the SMALL exchange

Methodology

10 Year U.S. Treasury Yield Index

Description

The Small 10 Year U.S. Treasury Yield Index is based on the U.S. 10-year yield to maturity of the on-the-run U.S. 10 Year Treasury Note. The Index is expressed as the computed yield multiplied by 1,000.

As an example, a US Treasury yield to maturity of 0.91% is equivalent to a Small 10Yr US Treasury Yield index of 9.91. This is 0.91% = 0.0091 x 1,000 = 9.91.

Composition of the Index

The Index takes the auctioned 10-year Treasury Note (which is considered "on-the-run"), and from this Note's coupon, time until maturity and currently traded midpoint, calculates a yield-until-maturity using a transparent closed-form solution.

Calculation of the Index is comprised of three steps: (1) **Selection**, (2) **Calculation**, and (3) **Indexing**.

1) **Selection.** Note specifics can be found on the U.S. Department of the Treasury Bureau of the Fiscal Service website: https://www.treasurydirect.gov/.

   For clarity, the "on-the-run" U.S. Treasury Note is the most recently issued 10-year U.S. Treasury Note; these are currently auctioned February, May, August, and November. Auctions are historically announced publicly the week before the auction detailing the issue date, maturity date, and coupon rate so participants can prepare their bids in advance.

   Days after the auction, there may be other notes or bonds with longer durations in the past that now more closely match a 10-year maturity – these are not used in the calculation of the Small 10-Year U.S. Treasury Index unless specifically auctioned as a 10-year Note.

   Because of this auction format, there are four times per year that the 10-year on-the-run issue will roll to a new security with a new CUSIP number. When the 10-year on-the-run issue rolls to a new CUSIP, the note has exactly 10 years to maturity. The day before the roll, the on-the-run has roughly 9.75 years to maturity (as two months, 29 days have passed since the last auction) and, the next day, the maturity will jump back to 10 years.

2) **Calculation.** The yield to maturity (YTM) is calculated using the following:

$$\text{YTM} = \frac{\text{Coupon} + \frac{\text{Face Value} - \text{Current Note Price}}{\text{t}}}{\frac{\text{Face Value} + \text{Current Note Price}}{2}}$$

   Where:

   Coupon = Coupon payment out of $100.
   Face Value = Face value of the note. I.e. This is $100 for the index.
   Current Note Price = Mid-price of the note's bid and offer

t = Years to maturity from the current day of the quote, to the maturity of the note. Time is a precision of 4 decimal points, e.g., 0.0001.

Example

On Feb 21, 2020, the current on-the-run 10-Year U.S. Treasury Note was CUSIP 912828Z94.
Note's Full Maturity = 10 years, Feb 15, 2030
Coupon = 1.50%
On Feb 21, 2020 at 14:59, the bid price=100.265625 and the ask price = 100.281250; making the mid-point=100.273438.

Therefore:

C = 1.50, since 1.50% of 100 face value
F = 100
P = 100.273438
t = 9.9918 years; the fraction of days left until maturity

$$\text{Approximate YTM} = \frac{C + \frac{F - P}{t}}{\frac{F + P}{2}} = \frac{1.5 + \frac{100 - 100.273438}{9.9918}}{\frac{100 + 100.273438}{2}} = 0.014706$$

The example calculated yield is therefore, $0.014706 = 1.47\%$.

3) **Indexing.** The index is current on-the-run U.S. Treasury 10-year Note yield to maturity multiplied by 1,000.

Index price = 1000 × YTM as a decimal

Example

The on-the-run 10-Year Treasury has a calculated Yield of 0.014706=1.4706%, the Index price would be 14.706=14.71.

Roll of the "On-the-Run" U.S. Treasury

The existing on-the-run U.S. Treasury note will be used for index publishing until 6:00 PM CT on the established quarterly auction date – even when the auction results are reported at noon of that day. After the end of the day of the auction, the new on-the-run CUSIP will be used for the published calculation until the next auction/roll.

In the case a quarterly auction does not occur on the expected quarterly date, the existing 10-Year U.S. Treasury is kept until a new 10-year is auctioned.

Definitions

On-the run 10-Year U.S Treasury Note. The most recently issued 10-Year U.S. Treasury Note.
CUSIP. The identifier.
Face Value. This is $100 for all U.S. Treasures that will be used for this Index.
Maturity. Currently, 10-year U.S. Treasury notes are auctioned quarterly.
Price. The price is defined as the mid-point of the note's bid and offer.
Coupon Rate. The coupon rate is taken from the U.S. Treasury Note. For example, an annual 1.50% coupon rate on a $100 face value is a $1.50 annual coupon payment.

Current Components and Inputs

The auctioned on-the-run 10-Year U.S. Treasury CUSIP can be found on the U.S. Department of the Treasury Bureau of the Fiscal Service website https://www.treasurydirect.gov/instit/instit.htm. Additional information such as coupon and maturity can be found as well.