Floating Rate Instruments

To assist in broadening the understanding of Floating Rate Notes, WATC has provided the following example to demonstrate how FRNs are priced.

Overview

Floating Rate Notes (FRNs) offer variable interest payments during the life of the instrument as the rate is periodically reset according to a predetermined money market reference rate such as the Bank Bill Swap Reference Rate (BBSW).

Coupon payments are calculated at the beginning of each coupon period, subsequent coupon payments are not known. The pricing of FRN involves discounting the principal and the next coupon payment using today's interest rates, similar to fixed rate securities. However, it is also necessary to calculate the value of the differential between the agreed margin and the margin at which the instrument is currently trading for all the future payments until maturity.

Formula

The formula for calculating the price of a FRN is:

$$P = \left[\frac{\left((BBSW_{last} + IM) \times \frac{d}{365}\right) + \left(\frac{(IM-TM)}{4} \times a_n\right) + 1}{\left(1 + (r+TM) \times \frac{f}{365}\right)}\right] \times 100$$

Where: P = FRN price per $100 of face value
$BBSW_{last}$ = BBSW rate from last reset date to next interest payment date (coupon date)
d = number of days in the current interest period
IM = issued or initial margin relative to BBSW
TM = traded margin relative to BBSW
r = BBSW rate from settlement date to next coupon date
f = number of days from settlement date to next coupon date
n = number of remaining complete interest periods to maturity as at the next coupon date
s = the nominal annual swap rate, assuming quarterly compounding, from settlement to FRN maturity

and

$$i = \frac{s+TM}{4}$$

$$v = \frac{1}{1+i}$$

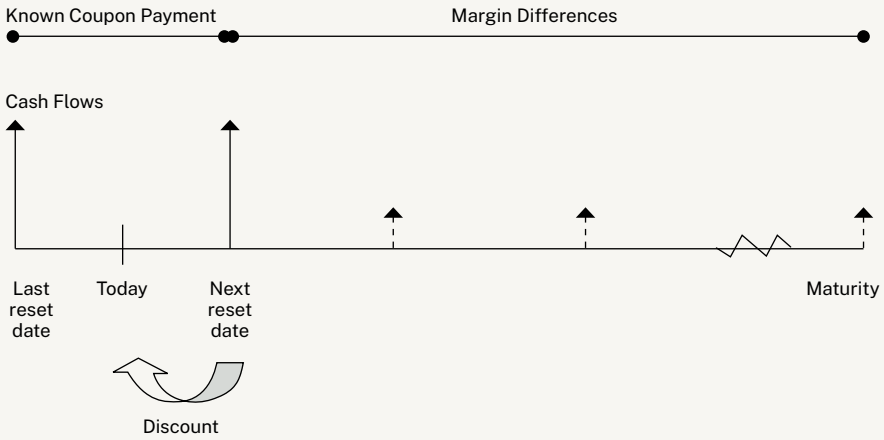
$$a_n = \frac{1-v^n}{i}$$

Note About This Formula

The above formula is based on quarterly interest payment periods (coupons). Appropriate adjustments are required where the interest payment period is not quarterly.

Pricing Equation

This pricing equation can be illustrated as follows:



Thus, the equation can be divided into the following 3 parts:

$\left((BBSW_{last} + IM) \times \frac{d}{365}\right)$ – Calculates the next known coupon payment.

$\left(\frac{IM-TM}{4} \times a_n\right)$ – Calculates the present value (at the next coupon date) of the difference between the agreed margin and the margin at which the FRN is currently trading for all the future payments until maturity as an annuity stream.

$\left(1 + (r + TM) \times \frac{f}{365}\right)$ – Discounts the above two payment streams back to settlement date.

Example

Today is 15 August 20*XX*. Calculate the price for an FRN based on the following details:

- It was issued at a margin of 30 basis points (0.30%) above BBSW
- It matures on 15 September 20*XY* (4+ years from 15 August 20*XX*)
- Quarterly interest payment periods (coupons)
- 3 month BBSW rate at previous interest payment was 4.90%
- FRN is currently trading at a margin of 15 basis points (0.15%) above BBSW
- Current swap rate (nominal annual rate assuming quarterly compounding) to maturity is 5.40%
- Bank bill rate from today to next coupon date is 4.97%.

Inputs: $BBSW_{last}$ = 0.049 (4.90%)

d = 92

IM = 0.0030

TM = 0.0015

r = 0.0497 (4.97%)

f = 31

n = 16

s = 0.054 (5.40%)

$i = \frac{s+TM}{4}$ = (0.054 + 0.0015)/4 = 0.013875

$v = \frac{1}{1+i}$ = 0.986315

$a_{n=\frac{1-v^n}{i}}$ = 14.260287

$$P = \left[\frac{\left((BBSW_{last} + IM) \times \frac{d}{365}\right) + \left(\left(\frac{IM - TM}{4}\right) \times a_n\right) + 1}{\left(1 + (r + TM) \times \frac{f}{365}\right)}\right] \times 100$$

$$P = \left[\frac{\left((0.049 + 0.0030) \times \frac{92}{365}\right) + \left(\left(\frac{0.0030 - 0.0015}{4}\right) \times 14.260287\right) + 1}{\left(1 + (0.0497 + 0.0015) \times \frac{31}{365}\right)}\right] \times 100$$

P = $101.4045