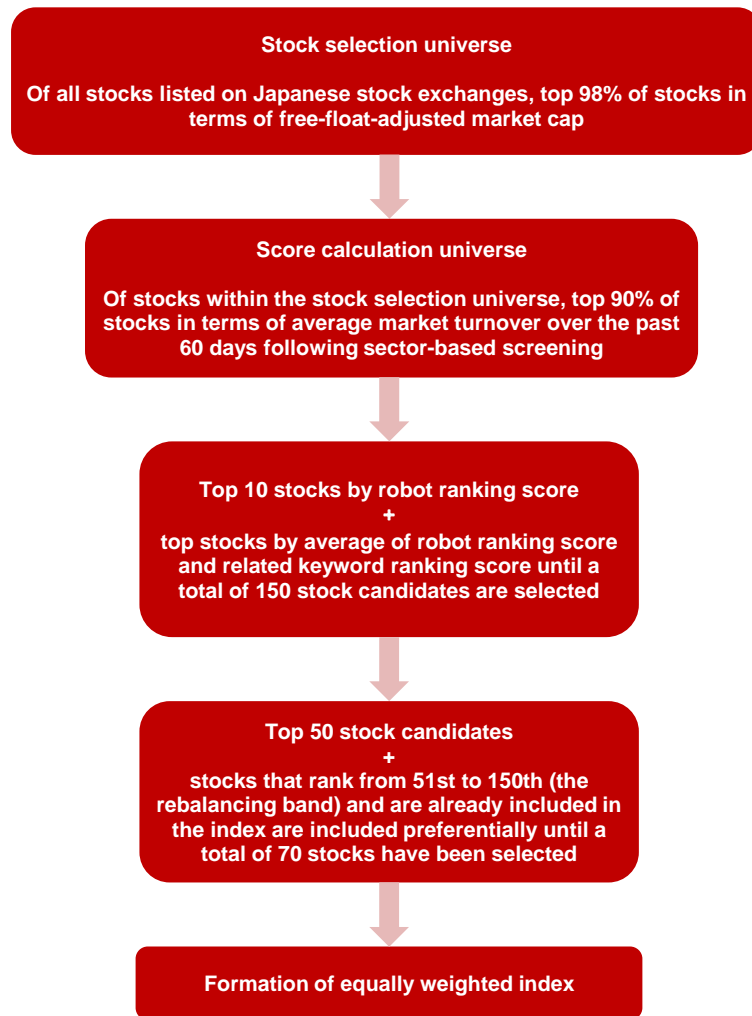
$$\text{Average ranking score} = (\text{robot ranking score} + \text{relevant keyword ranking score}) / 2$$

- (3) The top 50 stock candidates in terms of criteria (1) and (2) are then selected unconditionally.
- (4) Stock candidates that rank from 51st to 150th in terms of criteria (1) and (2) (the rebalancing band) and are already included in the index are then selected until a total of 70 stocks have been selected.
- (5) If the total number of stocks selected in (3) and (4) above is less than 70, the shortfall is made up by selecting stocks ranked from 51st onward that are not currently included in the index, in order of ranking.

⁴ Stock selection taking into account the rebalancing band as specified in (3) to (5) adopted starting with the December 2018 periodic reconfiguration.

The following method of inclusion was employed until December 2017.

- (1) The top 10 stocks based on robot ranking score are first selected. If there are multiple stocks with a score 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 of the robot ranking score and the related keyword ranking score, 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 robot ranking score. If the above criteria still yield multiple stocks with robot ranking scores putting them in the top 70, we select the top 70 stocks in terms of average daily market turnover over the past 60 days.

Fig. 1: Composition of the Nomura Robot Companies 70

Note: See the body text for details on exception handling and index construction methods.

Source: Nomura

2.4 Weighting of constituent stocks and number of shares per stock

On the periodic reconfiguration base date as set out in 1.2 Periodic reconfiguration base date, the 70 constituent stocks selected as set out in 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 for each stock 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 special quotation price or continuous confirmed quotation price on the selected exchange if these are available.

2.5. Article 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 will 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 Nomura's 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.

Related keywords for possible addition or revision are selected⁵ once a year.

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

The following examples are related keywords selected in 2017 (Figure 2).

Fig. 2: Related keywords selected in 2017

- Robo
- System integrator
- Muscle suit
- Assist suit
- Power assist
- Humanoid
- Manipulation
- Ubiquitous network
- Manipulator
- Personal mobility
- Actuator
- Robotics

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

Source: Nomura

⁵ Specific selection criteria is not disclosed for IP protection purposes.

3. Unscheduled reconfigurations

3.1. Response to stock swaps, stock transfers, mergers, etc⁶

Temporary exclusions of stocks from the index are avoided and the consistency of index constituents is maintained by adherence to 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 (hereafter, 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 (hereafter, 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 can be 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 have not been 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 regarded as compromising a constituent stock's eligibility for inclusion in the stock selection universe as 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, in the event that the reason for the stock's removal from the index no longer applies 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.

⁶ This rule applied from April 2002.

4. Index calculation

4.1. Index base date, base value, announcement date

The base date for the Nomura Robot 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 started on 14 June 2018.

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 using base market capitalization⁷. Subscript t indicates the current day and t-1 indicates the preceding business day.

Calculation of yen-denominated index values

- Index excluding dividends

Base market cap_t = index market cap_{t-1} + 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

Base market cap_t
 = index market cap_{t-1} + adjusted market cap_t
 – adjusted total dividends_t

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

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

- 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).

⁷ In 4.2 Calculation of index values, adjusted market capitalization 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.

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 (Figure 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

	Type of 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) ⁹
	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 into common 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	Last business day of month in which number of new shares for which rights were exercised becomes known	Previous day's price
Capital decrease	Corporate divestiture (new shares in continuing company)	Date of listing change	Previous day's price
	Retirement of treasury stock	Last business day of month following month in which shares are retired	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
Other	Capital reduction with compensation	Effective date	Previous day's price
	Other adjustments	Other adjustments to the base market capitalization, if required, are made on the last business day of the month of the announcement of the relevant report (or the last business day of the following month if the announcement is within five business days of month-end)	Previous day's price

Source: Nomura

⁹ 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, merger¹⁰
- 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

¹⁰ 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

Nomura Robot Companies 70 access points¹¹

Information on the Nomura Robot Companies 70 is available on the following media:

Bloomberg:

NMRIJORB<index> (index excluding dividends, yen-denominated)

NMRIJIRB<index> (index including dividends, yen-denominated)

QUICK:

NRIJ@

Reuters:

.NROBO (index excluding dividends, yen-denominated)

.NROBOTR (index including dividends, yen-denominated)

Website:

<http://qr.nomura.co.jp/jp/nrobot/index.html> (Japanese only)

Contact

Global Research Division, Financial Engineering & Technology Research Center

Index Operations Dept.

TEL: +81 (0)3-6703-3986

Email: idx_mgr@jp.nomura.com

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A license agreement with Nomura Securities is required to use the index and access detailed data.

In the case of an unavoidable event such as computer breakdown or natural disaster, calculation of the index may be delayed or suspended.

While every effort is made to ensure that the information used in this report and all published information is based on reliable data, it should be noted that data may be changed or amended when necessary.

Nikkei Telecom-related disclaimer

The index is not related to Nikkei Inc. and is not endorsed or guaranteed by Nikkei Inc.

¹¹ Published data are all for reference only

Policies with regard to NSC's indices

The below index-related policies are published on our website.

See the following link for details:

<http://qr.nomura.co.jp/en/guides/index.html>

- Index Calculation Policy
- Complaints Handling Policy
- Glossary (Equity)
- Index Governance Framework
- Conflicts of Interest Policy

Appendix A-1

Analyst Certification

I, Index Operations Dept., hereby certify (1) that the views expressed in this Research report accurately reflect my personal views about any or all of the subject securities or issuers referred to in this Research report, (2) no part of my compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this Research report and (3) no part of my compensation is tied to any specific investment banking transactions performed by Nomura Securities International, Inc., Nomura International plc or any other Nomura Group company.

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Distribution of ratings (Nomura Group)

The distribution of all ratings published by Nomura Group Global Equity Research is as follows:

51% have been assigned a Buy rating which, for purposes of mandatory disclosures, are classified as a Buy rating; 43% of companies with this rating are investment banking clients of the Nomura Group*. 0% of companies (which are admitted to trading on a regulated market in the EEA) with this rating were supplied material services** by the Nomura Group.

43% have been assigned a Neutral rating which, for purposes of mandatory disclosures, is classified as a Hold rating; 54% of companies with this rating are investment banking clients of the Nomura Group*. 0% of companies (which are admitted to trading on a regulated market in the EEA) with this rating were supplied material services by the Nomura Group

6% have been assigned a Reduce rating which, for purposes of mandatory disclosures, are classified as a Sell rating; 15% of companies with this rating are investment banking clients of the Nomura Group*. 0% of companies (which are admitted to trading on a regulated market in the EEA) with this rating were supplied material services by the Nomura Group.

As at 31 December 2018.

*The Nomura Group as defined in the Disclaimer section at the end of this report.

** As defined by the EU Market Abuse Regulation

Distribution of ratings (Instinet, LLC)

The distribution of all ratings published by Instinet, LLC Equity Research is as follows:

55% have been assigned a Buy rating which, for purposes of mandatory disclosures, are classified as a Buy rating; Instinet LLC has provided investment banking services to 0% of companies with this rating within the previous 12 months.

41% have been assigned a Neutral rating which, for purposes of mandatory disclosures, is classified as a Hold rating; Instinet LLC has provided investment banking services to 0% of companies with this rating within the previous 12 months.

4% have been assigned a Reduce rating which, for purposes of mandatory disclosures, are classified as a Sell rating; Instinet LLC has provided investment banking services to 0% of companies with this rating within the previous 12 months.

Definition of Nomura Group's equity research rating system and sectors

The rating system is a relative system, indicating expected performance against a specific benchmark identified for each individual stock, subject to limited management discretion. An analyst's target price is an assessment of the current intrinsic fair value of the stock based on an appropriate valuation methodology determined by the analyst. Valuation methodologies include, but are not limited to, discounted cash flow analysis, expected return on equity and multiple analysis. Analysts may also indicate expected absolute upside/downside relative to the stated target price, defined as (target price - current price)/current price.

STOCKS

A rating of '**Buy**', indicates that the analyst expects the stock to outperform the Benchmark over the next 12 months. A rating of '**Neutral**', indicates that the analyst expects the stock to perform in line with the Benchmark over the next 12 months. A rating of '**Reduce**', indicates that the analyst expects the stock to underperform the Benchmark over the next 12 months. A rating of '**Suspended**', indicates that the rating, target price and estimates have been suspended temporarily to comply with applicable regulations and/or firm policies. Securities and/or companies that are labelled as '**Not rated**' or shown as '**No rating**' are not in regular research coverage. Investors should not expect continuing or

additional information from Nomura relating to such securities and/or companies. Benchmarks are as follows: **United States/Europe/Asia ex-Japan**: please see valuation methodologies for explanations of relevant benchmarks for stocks, which can be accessed at: <http://go.nomuranow.com/research/globalresearchportal/pages/disclosures/disclosures.aspx>; **Global Emerging Markets (ex-Asia)**: MSCI Emerging Markets ex-Asia, unless otherwise stated in the valuation methodology; **Japan**: Russell/Nomura Large Cap.

SECTORS

A **'Bullish'** stance, indicates that the analyst expects the sector to outperform the Benchmark during the next 12 months. A **'Neutral'** stance, indicates that the analyst expects the sector to perform in line with the Benchmark during the next 12 months. A **'Bearish'** stance, indicates that the analyst expects the sector to underperform the Benchmark during the next 12 months. Sectors that are labelled as **'Not rated'** or shown as **'N/A'** are not assigned ratings. Benchmarks are as follows: **United States**: S&P 500; **Europe**: Dow Jones STOXX 600; **Global Emerging Markets (ex-Asia)**: MSCI Emerging Markets ex-Asia. **Japan/Asia ex-Japan**: Sector ratings are not assigned.

Target Price

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