

# **S&P/NZX New Zealand Fixed Interest Index Series *Methodology***

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# Table of Contents

Introduction	3
<b>Index Objective</b>	<b>3</b>
<b>Collaboration</b>	<b>3</b>
<b>Index Family</b>	<b>3</b>
<b>Supporting Documents</b>	<b>4</b>
Eligibility Criteria	5
<b>Eligibility Factors</b>	<b>5</b>
Index Construction	6
<b>Index Calculations</b>	<b>6</b>
Index Maintenance	7
<b>Rebalancing</b>	<b>7</b>
<b>Non-Government Bonds and Government Bonds</b>	<b>7</b>
<b>Only Additions and Par Amount Changes of Nominal and Inflation-Linked Government Bonds</b>	<b>7</b>
<b>Ongoing Maintenance</b>	<b>7</b>
<b>Currency of Calculation and Additional Index Return Series</b>	<b>8</b>
Index Governance	9
<b>Index Committee</b>	<b>9</b>
Index Policy	10
<b>Announcements</b>	<b>10</b>
<b>Holiday Schedule</b>	<b>10</b>
<b>Rebalancing</b>	<b>10</b>
<b>End-of-Day Calculation</b>	<b>10</b>
<b>Index Releases</b>	<b>10</b>
<b>Recalculation Policy</b>	<b>10</b>
<b>Contact Information</b>	<b>10</b>
Index Dissemination	11
<b>Tickers</b>	<b>11</b>
<b>Index Data</b>	<b>12</b>
<b>Web site</b>	<b>12</b>
Appendix I	13
<b>S&amp;P/NZX Investment Grade Corporate Bond and S&amp;P/ASX Corporate Bond 0+ NZD Hedged 50/50 Blend Index (Custom)</b>	<b>13</b>

Appendix II		14
	<b>Swap Calculation</b>	<b>14</b>
	<b>Yield to Maturity</b>	<b>14</b>
	<b>Modified Duration</b>	<b>14</b>
	<b>Swap Index Calculation</b>	<b>15</b>
Appendix III		17
	<b>30-Day Bank Bill Index Calculation</b>	<b>17</b>
	<b>90-Day Bank Bill Index Calculation</b>	<b>17</b>
	<b>Treasury Bill Rate Index Calculation</b>	<b>17</b>
Appendix IV		19
	<b>Call Rate Deposit Index Calculation</b>	<b>19</b>
Appendix V		20
	<b>Methodology Changes</b>	<b>20</b>
Disclaimer		21
	<b>Performance Disclosure/Back-Tested Data</b>	<b>21</b>
	<b>Intellectual Property Notices/Disclaimer</b>	<b>22</b>
	<b>ESG Indices Disclaimer</b>	<b>24</b>

# Introduction

## Index Objective

The S&P/NZX New Zealand Fixed Interest Index Series is a broad benchmark index family that measures the market value weighted performance of the New Zealand bond market, while meeting certain investability criteria.

## Collaboration

In July 2015, pursuant to an agreement between S&P Dow Jones Indices and NZX Limited, the existing suite of NZX Indices was co-branded and S&P Dow Jones Indices assumed responsibility for calculating, maintaining and licensing the indices. NZX continues to distribute and license the real-time and delayed index values via its data feed product.

With the introduction of the index series, New Zealand's indices have been placed at the forefront of the global market. The indices showcase the performance of the New Zealand fixed interest market.

## Index Family

**S&P/NZX Bond Indices.** The S&P/NZX Bond Indices consist of the following:

- **S&P/NZX NZ Fixed Interest Composite Index.** The index tracks the performance of the investment grade New Zealand fixed income market, including sovereign bonds, corporates and bonds issued in New Zealand dollars by foreign entities ("Kauri bonds").
- **S&P/NZX Government Bond Index.** The index is comprised of sovereign bonds issued by the New Zealand Government. In addition to the main index, indices covering various maturity bands are also calculated.
- **S&P/NZX Government Inflation-Linked Bond Index.** The index is comprised of inflation-linked bonds issued by the New Zealand government. The constituents of this index are excluded from the S&P/NZX Government Bond Index.
- **S&P/NZX Local Authority Bond Index.** The index is comprised of bonds issued by Local Authorities in New Zealand, as well as bonds issued by the New Zealand Local Government Funding Agency. Bonds issued by Watercare Services Ltd., a council-controlled organization, wholly owned by Auckland Council, are also eligible for inclusion in the index.
- **S&P/NZX Investment Grade Corporate Bond Index.** The index is comprised of investment grade bonds issued by domestic entities in local currency. A sub-index comprising bonds with credit ratings of A- or above is also calculated (the **S&P/NZX A-Grade Corporate Bond Index**), as are composite indices combining the investment grade corporate and government bond indices, and A-grade corporate and government bond indices (the **S&P/NZX Composite Investment Grade Bond Index** and **S&P/NZX Composite A-Grade Bond Index**, respectively).
- **S&P/NZX Kauri Bond Index.** The index is comprised of investment grade bonds issued in New Zealand dollars by foreign entities ("Kauri bonds"). An index comprising eligible Kauri bonds and New Zealand government bonds is also calculated (the **S&P/NZX Composite Kauri Bond Index**).

**S&P/NZX Swap Indices.** The index family comprises nine indices representing the return of an individual swap maturity and a further six aggregate indices representing the average return of two or more individual maturities.

**S&P/NZX Bank Bill Indices.** The indices measure the performance of shorter-dated securities by using the rolling average of short-term interest rate return of NZX bank bill yields. Currently the following indices exist:

- S&P/NZX 30-day Bank Bill Index
- S&P/NZX 90-Day Bank Bill Index

**S&P/NZX Treasury Bill Rate Index (NZD).** The index measures the performance of the rolling '90-day' average of short-term interest rate return as indicated by 30-day, 60-day, and 90-day NZX treasury bill yields.

**S&P/NZX Call Rate Deposit Index.** This index represents the performance of a rolling overnight deposit at the New Zealand Reserve Bank Official Cash Rate (OCR).

### Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices' Fixed Income Policies & Practices Methodology	<a href="#">Fixed Income Policies &amp; Practices</a>
S&P Dow Jones Indices' Fixed Income Index Mathematics Methodology	<a href="#">Index Mathematics Methodology</a>

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

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# Eligibility Criteria

## Eligibility Factors

**Currency and Market of Issue.** Only New Zealand dollar-denominated bonds that are issued in the New Zealand market are eligible. Bonds issued through private placements are ineligible.

**Maturity.** Bonds must be of bullet maturity with no embedded optionally (no callable or extendable structures). Securities must have an initial term to maturity greater than or equal to one year. Eligible bonds remain in the index through maturity.

**Credit Rating Quality.** Criteria are as follows:

- **New Issues.** New issues must be rated by at least one rating agency (S&P Global Ratings, Moody's, or Fitch) to be considered at the next rebalancing.
- **Non-rated and Defaulted Bonds.** Bonds that are no longer rated or have defaulted are removed at the next rebalancing.
- **Investment Grade.** The minimum credit rating for inclusion is BBB-/Baa3/BBB-. The lowest of all available ratings (S&P Global Ratings, Moody's, and Fitch) is used as the index rating.

For ratings-based sub-indices, the above rules are applied to the appropriate ratings band.

**Pricing.** Mid pricing provided by LSEG. Bonds not priced by the designated pricing source are ineligible.

**Coupon.** Only fixed rate, non-zero, coupon bonds are eligible. Fixed rate bonds with step-up, or extendable coupons, are excluded. All inflation adjusted coupon payout bonds are only applicable to the S&P/NZX Government Inflation-Linked Bond Index.

**Collateral Types.** Except for Covered Bonds, bonds secured by mortgages are ineligible.

**Bond Type.** Deferral option, callable, extendable, and perpetual bonds are ineligible.

**Size.** Bonds must have a minimum par amount of NZ\$ 100 million at each rebalancing selection date. The government holdings are excluded in determining par amount outstanding for sovereign bonds.<sup>1</sup>

**Reinvestment.** Coupon payments and maturity cash flows are invested in the index daily.

**Settlement.** Bonds settle prior to the rebalancing reference date. Standard index settlement convention is same-day (e.g., T+0), unless otherwise specified. For month ends that fall on a weekend, the interest accrued during the month will be reflected within the calendar month, regardless of settlement convention. For rates that are not available at month-end (e.g., a rate with an unknown reset), the accrual will be based on the current rate and adjusted the first business day of the next month.

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<sup>1</sup> The par amount outstanding for sovereign bonds takes into account tenders and repurchases in the primary market published by New Zealand Debt Management (NZDM), along with open market purchases by the Reserve Bank of New Zealand (RBNZ) via the Large Scale Asset Purchase Program. Effective May 17, 2021, RBNZ purchases for bonds approaching maturity are considered government holdings and are excluded from the par amount outstanding for index purposes.

# Index Construction

## Index Calculations

### S&P/NZX Bond Indices

**Constituent Weightings.** The indices are market-value-weighted.

**Calculation.** The total return is calculated by aggregating the interest return, reflecting the return due to paid and accrued interest, and price return, reflecting the gains or losses due to changes in the end-of-day price and principal repayments.

### S&P/NZX Swap Indices

The swap index replicates the return of a position in a receiver swap, plus a cash deposit at three-month Bank Bill Reference Rate (BKBM). The BKBM deposit nets out the floating side of the swap. Consequently, the index is solely concerned with a long position in a fixed rate 'synthetic' bond. The valuation is therefore determined by the present value of all future cash flows of the 'synthetic' bond. The coupon of the 'synthetic' bond equals to the latest swap rate on each rebalance day.

*For details regarding swap, bank bill, and call rate deposit index calculations, please refer to Appendices II and III, respectively.*

*For other information regarding Index Calculations, please refer to the S&P Dow Jones Indices' Fixed Income Mathematics Methodology.*

# Index Maintenance

## Rebalancing

**S&P/NZX Bond Indices.** The indices are reviewed and rebalanced in accordance with their stated schedule. The Index Committee, nevertheless, reserves the right to make adjustments to an index at any time that it believes appropriate.

Additions, deletions, and other changes to an index arising from the rebalancing are made provided the security's reference information and pricing are available by designated pricing and data providers on the rebalancing reference date. Changes to an index are published on the announcement date and become effective on the rebalancing date. Information related to the rebalancing is obtained and disseminated after the close of business.

## Non-Government Bonds and Government Bonds

Rebalancing Schedule	
Rebalancing Frequency	Monthly
Rebalancing Date	Last business day of the rebalancing period ( $T$ )
Announcement Date	$T -$ three business days ( $T-3$ )
Reference Date	$T -$ three business days ( $T-3$ )

\* All days reflect after the market close

## Only Additions and Par Amount Changes of Nominal and Inflation-Linked Government Bonds<sup>2</sup>

Rebalancing Schedule	
Rebalancing Frequency	Daily
Rebalancing Date	Every business day up to $T-4$
Announcement Date	Every business day up to $T-4$
Reference Date	Every business day up to $T-4$

\* All days reflect after the market close

## Ongoing Maintenance

For more information on treatment of defaults or lack of daily price data, please refer to the Defaults section of S&P Dow Jones Indices' Fixed Income Policies & Practices Methodology.

<sup>2</sup> The migration among maturity bands for government bonds is reviewed during each monthly rebalancing, so no government bond would be dropped from maturity bands during the daily rebalancings.



**S&P/NZX Swap Indices.** The indices are rebalanced on the last business day of each month whereby the underlying positions are terminated at market value and replaced with new par swaps and cash deposits.

**S&P/NZX Bank Bill Indices.** The 30-day bank bill index calculation represents the present value of a hypothetical portfolio consisting of an equal notional of bills with maturities ranging between 1 and 30 days. The 90-day bank bill index calculation represents the present value of a hypothetical portfolio consisting of an equal notional of bills with maturities ranging between 1 and 90 days.

A bill matures daily and is replaced by a new 30-day or 90-day bank bill, respectively. The hypothetical portfolio of bank bills is valued at either the 30-day, 60-day, or 90-day bank bill yield, depending on the number of days to maturity. Bills with maturities at or under 30-days are all valued using the 30-day bank bill yield, those with maturities between 31-days and 60-days are all valued using the 60-day bank bill yield, and those with maturities at or greater than 61-days are all valued using the 90-day bank bill yield.

*For more information on index calculation, please refer to Appendix III.*

**S&P/NZX Treasury Bill Rate Index (NZD).** The index calculation represents the present value of a hypothetical portfolio consisting of an equal notional of bills with maturities ranging between 1 and 90 days. A bill matures daily and is replaced by a new 90-day treasury bill. The hypothetical portfolio of treasury bills is valued at either the 30-day, 60-day, or 90-day treasury bill yield, depending on the number of days to maturity. Bills with maturities at or under 30-days are all valued using the 30-day treasury yield, those with maturities between 31-days and 60-days are all valued using the 60-day treasury yield, and those with maturities at or greater than 61-days are all valued using the 90-day treasury yield.

*For more information on index calculation, please refer to Appendix III.*

**S&P/NZX Call Rate Deposit Index.** The index represents the performance of a rolling overnight deposit and does not undergo a rebalancing in the manner of the indices described above.

### **Currency of Calculation and Additional Index Return Series**

Additional currency and currency hedged versions of the indices, as well as maturity, sector and rating-based sub-indices, may be available. For a list of available sub-indices and tickers, please refer to S&P Dow Jones Indices' Fixed Income Index Directory available at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).

*For more information on currency and currency hedged indices, please refer to S&P Dow Jones Indices' Fixed Income Index Mathematics Methodology.*

# Index Governance

## Index Committee

The S&P/NZX Fixed Income Index Committee maintains the indices. All members of the Committee are full-time professionals at S&P Dow Jones Indices or the NZX. Meetings are held whenever deemed appropriate.

The Committee oversees the management of the indices, including determinations of intra-rebalancing changes, maintenance and inclusion policies, and other matters affecting the maintenance and calculation of the indices.

In fulfilling its responsibilities, the Committee has full and complete discretion to (i) amend, apply, or exempt the application of index rules and policies as circumstances may require and (ii) add, remove, or by-pass any bond in determining the composition of an index.

The Committee may rely on any information or documentation submitted to it or gathered by it that the Committee believes to be accurate. The Committee reserves the right to reinterpret publicly available information and to make changes to the indices based on a new interpretation of that information at its sole discretion. All Index Committee discussions are confidential.

The Index Committee is separate from and independent of other analytical groups at S&P Global. In particular, the Index Committee has no access to or influence on decisions by S&P Global Ratings analysts.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to the daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

*For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Fixed Income Policies & Practices Methodology.*

# Index Policy

## Announcements

Announcements of any relevant information pertaining to the indices are made after market close. Press releases are posted on the S&P Dow Jones Indices' Web site at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).

## Holiday Schedule

Except for the following holidays, the indices calculate daily on all business days throughout the calendar year:

- New Zealand national holidays
- Wellington regional anniversary holidays
- Auckland regional anniversary holidays

A complete holiday schedule for the year is available at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).

## Rebalancing

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with reasonable advance notice where possible.

## End-of-Day Calculation

Index levels are calculated and published at the end of each business day via S&P Dow Jones Indices' Web site. This may be subject to change.

## Index Releases

Releases are issued by S&P Dow Jones Indices at the end of the business day.

## Recalculation Policy

For information on the recalculation policy, please refer to S&P Dow Jones Indices' Fixed Income Policies & Practices Methodology.

*For information on Calculations and Pricing Disruptions, Expert Judgment and Data Hierarchy, please refer to S&P Dow Jones Indices' Fixed Income Policies & Practices Methodology.*

## Contact Information

For questions regarding an index, please contact: [index\\_services@spglobal.com](mailto:index_services@spglobal.com).

# Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/), major quote vendors (see codes below), numerous investment-oriented websites, and various print and electronic media.

## Tickers

The table below lists headline indices covered by this document. All versions of the below indices that may exist are also covered by this document. Please refer to the [S&P DJI Methodology & Regulatory Status Database](#) for a complete list of indices covered by this document.

Index (Total Return Index)	BBG
<i>S&amp;P/NZX Bond Indices:</i>	
S&P/NZX NZ Fixed Interest Composite Index	SPBNZCT
S&P/NZX NZ Government Bond Index	SPBNGBT
S&P/NZX NZ Government Bond 0-3 Year Index	SPBNG3T
S&P/NZX NZ Government Bond 0-5 Year Index	SPBNG05T
S&P/NZX NZ Government Bond 3-7 Year Index	SPBNG37T
S&P/NZX NZ Government Bond 1+ Year Index	SPBNG1T
S&P/NZX NZ Government Bond 5+ Year Index	SPBNG5T
S&P/NZX NZ Government Bond 7+ Year Index	SPBNG7T
S&P/NZX NZ Inflation-Indexed Government Bond Index	SPBNILT
S&P/NZX NZ Inflation-Indexed Government Bond 5+ Year Index	SPBNIL5
S&P/NZX A-Grade Corporate Bond Index	SPBNCAT
S&P/NZX Investment Grade Corporate Bond Index	SPBNCIT
S&P/NZX Local Authority Bond Index	SPBNLAT
S&P/NZX Kauri Bond Index	SPBNKAT
S&P/NZX Kauri Bond 0-5 Year Index	SPBNK05T
S&P/NZX Kauri Bond 5+ Year Index	SPBNK5T
S&P/NZX Composite Kauri Bond Index	SPBNCKT
S&P/NZX Composite A-Grade Bond Index	SPBNCOT
S&P/NZX Composite Investment Grade Bond Index	SPBNCOIT
<i>S&amp;P/NZX Swap Indices:</i>	
S&P/NZX 1 Year Swap Index	SPBNS1T
S&P/NZX 2 Year Swap Index	SPBNS2T
S&P/NZX 3 Year Swap Index	SPBNS3T
S&P/NZX 4 Year Swap Index	SPBNS4T
S&P/NZX 5 Year Swap Index	SPBNS5T
S&P/NZX 7 Year Swap Index	SPBNS7T
S&P/NZX 10 Year Swap Index	SPBNS10T
S&P/NZX 12 Year Swap Index	SPBNS12T
S&P/NZX 15 Year Swap Index	SPBNS15T
S&P/NZX All Swaps Index (1Y – 10Y incl.)	SPBNSCT
S&P/NZX Short End Swap Index (1Y, 2Y & 3Y)	SPBNSST
S&P/NZX Short-Mid Curve Swap Index (1Y – 5Y incl.)	SPBNSMT
S&P/NZX Mid Curve Swap Index (3Y – 7Y incl.)	SPBNSMT
S&P/NZX Mid-Long End Swap Index (5Y, 7Y & 10Y)	SPBNSMLT
S&P/NZX Long End Swap Index (7Y & 10Y)	SPBNSLT
<i>S&amp;P/NZX Bank Bill Indices:</i>	
S&P/NZX 30-Day Bank Bill Index	SPBNB30T
S&P/NZX 90-Day Bank Bill Index	SPBNB90T
<i>Other Indices:</i>	
S&P/NZX Call Rate Deposit Index	SPBNCRT
S&P/NZX 90-Day Treasury Bill Index	SPBNT90T

**Index Data**

Daily index level data is available via subscription.

*For product information, please contact S&P Dow Jones Indices, [www.spglobal.com/spdji/en/contact-us](http://www.spglobal.com/spdji/en/contact-us).*

**Web site**

*For further information, please refer to S&P Dow Jones Indices' Web site at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).*

# Appendix I

## **S&P/NZX Investment Grade Corporate Bond and S&P/ASX Corporate Bond 0+ NZD Hedged 50/50 Blend Index (Custom)**

**Index Objective.** The index measures the equal weighted performance of the component indices.

**Underlying Indices.** S&P/NZX Investment Grade Corporate Bond Index and S&P/ASX Corporate Bond 0+ Index NZD Hedged. For information on the underlying indices, please refer to the S&P/NZX New Zealand Fixed Interest Index Series and S&P/ASX Australian Bond Index Series Methodology documents, available at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).

<b>Component Index</b>	<b>Index Code</b>
S&P/NZX Investment Grade Corporate Bond Index	SPBNCIT
S&P/ASX Corporate Bond 0+ Index NZD Hedged	SPBDACHT

**Constituent Weightings.** At each rebalancing, reset the weight of each underlying index to 50% of the total index weight at the close of the last trading day of the month.

**Index Calculation.** For information on the index calculation, please refer to the Weighted Return section of S&P Dow Jones Indices' Index Mathematics Methodology.

**Rebalancing.** The index rebalances monthly, effective after the close of the last business day of the month.

**Index Maintenance.** All index adjustments and corporate action treatments follow the component indices.

**Holiday Schedule.** Except for the following holidays, the indices calculate daily on all business days throughout the calendar year:

- New Zealand national holidays
- Wellington regional anniversary holidays
- Auckland regional anniversary holidays

*A complete holiday schedule for the year is available at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).*

**Currency of Calculation.** The index calculates in New Zealand dollars.

# Appendix II

## Swap Calculation

### Price

The present value of the swap calculates by summing the present value of all future flows of the 'synthetic' bond. The present value of a flow is the amount multiplied by an appropriate discount factor. The discount factor is derived through "bootstrapping", a process of deconstructing periodic market bills and swap rates and combining them through forward-substitution to derive the equivalent zero-coupon rates from today to a given maturity. The resulting zero-coupon curve is continuous and used to calculate discount factor by interpolation.

$$P = \sum_i PV_i = \sum_i DF_i * CF_i$$

where:

- $P$  = Swap price
- $Pv_i$  = Present value of future cash flow  $i$
- $Df_i$  = Discount factor of future cash flow  $i$
- $Cf_i$  = Cash flow amount for period  $i$

### **Yield to Maturity**

Yield to maturity is the internal rate of return derived based on the swap price.

$$P = \sum_{i=1}^n \frac{CF_i}{(1 + YTM)^i}$$

where:

- $P$  = Swap price
- $Cf_i$  = Cash flow amount for period  $i$
- $YTM$  = Yield to maturity

### **Modified Duration**

$$MD = \frac{D}{1 + \frac{Y}{2}}$$

$$D = \frac{1}{P} \times \sum_{i=1}^n \left( PV_i \times \frac{d_i}{365} \right)$$

where:

- $MD$  = Modified duration
- $Y$  = Market yield from linear interpolation of the NZFMA Mid-market swap and bill rates
- $D$  = Macaulay duration calculates as the weighted average maturity of the swap's cash flows, where the weights are the present value of the cash flows as a fraction of the swap's present value

Inputs and Yield Curve	
Inputs:	NZFMA Mid-market swap and bill rates from LSEG; New Zealand Reserve Bank Official Cash Rate (OCR)
Settlement Dates:	Same day ( <i>T</i> ) for cash and bill rates; <i>T</i> +2 for swap rates
Spot Rate:	OCR compounded for two days
Day Count:	Actual/365
Convention:	Interest rate swaps are semi-annually
Interpolation:	Linear interpolation of market rates is used to derive rates for intervening dates

Synthetic Bond Convention	
Coupon Rate:	NZFMA Mid-Market swap rate on the last business day of each month
Accrued Interest:	Interest is accrued daily at the current coupon rate
Day Count:	Actual/365
Coupon Frequency:	Semi-annually
First Accrual Date:	Rebalance day + 2

## Swap Index Calculation

### Individual Swap Index

Index levels calculate by taking the ratio of the swap price today and at the previous rebalancing and multiplying this by the index level at the previous rebalancing:

$$IndexTR_t = \frac{\sum_i PV_{i,t}}{\sum_i PV_{i,Rebalance}} * IndexTR_{Rebalance}$$

The index level yield to maturity and modified duration are from swaps directly for the individual swap indices.

### Aggregate Swap Index

Index levels calculate by an equally weighted average of the adjustment in each individual component swap since last rebalance, multiplied by the aggregate index level at the previous rebalancing.

$$IndexTR = \left( \sum_{i=1}^n \frac{1}{n} * \frac{P_{i,t}}{P_{i,rebalance}} \right) * IndexTR_{rebalance}$$

where:

- $P_{i,t}$  = The component swap price on the valuation day
- $P_{i,rebalance}$  = The component swap price at the previous rebalance
- $IndexTR_{rebalance}$  = The index level at the previous rebalance

Index level yield to maturity is the duration weighted average of the yield of all component swaps.

$$IndexYield = \sum_{i=0}^n \frac{D_i}{\sum_{j=0}^n D_j} * YTM_i$$

where:

- $D_i$  = Macaulay duration of the component swap
- $YTM_i$  = The component swap yield to maturity



Index level modified duration calculates based on the index Macaulay duration. Index Macaulay duration is the price weighted average of the Macaulay duration of all component swaps.

$$IndexMD = \frac{IndexD}{1 + \frac{IndexYield}{2}}$$

$$IndexD = \sum_{i=0}^n \left( \frac{P_i}{\sum_{j=0}^n P_j} * D_i \right)$$

where:

$IndexD$  = Index Macaulay duration

$P_i$  = The component swap price

$D_i$  = The component swap Macaulay duration

# Appendix III

## 30-Day Bank Bill Index Calculation

Index values are calculated by multiplying the previous day's index value by the ratio of the market value of the bank bill portfolio today to the market value on the previous day:

$$IndexTR_t = \frac{MVPortfolio_t}{MVPortfolio_{t-1}} * IndexTR_{t-1}$$

$$MVPortfolio_t = \sum_{i=0}^{i=29} \frac{1}{1+R_{30}(i/365)}$$

$$MVPortfolio_{t-1} = \sum_{i=1}^{i=30} \frac{1}{1+R_{30}(i/365)}$$

where:

$MV Portfolio_t$  = Market value of Bank Bill portfolio on day  $t$ .

$IndexTR_t$  = Index value on day  $t$ .

$i$  = The number of days to maturity.

$R_{30}$  = Mid 30-day bank bill rate provided by LSEG.

## 90-Day Bank Bill Index Calculation

Index values are calculated by multiplying the previous day's index value by the ratio of the market value of the bank bill portfolio today to the market value on the previous day:

$$IndexTR_t = \frac{MVPortfolio_t}{MVPortfolio_{t-1}} * IndexTR_{t-1}$$

$$MVPortfolio_t = \sum_{i=0}^{i=30} \frac{1}{1+R_{30}(i/365)} + \sum_{i=31}^{i=60} \frac{1}{1+R_{60}(i/365)} + \sum_{i=61}^{i=89} \frac{1}{1+R_{90}(i/365)}$$

$$MVPortfolio_{t-1} = \sum_{i=1}^{i=30} \frac{1}{1+R_{30}(i/365)} + \sum_{i=31}^{i=60} \frac{1}{1+R_{60}(i/365)} + \sum_{i=61}^{i=90} \frac{1}{1+R_{90}(i/365)}$$

where:

$MV Portfolio_t$  = Market value of Bank Bill portfolio on day  $t$ .

$IndexTR_t$  = Index value on day  $t$ .

$i$  = The number of days to maturity.

$R_{30}, R_{60}, R_{90}$  = Mid 30-day, 60-day, 90-day bank bill rates provided by LSEG.

## Treasury Bill Rate Index Calculation

Index values are calculated by multiplying the previous day's index value by the ratio of the market value of the treasury bill portfolio today to the market value on the previous day:

$$IndexTR_t = \frac{MVPortfolio_t}{MVPortfolio_{t-1}} * IndexTR_{t-1}$$

$$MVPortfolio_t = \sum_{i=0}^{i=30} \frac{1}{1 + R_{30(i/365)}} + \sum_{i=31}^{i=60} \frac{1}{1 + R_{60(i/365)}} + \sum_{i=61}^{i=89} \frac{1}{1 + R_{90(i/365)}}$$

$$MVPortfolio_{t-1} = \sum_{i=1}^{i=30} \frac{1}{1 + R_{30(i/365)}} + \sum_{i=31}^{i=60} \frac{1}{1 + R_{60(i/365)}} + \sum_{i=61}^{i=90} \frac{1}{1 + R_{90(i/365)}}$$

where:

$MV Portfolio_t$  = Market value of Treasury Bill portfolio on day  $t$ .

$IndexTR_t$  = Index value on day  $t$ .

$i$  = The number of days to maturity.

$R_{30}, R_{60}, R_{90}$  = Mid 30-day, 60-day, 90-day treasury bill rates provided by LSEG.

# Appendix IV

## Call Rate Deposit Index Calculation

$$IndexTR_t = \left(1 + \frac{n[T, T-1] * r}{365}\right) * IndexTR_{t-1}$$

where:

$n[T, T-1]$  = The number of days between the current and previous business days.

$r$  = The Official Cash Rate (OCR) published by the New Zealand Reserve Bank.

# Appendix V

## Methodology Changes

Methodology changes since 07/01/2015 are as follows:

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
Underlying pricing source for S&P/NZX Swap Indices	03/20/2020	Mid-market swap and bill rates provided by Refinitiv are used for EOD calculation.	NZFMA Mid-market swap and bill rates are used for EOD calculation.
Exclusion of Government Holdings from Par Amount Outstanding for Index Eligibility Purposes	12/31/2019	Government holdings are included in determining par amount outstanding for sovereign bonds.	Government holdings are excluded in determining par amount outstanding for sovereign bonds.
Index rebalancing schedule change to S&P/NZX Bond Indices	3/31/2017	S&P/NZX Bond Indices are normally reviewed and rebalanced in accordance with the monthly rebalancing procedure. The monthly rebalancing reference date is T-5 business days.	New Zealand government bonds are reviewed on a daily basis, including bond additions, taps and buybacks. Non-government bonds and the deletions of government bonds are reviewed on a monthly basis. The monthly rebalancing reference date is T-3 business days for both government and non-government bonds.
Month end index return calculation change to the S&P/NZX Bank Bill indices, S&P/NZX Call Rate Deposit Index, and S&P/NZX Swap Indices	07/26/2016	Accrued interest on non-business days, including weekends and holidays, are incorporated into the index return on the following business day.	The index return on the last business day of the month incorporates the accrued interest up to and including the last calendar day of the month. The first business day of the following month only accounts for the accrued interest from the first calendar day of the new month to the first business day.

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Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

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