

NOMURA-BPI/Ladder

Cross-asset - Japan

Index rulebook

Key features of NOMURA-BPI/Ladder

- The NOMURA-BPI/Ladder is an investment return index that reflects the performance of laddered JGBs, Japanese government bonds, which allocate equal amounts to each maturity. The NOMURA-BPI/Ladder index portfolios only cover JGBs.
- The NOMURA-BPI/Ladder is designed as a benchmark of stable durations.
- The index value calculation method and inclusion criteria of the NOMURA-BPI/Ladder are based on those of the NOMURA-BPI.
- Bonds included in the NOMURA-BPI/Ladder are reviewed monthly.

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1 Introduction

First released in November 2005, the NOMURA-BPI/Ladder was developed to reflect the performance of nominal-JGB ladder investments, with the aim to provide a benchmark with a stable duration. The index value calculation method and inclusion criteria of the index are based on those of the NOMURA-BPI®^[1].

Nomura Fiduciary Research & Consulting Co., Ltd. (NFRC)^[2] is the Administrator of the index, and Nomura Research Institute, Ltd. (NRI) serves as the Calculation Agent. NFRC assumes the primary responsibility for the daily calculation of the bond performance indices, as well as their production and operation. Specifically, NFRC, in its role as operations manager:

- Maintains and records the index weightings of all constituents;
- Reviews the index portfolios according to the inclusion/exclusion criteria, and replaces securities in these portfolios as necessary, reflecting these changes in the performance and other indicators; reviews the index portfolio inclusion criteria;
- Announces changes in the securities included in the index portfolios, which are determined as a result of daily operations management and scheduled reviews; and
- Distributes the index portfolio performances, through either NRI's data delivery service or its own.

The index is meant to be used as:

- A tool for determining investment policies (asset allocation strategies);
- A tool for determining investment manager structure;
- An investment management benchmark;
- A tool for portfolio management;
- An investment performance indicator; and
- A risk management tool.

1. NOMURA-BPI® is a registered trademark of NFRC (Registered Number: 4991073)
2. NFRC took over the index business of Nomura Securities Co., Ltd., effective 1 February 2023.

2 Sub-indices

The index was initially launched in November 2005 with two indices, 10 years and 20 years, which were classified by maturity of JGBs. Subsequently, the 5 year index was added in February 2006 and the 30 year index in February 2009. Currently, it has the following four portfolio categories in terms of maturity:

- NOMURA-BPI/Ladder 5 years
- NOMURA-BPI/Ladder 10 years
- NOMURA-BPI/Ladder 20 years
- NOMURA-BPI/Ladder 30 years

2.1 Sub-Index portfolios by term to maturity

The index has sub-index portfolios categorized by term to maturity as of the end of each month and calculates their performance indices and portfolio indicators (Figure 1).

The sub-index portfolios are determined based on term to maturity as of the last day of the month. Once determined, the classification remains unchanged throughout the month.

Fig. 1: Sub-index portfolio classification by term to maturity

Classification	Term to maturity
Short-term (0-3years)	0 year or more and less than 3 years
Medium-term (3-7years)	3 years or more and less than 7 years
Long-term (7years-)	7 years or more
Long-term (7-11years)	7 years or more and less than 11years
Super long-term (11years-)	11 years or more
Super long-term (11-15years)	11 years or more and less than 15 years
Super long-term (15years-)	15 years or more

Source: NFRC

3 Scheduled portfolio reconstitution

NFRC reviews and reconstitutes the index portfolios every month. Next month's portfolios are determined on the portfolio determination day of each month.

3.1 Scheduled reconstitution date

Index portfolios are reconstituted on the first business day of the month (scheduled reconstitution date), with the inclusion/exclusion implemented after the bond market closes on the business day before the scheduled reconstitution date.

3.2 Portfolio determination date

In principle, next month's portfolio determination date is one of the following dates, whichever is the earlier:

- The business day after the 25th day of the month
- The three business days before the last business day of the month

However, the portfolio determination date may be changed if a JGB auction that may have a non-negligible impact is held between the day after the determination date and the last day of the month. Any such changes will be announced in advance.

3.3 Scheduled reconstitution base date

Next month's portfolio is determined on the day before the portfolio determination date based on disclosed information available as of the scheduled reconstitution base date.

3.4 Portfolio reconstitution announcement

Information about scheduled portfolio reconstitution is announced through NRI's data delivery service and other media, except in cases where definite information on new portfolios is unavailable due to unexpected circumstances.

4 Portfolio inclusion/exclusion method

4.1 Portfolio inclusion criteria for next month

The index incorporates all securities that meet the inclusion criteria as of the scheduled portfolio reconstitution base date into the following month's index portfolios.

Fig. 2: Index inclusion criteria for all

Coupon	Fixed
Issue date	Issues until the portfolio determination date ^[3]
Term to maturity	None (all bonds are held until maturity)

Source: NFRC

Fig. 3: Index inclusion criteria as for each index

NOMURA-BPI/Ladder 5yrs	Within the set of all 5-year coupon-bearing JGBs maturing in March, June, September, and December, the index includes the issues with the earliest month of issue from among the issues maturing in each month (with a preference for the issue with the largest issued face value when there were multiple issuances in that month).
NOMURA-BPI/Ladder 10yrs	Within the set of all 10-year coupon-bearing JGBs maturing in March, June, September, and December, the index includes the issues with the earliest month of issue from among the issues maturing in each month (same as above).
NOMURA-BPI/Ladder 20yrs	Within the set of all 20-year coupon-bearing JGBs ^[4] maturing in September, the index includes the issues with the earliest month of issue from among the issues maturing in each month (same as above).
NOMURA-BPI/Ladder 30yrs	Within the set of all 30-year coupon-bearing JGBs ^[5] maturing in each term classified into H1(Apr.-Sep.) and H2(Oct.-Mar.), the index includes the issues with the earliest month of issue from among the issues maturing in each month (same as above).

Source: NFRC

4.2 Face value amount for inclusion

Each index portfolio includes constant amount for each issue (JPY10bn).

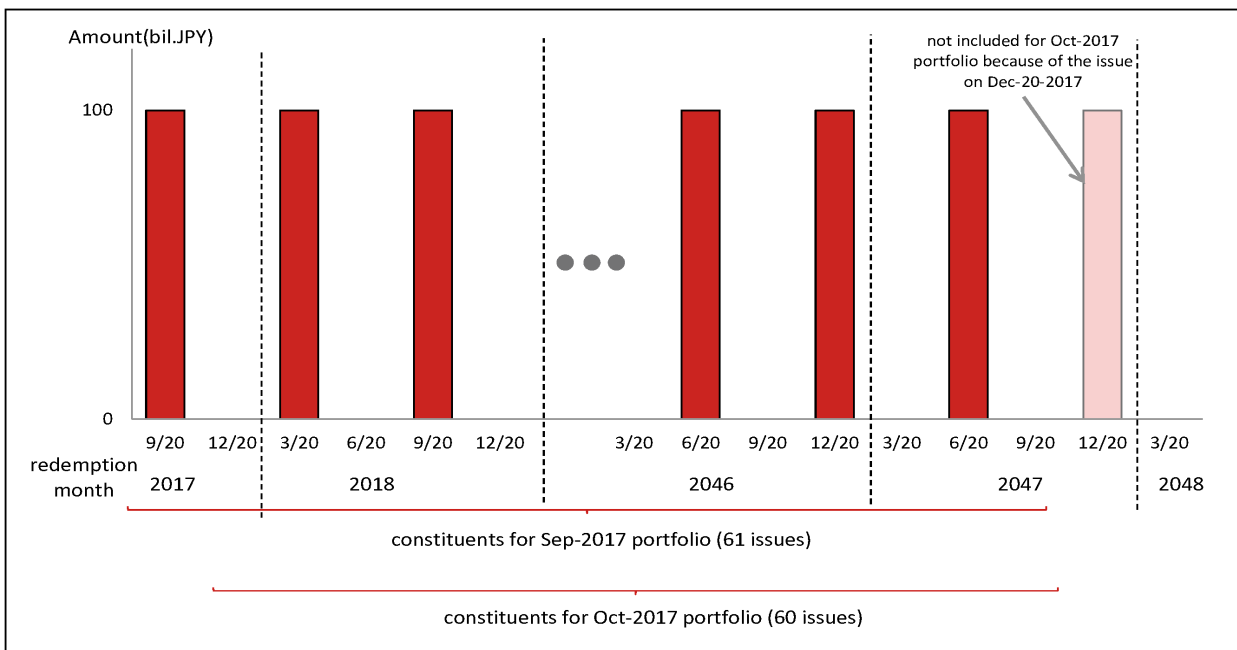
4.3 Inclusion timing

The index portfolio includes the first-issued JGB of all eligible bonds in each of the designated periods.

If there is no eligible issue suitable to be included for the month following any constituent reaching maturity, no issue will be added to the index portfolio until there is a new issue eligible for inclusion. This means the number of issues included in the index portfolios is not necessarily consistent. Figure 4 shows how the number of NOMURA-BPI/Ladder 30yr constituents can vary due to a lack of eligible JGBs.

- This rule was introduced at the May 2018 portfolio determination (implemented on 24 April 2018). Previously, JGB issues until the last day of the month of the portfolio determination date were eligible for the following month's index portfolio inclusion.
- Although the portfolio was designed to consist of only 20yr coupon-bearing JGBs, portfolios prior to September 2006 have substituted 10yr coupon-bearing JGBs for bonds whose life was shorter than 20yr coupon-bearing JGB number 2.
- Although the portfolio was designed to consist of only 30yr coupon-bearing JGBs, portfolios prior to March 2010 have substituted 10yr and 20yr coupon-bearing JGBs for bonds whose life was shorter than 30yrs coupon-bearing JGB number 1, and those after the April 2010 portfolio likewise substitute 20yr coupon-bearing JGBs.

Fig. 4: Example of number change of the NOMURA-BPI/Ladder 30yr constituents



Source: NFRC

5 Unscheduled portfolio reconstitution

In principle, index portfolios for the next month, as determined on the portfolio determination date, will remain unchanged through the last business day of the next month. However, these planned portfolios may be subject to an unscheduled reconstitution to be implemented between the portfolio determination date and the last business day of the same month if a material event occurs that affects any of the JGBs included. In such cases, NFRC will carry out the reconstitution promptly after issuing an announcement.

A material event may lead to an unscheduled portfolio reconstitution. Any such change would be announced in advance.

5.1 Announcement of unscheduled portfolio reconstitution

Information about unscheduled portfolio reconstitution is announced through NRI's data delivery service, except in cases where definite information on such a change is unavailable until it actually takes place due to unexpected circumstances.

6 Calculating index value and return

6.1 Method for calculating index

6.1.1 Total investment return index (Total index)

This is an index of investment return including capital and income gains. Assuming the index portfolio was purchased on the last business day of the previous month at a value including accrued interest, coupon payments and redemptions are added to the market value amount (including accrued interest), and this is announced as the index value for the day. All coupon payments and redemptions are assumed to be received in cash without interest on the day they are made, and reinvested at the following portfolio reconstitution. Coupon payments made on weekends and holidays are assumed to be made on the following business days.

$$BPIL_{(today)} = BPIL_{(e.l.m.)} \times \frac{MVLt_{(today)} + CF_{(e.l.m.,today)}}{MVLt_{(e.l.m.)}}$$

Where

$$MVLt_{(i)} = P_{(i)} \times Amount_{(i)} \times \frac{1}{100}$$

$BPIL_{(today)}$:	Total index value, today
$BPIL_{(e.l.m.)}$:	Total index value, the last business day of the previous month
$MVLt_{(today)}$:	Market value amount (including accrued interest) of index portfolio, today
$MVLt_{(e.l.m.)}$:	Market value amount (including accrued interest) of index portfolio, the last business day of the previous month
$CF_{(e.l.m., today)}$:	Total income gains and redemptions paid from the last business day of the previous month through today
$P_{(i)}$:	“Dirty price” at point i
$Amount_{(i)}$:	Outstanding face value at point i

6.1.2 Capital investment return index (Capital index)

This is an index of investment return in terms of capital gains. Assuming the index portfolio was purchased on the last business day of the previous month at the “dirty price”, redemptions that have occurred through the valuation date are added to the market value amount (excluding accrued interest), and this is announced as the index value for the day. All redemptions are assumed to be received in cash without interest on the day they are made, and reinvested at the following portfolio reconstitution.

$$BPILC_{(today)} = BPILC_{(e.l.m.)} \times \left[1 + \frac{MVLC_{(today)} - MVLC_{(e.l.m.)} + RD_{(e.l.m.,today)}}{MVLt_{(e.l.m.)}} \right]$$

Where

$$MVLC_{(i)} = SP_{(i)} \times Amount_{(i)} \times \frac{1}{100}$$

$BPILC_{(today)}$:	Capital index value, today
$BPILC_{(e.l.m.)}$:	Capital index value, the last business day of the previous month
$MVLC_{(today)}$:	Market value amount (excluding accrued interest) of index portfolio, today
$MVLC_{(e.l.m.)}$:	Market value amount (excluding accrued interest) of index portfolio, the last business day of the previous month
$MVLt_{(e.l.m.)}$:	Market value amount (including accrued interest) of index portfolio, the last business day of the previous month
$RD_{(e.l.m.,today)}$:	Total income gains and redemptions paid from the last business day of the previous month through today
$SP_{(i)}$:	“Clean price” at point i
$Amount_{(i)}$:	Outstanding face value at point i

6.2 Return

6.2.1 Total return (annualized)

$$Rt_{(m,n)} = \left[\frac{BPIL_{(n)}}{BPIL_{(m)}} - 1 \right] \times \frac{365}{\Delta t_D}$$

Point m is assumed to precede point n in a given timeline.

$Rt_{(m,n)}$:	Total return from point m through point n
$BPIL_{(i)}$:	Total index value at point i
$\Delta t_D (>0)$:	Days between point m and point n (excluding the settlement date)

6.2.2 Capital return (annualized)

$$Rc_{(m,n)} = \left[\frac{BPILc_{(n)}}{BPILc_{(m)}} - 1 \right] \times \frac{365}{\Delta t_D}$$

Point m is assumed to precede point n in a given timeline.

$Rc_{(m,n)}$:	Capital return from point m through point n
$BPILc_{(i)}$:	Capital index value at point i
$\Delta t_D (>0)$:	Days between point m and point n (excluding the settlement date)

6.2.3 Income return (annualized)

$$Ri_{(m,n)} = Rt_{(m,n)} - Rc_{(m,n)}$$

Point m is assumed to precede point n in a given timeline.

$Ri_{(m,n)}$:	Income return from point m through point n
$Rt_{(m,n)}$:	Total return from point m through point n
$Rc_{(m,n)}$:	Capital return from point m through point n

6.3 Reference for obtaining market data

The index references bond market pricing data for the marked-to-market valuation of the index portfolios (listed in descending order of priority):

- JS Price
- Nomura price

These values are provided on a settlement-day basis, and should be converted to trade-day basis for use as reference in calculating portfolio and performance indicators.

JS Price is evaluated and calculated by Nomura Securities Co., Ltd. and later examined by Nikkei Inc., Nikkei Financial Technology Research Institute, Inc. and Nomura Research Institute, Ltd. JS Prices are reliable for a variety of purposes, including mark-to-market accounting. JS Prices are calculated by the reasonable and consistent methodology with passing through the process which examines validations to detect relative/absolute outlier by the methodology designed by Nikkei Inc., Nikkei Financial Technology Research Institute, Inc., Nomura Research Institute, Ltd., and Nomura Securities Co., Ltd.

Besides, JS Price lists more than 12,000 bonds in total (mainly publicly offered and private placement domestic bonds) and covers almost 100% of index portfolios. In addition, JS Price offers daily prices with good continuity.

NSC dealers value Nomura prices for its own daily valuation process, and the NSC is one of the key financial instruments firms in the yen bond market, and is actively engaged in transactions with other financial instruments firms and its clients. For this reason, NSC is on a good position to obtain traded prices and/or quotations in the secondary market.

6.4 Data released and base date of each index

Base dates and publication start dates of the indices belonging to the index are as follows:

Fig. 5: Base date of each index

Index	Base date (=Base index value)	Publication start date
NOMURA-BPI/Ladder 10yrs	End of December 1986(=100)	November 2005
NOMURA-BPI/Ladder 20yrs	End of December 1996(=100)	November 2005
NOMURA-BPI/Ladder 5yrs	End of December 2004(=100)	February 2006
NOMURA-BPI/Ladder 30yrs	End of December 2008(=100)	February 2009

Source: NFRC

7 Definition of NOMURA-BPI/Ladder indicators

7.1 Definition of issue-specific return-risk indicators

In the index, the issue-specific risk-return indicators are defined as described below. Note that redeemed issues are not considered in calculating risk-return indicators.

- Current yield CY (%)

$$CY = \frac{Cpn \times FV}{SP}$$

SP : Clean price (JPY)

Cpn : Coupon rate (%)

FV : Face value (JPY100)

- Simple yield SY (%)

$$SY = \frac{Cpn + \frac{FV - SP}{Yr}}{SP} \times 100$$

SP : Clean price (JPY)

Cpn : Coupon rate (%)

FV : Face value (JPY100)

Yr : Term to maturity (scheduled redemption)

- Compound yield r (%)

r satisfies the given equation:

$$P = \sum_i CF_i \times \left(1 + \frac{r}{100} \times \frac{1}{2}\right)^{-2t_i}$$

- P : Dirty price
- CF_i : i th future cash flow (JPY)
- t_i : Number of years until CF_i occurs

Future cash flow CF_i includes principal and interest payments (unless otherwise specified)

- T-spread $Tspd$ (%)

$$Tspd = r - r_g$$

Assume P_g is the dirty price of a JGB issue that has the same cash flow as the one for which $Tspd$ is calculated:

$$P_g = \sum_i CF_i \times DF(t_i)$$

Calculate r_g (compound yield) for P_g as

$$P_g = \sum_i CF_i \times \left(1 + \frac{r_g}{100} \times \frac{1}{2}\right)^{-2t_i}$$

r	:	Compound yield (%)
CF_i	:	i th the future cash flow (JPY)
$DF_{(t_i)}$:	Discount coefficient at point t_i ⁶⁾
t_i	:	Number of years until CF_i occurs

- Duration D (years)

$$D = \sum_i \frac{CF_i \times \left(1 + \frac{r}{100} \times \frac{1}{2}\right)^{-2t_i} \times t_i}{P}$$

r	:	Compound yield (%)
CF_i	:	i th the future cash flow (JPY)
t_i	:	Number of years until CF_i occurs
P	:	Dirty price

- Modified duration mD

$$mD = \frac{D}{1 + \frac{r}{100} \times \frac{1}{2}} \left(= -\frac{1}{P} \frac{dP}{dr} \right)$$

D	:	Duration (years)
r	:	Compound yield (%)
P	:	Dirty price

6. The JGB discount factor is calculated using the NOMURA Par Yield Model.

- Convexity CV

$$CV = \sum_i \frac{CF_i \times \left(1 + \frac{r}{100} \times \frac{1}{2}\right)^{-2t_i - 2} \times t_i \times \left(t_i + \frac{1}{2}\right)}{P} \left(= -\frac{1}{P} \frac{d^2P}{dr^2}\right)$$

CF_i	:	i th the future cash flow (JPY)
t_i	:	Number of years until CF_i occurs
r	:	Compound yield (%)
P	:	Dirty price

- Effective duration $EffD$, effective convexity $EffCV$

$$EffD = \frac{1}{P} \sum_i t_i \times CF_i \times DF(t_i) \times \exp(-\alpha t_i)$$

$$EffCV = \frac{1}{P} \sum_i t_i^2 \times CF_i \times DF(t_i) \times \exp(-\alpha t_i)$$

Where α (yield curve spread) satisfies the following formula

$$P = \sum_i CF_i \times DF(t_i) \times \exp(-\alpha t_i)$$

CF_i	:	i th the future cash flow (JPY)
$DF(t_i)$:	Discount coefficient at point t_i ⁷
t_i	:	Number of years until CF_i occurs
P	:	Dirty price

7. The JGB discount factor is calculated using the NOMURA Par Yield Model.

- Calculating indicators for issues less than half a year to maturity

The method for calculating simple and compound yields in the NOMURA-BPI may lead to a discrepancy between the two for issues with less than half a year to maturity⁸. This becomes particularly apparent as it approaches maturity. As the market convention, JGBs are traded on a simple yield basis. Hence, compound yields for bonds nearing maturity may differ significantly from their simple yield and may not match actual market levels.

The NOMURA-BPI, which does not contain issues with less than half a year to maturity, does not suffer from the problem described above. However, the index which holds all issues until maturity, will face such a discrepancy. To address this, simple yields are used for issues with a term to maturity of less than a half year. Duration and other risk measures are calculated by the formulas below, where SY represents simple yield and Yr is term to maturity.

- Duration

$$D = Yr$$

- Modified duration

$$mD = \frac{Yr}{1 + SY \times Yr}$$

- Convexity

$$CV = 2 \times mD^2$$

- Effective duration

$$EffD = Yr$$

- Effective convexity

$$EffCV = EffD^2$$

Please also note that T-spreads are not calculated for issues that are so close to maturity since the spread is calculated based on compound yields.

8. More precisely, issues with only one future cash flow, a payment at maturity. In case of semi-annual payment bonds, this means its term to maturity becomes shorter than half a year.

7.2 Definition of portfolio indicators

Portfolio indicators are calculated using the issue-specific indicators of all issues in the index portfolio. The weighted average is used in the calculation, as shown in Figure 5.

Fig. 6: Portfolio indicator calculation method

Indicator	Calculation Method
Coupon rate Term to maturity (scheduled redemption) Dirty price Clean price	Outstanding face value amount weighted average
Current yield Simple yield Compound yield T-spread ⁹⁾	Market value amount (excluding accrued interest) weighted average
Duration Modified duration Convexity Effective duration Effective convexity	Market value amount (including accrued interest) weighted average

Source: NFRC

9. As noted in “Calculating indicators for JGB issues with six months or less remaining maturity,” T-spreads are not calculated for issues with six months or less to maturity. This means T-spreads are calculated by weighted averaging index portfolios excluding these short-dated issues.

Data services

Data for the indices can be obtained via the following channels.^[10]

Index values are published in the following media:

QUICK : NRIJ120 - NRIJ123

Website : <http://qr.nomuraholdings.com/jp/bpil/index.html> (Japanese only)

10. Published data are all for reference only.

For further information on the indices

Nomura Fiduciary Research & Consulting Co., Ltd.

Index Services Department

e-mail : bpi@nfrco.jp

Website : http://qr.nomuraholdings.com/jp/bpil/index_contacts.html (Japanese only)

Detailed data on portfolio indices and issue-specific indicators are available on IDS, NRI's data delivery services.

Nomura Research Institute, Ltd.

Investment Data Service Department

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Nomura Fiduciary Research & Consulting Co., Ltd.

Registration Number: Director-General of the Kanto Local Financial Bureau(Finance & Commerce) Registration No.451

Membership: Japan Investment Advisers Association No. 011-00961

Policies with regard to the indices

The below index-related policies are published on our website. See the following link for details:

<http://qr.nomuraholdings.com/en/guides/index.html>

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