UOB SGS INDEX

Singapore Government Securities Index
Technical Manual

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1. OVERVIEW

1.1 Summary

The UOB SGS Index is designed to provide Singapore fund managers and interest rate market participants with a Singapore government bond index calculated using internationally accepted practices. The index is an accumulation index incorporating price and income components covering only Singapore government bonds.

This Index will allow treasurers, fund managers, plan sponsors (or trustees) and consultants the first consistent way to measure the performance of the Singapore fixed interest market.

1.2 Benefit to Fixed Interest Participants

Treasurers

The UOB SGS Index provides an independent benchmark by which to measure performance of treasury operations.

Plan Sponsors or Trustees

It provides a means for the comparison of manager performance in the same way equity indices may be used.

Fund Managers

It provides managers with an index that can be used as an acceptable benchmark against which to measure performance.

1.3 International Practice

The UOB SGS Index follows international convention with respect to:

- **Coverage of Index:** The Index currently comprising 3 sub-indices, is representative of the market in terms of weight and coverage.

- **Ability to Replicate:** The Index contains bonds that can be dealt in the market and are known in advance. This ensures that a portfolio which will track the Index can be constructed.

- **Release Times:** Values are available shortly after the market closes each day.

- **Market Movements:** Return calculations are based on changes in the value of a portfolio so that the Index will reflect market movements.

- **Accurate Data Source:** The Index uses market closing prices as the basis of calculation.

- **Choice of Maturity:** Apart from the All Series Sub-Index, there is also a choice of 2 other sub-indices to ensure that the specific needs of market participants are met. Only bonds with outstanding maturities of 1 year or longer are included in the Index.

2. DETAILS OF INDEX CALCULATIONS

The UOB SGS Index was jointly developed by UOB and Quant Shop to measure the performance of Singapore government bonds in the fixed interest market. Details of the Index are set out below:

2.1 Coverage

Bonds — The face value of the bonds on issue is reconciled with the list of book entry government bonds as at each month-end issued by the Monetary Authority of Singapore.

Maturities — All outstanding maturities of 1 year and longer.

Types — There are 3 separate indices created under the UOB SGS Index covering 3 distinct time periods. The breakdown allows market participants to better target their portfolio requirements with a benchmark. The indices are:

All Series: This covers government bonds with outstanding maturities of 1 year or longer and this represents the total market.

Short: This covers government bonds with outstanding maturities of 1 year or longer but less than 3 years – suitable for short term investors to use as a benchmark.

Long: This covers government bonds with outstanding maturities of 3 years or longer – for those investing at the longer end of the curve.

2.2 Characteristics

Start Date	January 1995
Start Level	100.00
Revaluations	Daily, at close of business prices using the formula shown in Section 4 herein
Pricing Basis	Market quoted clean prices
Weightings	Gross market value on date of revaluation
Reinvestment	Coupons are added on coupon payment dates. Effectively, the cash is reinvested in proportion to the market value of each bond.
Rebalancing	Occurs when a bond is no longer eligible for inclusion or there has been a change in the bonds on issue

2.3 Inclusion and Exclusion of Bonds

2.3.1 Daily Index

Inclusion	When there is a new issue or reissue of bonds, it is included in the All Series Sub-Index as well as either of the other two Sub-Indices, i.e., Short or Long, on issue date.
Exclusion	A bond is excluded whenever there is reason to do so, e.g. early redemption, or when it is no longer eligible for inclusion, i.e. has outstanding maturities of less than 1 year for the All Series and Short Sub-Indices and less than 3 years for the Long Sub-Index.
Between Sub-Indices	When a bond reaches the point where it has an outstanding maturity of less than 3 years, it moves from the Long to the Short Sub-Index. What is included in the Short Sub-Index is removed from the Long Sub-Index.

2.3.2 Historical Monthly Data

Inclusion	New issues or reissues of bonds are added to the Index on the date when the issue or reissue takes place.
Exclusion	A bond is excluded from the valuation whenever there is a reason to do so or it is no longer eligible for inclusion.
Between Sub-Indices	When a bond reaches the point where it has an outstanding maturity of less than 3 years, it is moved from the Long to the Short Sub-Index on the date when the change in outstanding maturity takes place.

2.4 Duration

In addition to maturity of a bond portfolio, the most common guide to the impact of time on a portfolio is Macauley's modified duration. This shows the approximate percentage change in a bond's price for a 100 basis point parallel shift in the yield curve assuming that the bond's cash flow does not change when the yield curve shifts. So a bond with a modified duration of 5 years will change by approximately 5% for a 100 basis point parallel shift in the yield curve.

3. ABOUT BOND INDICES

3.1 Causes of Index Level Changes

- **Accrued Interest:** With the passage of time, the accumulation Index will steadily increase due to the interest earned on the bonds in the index portfolio. Since the Index includes the value of accumulated interest, this effect occurs day by day, rather than just on coupon payment days. This impact must always be positive.

- **Changing Yield:** These are the major source of movements. A rise in yield implies a fall in prices and the Index. A fall in yield, all other things being equal, implies a rise in the Index.

- **Reducing Maturity:** The closer the bond is to maturity, the smaller will be the impact of differences between yield (market price) and coupon (determined at issue). So bonds priced at a discount will slowly increase in value over time, all other things being equal, while *those* priced at a premium will slowly decrease in value.

3.2 Weights in the Index

The UOB SGS Index is market weighted. That is, the weight of a bond in the Index is the market value of that bond divided by the total value of all bonds on issue:

Market value of Bond / Total Value of All Bonds on Issue

3.3 Rebalancing

The Index automatically rebalances for price changes. A rise in the price of a particular bond will increase its weighting in proportion to the rise in market value.

So, the portfolio representing the Index only needs to be revalued to provide a new index value.

Rebalancing takes place when one of the following occurs:

- Coupon payment (on the coupon payment date);
- Bond is no longer eligible for inclusion (e.g., less than 3 years or less than 1 year);
- New issue of a bond; and/or
- Any other change in the amount of bonds on issue

At the end of the day, the portfolio is:

- Revalued to provide the Index figure;
- Rebalanced for the next period

As the number and volume of the bonds on issue change, the Index is not distorted by changes in composition of the Index. Essentially, this is because all the bonds in the Index at the end of a given day are sold for their end-of-day prices. The proceeds are then used to purchase a new set of bonds in their market value proportions.

3.4 Reinvestment

All coupons and maturities are reinvested in bonds at their market value proportions on valuation day.

So, coupon income from a bond is reinvested across the whole portfolio. This takes place on the coupon payment date as the coupon cash would not be available until the payment date in a real portfolio.

4. INDEX INFORMATION

4.1 Source of Daily and Monthly Index Date:

Information on the UOB SGS Index is readily available to the public. On a daily basis, the UOB SGS Index is available from the following sources:

- UOB's website at www.uob.com.sg
- Quant Shop's website at www.quantshop.com (monthly data only)
- Reuters
- Bloomberg

In addition, major newspapers in Singapore, e.g. The Straits Times, The Business Times and Lianhe ZaoBao carry the UOB SGS Index.

4.2 Relevant Formula

4.2.1 Index Value

Index value at a time t is given by:

$$I_t = \sum_{i=1}^{n} (P_{it} + A_{it} + C_{it})$$

Where:
I_t = Index at time t
P_{it} = Price of i-th bond at time t
A_{it} = Accrued interest on i-th bond at time t
C_{it} = Coupons received on i-th bond this period
i = Number of bonds on issue

4.2.2 Modified Duration

$$\text{MDuration} = \frac{\text{Duration}}{1 + \left(\frac{\text{Market Yield}}{\text{Coupon payments per year}}\right)}$$

5. FURTHER INFORMATION

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