

REFINITIV/iEDGE SINGAPORE FIXED INCOME INDICES

Index Methodology

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About this document

Intended readership

This document supports data use by Refinitiv Indices clients. Clients receive the data as part of their desktop license or may be licensed to use Indices from Refinitiv in a separate licensing agreement.

Background

The Refinitiv/iEDGE Singapore Bond Indices (SFI) are calculated by Refinitiv Datastream. Datastream has been calculating domestic government bond indices since 1985, based on the formulation recommended by EFFAS (European Federation of Financial Analysts Societies).

Refinitiv aims to offer as transparent and flexible a set of bond indices as possible. To this end, each index contains only those bonds that follow the rules agreed by the subcommittee and all indices have been rigorously back tested. All indices in the SFI series are calculated from January 2009.

Purpose and basic principles

The main purposes of bond indices are to act as a benchmark for portfolio management, an indicator of market performance and development, and a basis of comparison for different markets.

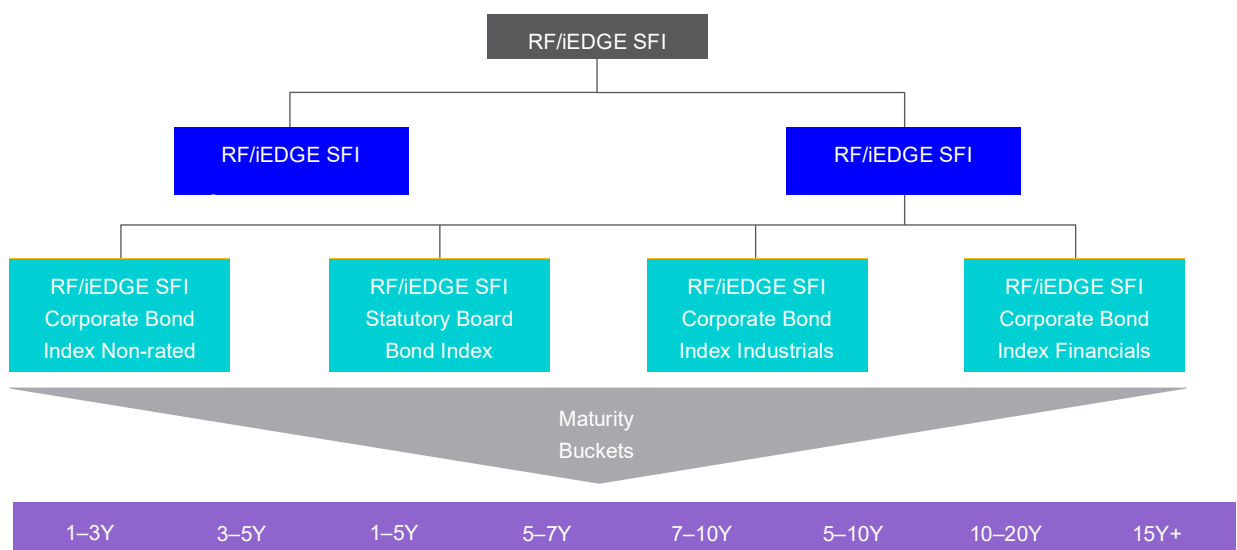
Bond index calculations should abide by several basic principles. They must reflect the experience of the average holder in the sector; have objective criteria for underlying selection and finally publish all calculations and selection criteria.

The SFI bond index suite is derived on the basis of an all traded index methodology. The indices include all traded issues and are primarily aimed at long term investors whose portfolios tend to encompass both liquid and illiquid bonds.

Index types

Overview of SFI Bond Index family

The Refinitiv/iEDGE Singapore Fixed Income Index family covers over 80% of the Singapore Dollar denominated plain vanilla bullet bond market. The flagship RF/iEDGE SFI composite index is divided into sub-indices as indicated in the below diagram. Please note that the non-rated sub-indices only have indices for 1–5Y, 5–10Y and 10Y+ maturities.



Available Data Types

DATA TYPE DESCRIPTION	DATA TYPE
Total Return Index	RI
Gross Price Index	PI
Clean Price Index	CI
Average Redemption Yield	RY
Redemption Yield Annualized	RA
Average Coupon	CO
Average Life	L
Average Duration	DU
Average Convexity	CX
Interest Paid This Year	XD
Market Value	MV
Average Current Yield	IY

General selection criteria

	REQUIREMENT
Currency of Denomination	Singapore Dollar
Market of Issue	Singapore
Remaining Term-to-Maturity	Greater or equal to 1 year and less than 50 years
Coupon Type	Bullet Bonds including callable bonds
Minimum Amount Outstanding	None
Excluded	Floating Rate Notes
	Convertibles
	CMBS/MBS/ABS
	Hybrid Bonds Variable Rate Bonds
<i>Band</i>	<i>Criteria</i>
1–3 Years	Bonds between 1 – 2.999 years
1–5 Years	Bonds between 1 – 4.999 years
3–5 Years	Bonds between 3 – 4.999 years
5–7 Years	Bonds between 5 – 6.999 years
5–10 Years	Bonds between 5 – 9.999 years
7–10 Years	Bonds between 7 – 9.999 years
10+ Years	Bonds equal and greater than 10 years
10–20 Years	Bonds between 10 – 19.999 years
15+ Years	Bonds equal and greater than 15 years

Selection times

Index lists are selected on the 1st working day of each month using values and details as of the last working day of the previous month.

Calculation times

Index data is calculated at approx. 10am Singapore time (2am GMT) for the previous days bond prices.

Calculation price basis

Current, historical and ongoing prices of the RF/iEDGE Singapore Fixed Income Indices rely on Refinitiv Pricing Service which is described in detail below.

Bond Pricing Overview

Each issue is individually priced by incorporating the following information, techniques, and resources:

- Terms and conditions in Refinitiv corporate bond database
- Refinitiv Evaluation staff
- Market color gathered from broker / dealer sources and contributed pricing
- Refinitiv Proprietary Bond Model
- Market news from Thomson Reuters Editorial staff
- Quality control checks

Terms and Conditions

Security terms and conditions are collected and maintained by Refinitiv full time data staff. Coverage includes:

- Credit ratings of issuers
- Amount issued/outstanding
- Deal underwriters
- Call/put schedules
- Coupon, maturity, and all significant reference data

New issue information is gathered from official prospectuses and offering documents obtained from public document libraries and underwriter solicitation. All data must pass multiple quality checks to ensure consistency and accuracy.

Evaluation Staff

The dedicated evaluators are reviewing Singapore government/ corporate bonds on daily basis. Each evaluator is responsible for gathering quotes, as well as maintaining current terms and conditions. Refinitiv Pricing Service has seven offices world- wide: Singapore, Sydney, Tokyo, Bangalore, Gdynia, London and New York.

Market Color and Pricing Model

Refinitiv has a wide network of real time contributors of SG Treasury prices. These contributors include over 10 secondary dealers and inter-dealer brokers. Refinitiv Evaluation staff updates SG Treasury prices throughout the day. The model incorporates real time on-the-run updates and dealer contributions. Evaluators compare the output with multiple price sources.

Most Singapore corporate issues are priced by dealer quote. Refinitiv receives market quotes from a number of dealers. Evaluators call street contacts for up-to-date quotes as needed. Evaluators examine all available quotes and choose the most accurate based upon parameters, such as underwriter status and historical reliability. Issues not quoted by the broker/dealer community are evaluated using theoretical assumptions based upon observable market data.

Market News

Thomson Reuters Editorial staff covers all financial markets globally. They have significant relationships with all dealer desks in major market locations. Evaluators are notified of all new issuances, news stories, and credit events through Refinitiv products and via internal e-mail and messaging systems.

Quality Control

Refinitiv employs vigorous quality control checks to ensure pricing accuracy. All issues that are flagged must be viewed by the assigned evaluator, as well as the desk team leader before prices are released to customers. Below are three tolerance check reports used in the quality control process:

- **Stale Report** - A daily report that alerts the evaluation team to any price that has not changed in the last 5 business days. Evaluators are responsible for checking each of these issues and providing a detailed report as to why the price is stale.
- **Tolerance Report** - A daily report that shows all bonds moving by more than 2% from the prior day. Evaluators and team manager must approve the change and give a detailed report on the movement before prices can be released to customers.
- **Stale Contributor Report** - A monthly report that tracks prices from Refinitiv Pricing Service contributors. This report compares prices on a monthly basis to ensure that all contributors are keeping their prices up to date. Prices that are stale are investigated further for news about mergers, or any other information that might have led to a stale price.

Formulas

NOTATION			
Z_t	Value of criterion Z at time t	Y	Redemption yield to assumed maturity
Z_{t-1}	Value of criterion Z at time (t-1)	L	Life to assumed maturity
Z_0	Initial value of criterion Z	D	Duration
$Z_{i,t}$	Value of criterion Z for the ith security at time t	X	Convexity
P	Clean price of the bond (without accrued interest) Based on a middle price	C	Coupon rate%
$P_{i,t}$	Clean price of the ith bond at time t	$G_{i,t}$	Value of any coupon payment received from the ith bond at time t or since time (t-1). If none, the value = 0
$P^*_{i,t}$	Clean price of the ith bond at time t, adjusted for any partial serial redemptions. At all other times it is the same as the unadjusted price P	R	Redemption price of the bond
A	Accrued interest to the "normal" settlement date	N	Nominal value of amount outstanding is known, otherwise the issued amount
P^*	<p>For serial bonds: When a serial bond is partly redeemed the price of the bond may jump as a result of the rump of the issue being quoted ex the partial redemption. Market convention assumes that the part of the bond being called for redemption is now worth the redemption price, and on the premise that the investor should not gain or lose money on this partial redemption, the current price is adjusted according to the following formula:</p> <p>Where: NC_t is the amount called for redemption at time t</p> <p>N_t is the amount remaining in issue (ex the amount called) at time t</p> <p>R_t is the redemption price of the bonds being called at time t</p> <p><i>Note: This assumes any moneys from the partial redemption are available for reinvestment on the ex date as opposed to the actual early redemption date.</i></p> <p>At other times P^* is the same as P.</p>		

Clean Price Index (CI):

$$CI_0 = 100$$

$$CI_t = CI_{t-1} * \frac{\sum_i P_{i,t} * N_{i,t}}{\sum_i P_{i,t-1} * N_{i,t-1}}$$

Gross Price Index (PI):

The accrued interest (AI) in the gross price is given by:

$$AI_t = \frac{\sum_i A_{i,t} * N_{i,t}}{\sum_i P_{i,t} * N_{i,t-1}}$$

where the summations are over the bonds currently in the index.

The Gross Price Index (PI) is then:

$$PI_t = CI_t * (1 + AI_t)$$

Total Return Index (RI):

where the summations are over the bonds currently in the index. CP is an adjustment made for bonds which have ex-dividend

$$RI_0 = 100$$

$$RI_t = RI_{t-1} * \frac{\sum_i (P_{i,t} + A_{i,t} + CP_{i,t} + G_{i,t}) * N_{i,t-1}}{\sum_i (P_{i,t-1} + A_{i,t-1} + CP_{i,t-1}) * N_{i,t-1}}$$

periods – when a bond goes ex-dividend, CP has a value equal to the next coupon payment; outside the ex-dividend period $CP=0$.

This compensates for the sharp drop in accrued interest when a bond goes ex-dividend. For any bonds currently in the index that have serial redemption features, an adjustment is made when t falls within the period between the drawing date and the next serial redemption date. For such bonds the calculation is:

$$RI_t = RI_{t-1} * \frac{\sum_i N_{i,t-1} * (P_{i,t} + A_{i,t}) + G_{i,t} * (N_t + NC_{i,t}) + CP_{i,t} * (N_t + NC_{i,t}) + NC_{i,t} * (R_{i,t} + A_{i,t})}{\sum_i N_{i,t} * (P_{i,t-1} + A_{i,t-1}) + NC_t * (R_t + A_{i,t-1}) + CP_{i,t} * (N_t + NC_{i,t})}$$

Note: when $t =$ drawing date, $N_{i,t-1} = N_{i,t-1} + NC_{i,t}$

Interest Paid this Year (XD):

The interest paid this year calculation gives the accumulated income expressed as a percentage of the gross price index. It is reset at the start of each year. The interest paid calculation enables the total return index to be adjusted for portfolios subject to tax on income received.

$$XD_{ts} = 0$$

where $ts =$ the time at the end of each calendar year

$$XD_t = xd_{t-1} + Pl_{i,t} * \frac{\sum_i G_{i,t} * N_{i,t-1}}{\sum_i (P_{i,t-1} + A_{i,t-1}) * N_{i,t-1}}$$

where the summations are over the bonds currently in the index.

Average Coupon (CO):

$$CO_t = \frac{\sum_i C_{i,t} * N_{i,t}}{\sum_i N_{i,t}}$$

where the summations are over the bonds currently in the index.

Average Life (L):

$$L_t = \frac{\sum_i L_{i,t} * N_{i,t}}{\sum_i N_{i,t}}$$

where the summations are over the bonds currently in the index.

Average Duration (DU):

$$DU_t = \frac{\sum_i D_{it} * (P_{it} + A_{it}) * N_{it}}{\sum_i (P_{it} + A_{it}) * N_{it}}$$

where the summations are over the bonds currently in the index.

Average Convexity (CX):

$$CX_t = \frac{\sum_i X_{it} * (P_{it} + A_{it}) * N_{it}}{\sum_i (P_{it} + A_{it}) * N_{it}}$$

where the summations are over the bonds currently in the index.

Average Redemption Yield (RY):

$$RY_t = \frac{\sum_i Y_{it} * D_{it} * (P_{it} + A_{it}) * N_{it}}{\sum_i D_{it} * (P_{it} + A_{it}) * N_{it}}$$

where the summations are over the bonds currently in the index. Yields are compounded according to the conventions of the market (for example, semi-annually in the UK and USA and annually in France).

Average Redemption Yield – Annualised (RA)

This is calculated according to the previous formula, except that all yields are compounded annually. This facilitates cross-country comparisons.

Average Current Yield (IY):

The current yield of a bond is also known as a flat, running or interest yield. It is given by:

$$IY_t = \frac{100 * \sum_i C_{it} * N_{it}}{\sum_i P_{it} * N_{it}}$$

where the summations are over the bonds currently in the index.

Market Value (MV)

$$MV_t = \sum_i (P_{it} + A_{it}) * N_{it}$$

where the summations are over the bonds currently in the index. The value is expressed in local currency, in thousands.

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Your questions about the document, suggestions, and contributions are welcome, please send an e-mail to: Index_Queries@refinitiv.com or data@sgx.com.
