Learning Module 8: Yield and Yield Spread Measures for Floating Rate Instruments

Q.204 A Treasury Bill (T-Bill) with a par value of USD 1,000,000 and 200 days until maturity is selling for USD 990,000. Its bank discount yield is *closest to*:

A. 0.54%

B. 1.80%

C. 1.82%.

The correct answer is **B.**

The following formula determines the bank discount yield;

$$\text{PV} = \text{FV} \times [1 - \frac{\text{Days}}{\text{Year}} \times \text{DY}]$$

Where; PV = Current selling price of the T-Bill. FV = Par value of the T-Bill. DY = Discount yield. Therefore;

$$990,000 = 1,000,000 \times [1 - \frac{200}{360} \times \text{DY}] \Rightarrow \text{DY} = 1.8\%$$

A is incorrect. Divides the number of days with days to maturity as follows:

$$1,000,000 \times [1 - \frac{360}{200} \times \text{DY}] = 990,000 \Rightarrow \text{DY} = 0.54\%$$

C is incorrect. It assumes a 365-day year:

$$990,000 = 1,000,000 \times [1 - \frac{200}{365} \times \text{DY}] \Rightarrow \text{DY} = 1.82\%$$

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Q.207 A Treasury bill with a face value of $10,000 and 150 days until maturity is selling for $9,650. The T-bill's money market yield is *closest to*;

A. 8.40%

B. 8.65%

C. 8.70%

The correct answer is **A.**

The money market yield is calculated as:

$$\text{DR} = \frac{\text{Year}}{\text{Days}} \times \left(\frac{\text{FV-PV}}{\text{FV}}\right) = \frac{360}{150} \times \left(\frac{10{,}000\text{-}9650}{10{,}000}\right) = 8.40\%$$

B is incorrect. It assumes the 365-day year.

C is incorrect. It calculates the add-on rate instead of discount rate.

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Q.212 A $10,000 par value T-Bill is selling for $9,850. There are 150 days until maturity. The bank discount yield is *closest to*:

A. 3.60%

B. 3.56%

C. 3.65%

The correct answer is **A.**

$$\text{PV} = \text{FV} \times [1 - \frac{\text{Days}}{\text{Year}} \times \text{DY}]$$

So that:

$$9,850 = 10,000 \times [1 - \frac{150}{360} \times \text{DY}] \Rightarrow \text{DY} = 3.60\%$$

B is incorrect. It assumes annual compounding:

$$10000[1 - \text{DY}]^{\frac{150}{360}} = 9850 \Rightarrow \text{DY} = 3.56\%$$

C is incorrect. Assumes 365-day year:

$$9,850 = 10,000 \times [1 - \frac{150}{365} \times \text{DY}] \Rightarrow \text{DY} = 3.65\%$$

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Q.853 The redemption yield is the rate of return based on certain assumptions. Which of the following is *least likely* an assumption for calculating the redemption yield?

A. The investor holds the bond to maturity.

B. The investor is able to reinvest coupon payments at a different yield.

C. The issuer makes all of the coupon and principal payments in full on scheduled dates.

The correct answer is **B.**

Reinvestment of coupon payments at the exact yield is a characteristic of the internal rate of return. Hence, it is the least likely option.

A is incorrect. Bond maturity is critical in the calculation of the present value given a discount rate.

C is incorrect. The bond issuer always makes all of the coupon and principal payments in full and on scheduled dates.

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Q.863 A frequently used benchmark for floating-rate notes is the:

A. LIBOR.

B. I-spread.

C. G-spread.

The correct answer is **A.**

The reason for its most frequent use is its nature (i.e., a composite interbank rate). Also, it is not a risk-free rate.

B is incorrect. I-spread is the difference between the yield on a bond and the swap rate.

C is incorrect. G-spread is the difference between the yield on treasury and corporate bonds of the same maturity.

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Q.2515 Which type of debt instrument typically has a more stable market value?

A. Fixed-rate debt instruments.

B. Floating-rate debt instruments.

C. Both fixed-rate debt and floating-rate debt instruments.

The correct answer is **B.**

Fixed-rate debt values are more volatile compared to those of floating-rate notes of similar maturities. Fixed-rate debts are sensitive to interest rate changes, leading to fluctuations in their market value. On the other hand, floating-rate notes adjust their coupon payments with the reference rate, making their values more stable.

A is incorrect. Fixed-rate debts are sensitive to interest rate changes, leading to fluctuations in their market value.

C is incorrect. Both fixed-rate and floating-rate debt instruments do not have equally stable values. Floating-rate debt instruments are more stable because their coupon payments adjust with interest rate changes.

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Q.2516 If the discount margin is greater than the quoted margin, the floating rate note (FRN) will trade at:

A. Par.

B. A premium.

C. A discount.

The correct answer is **C.**

If the discount margin is greater than the quoted margin, the FRN will trade at a discount.

A is incorrect. The FRN will trade at par if the discount margin equals the quoted margin.

B is incorrect. The FRN will trade at a premium if the discount margin is less than the quoted margin.

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Q.2517 A $1,000 90-day T-bill is priced with an annualized discount of 1.2%. The annualized add-on yield based on a 365-day year is *closest to*:

A. 1.22%

B. 1.25%

C. 1.50%

The correct answer is **A.**

We will first determine the current price of the treasury bill (PV).

$$\text{PV} = \text{FV} \times (1 - \frac{\text{Days}}{\text{Year}} \times \text{DR})$$

Where
PV- Principal Amount (The price of the treasury bill).
FV = Face value of the treasury bond at maturity.
DR = Discount Rate.
Days = number of days between the settlement and maturity periods.
Year = number of days in a year.

$$\text{PV} = 1,000 \times (1 - \frac{90}{360} \times 0.012) = 997$$

Then we determine the AOR using the AOR formula. Note that we've been asked to use a 365-day year.

$$\text{AOR} = \frac{\text{FV} - \text{PV}}{\text{PV}} \times \frac{\text{Year}}{\text{Days}} = \frac{1,000 - 997}{997} \times \frac{365}{90} = 0.012203 \text{ or } 1.2203\%$$

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Q.2518 If a $1 million negotiable Certificate of Deposit (CD) with 120 days to maturity is quoted with an add-on yield of 1.4% based on a 365-day year, then the payment at maturity for this CD is *closest to*:

A. $1,004,500

B. $1,004,603

C. $1,001,400

The correct answer is **B.**

We need to calculate the FV using the add-on-rate formulae.

$$\text{PV} = \frac{\text{FV}}{(1 + \frac{\text{Days}}{\text{Year}} \times \text{AOR})}$$

Therefore,

$$\text{FV} = \text{PV} \times (1 + \frac{\text{Days}}{\text{Year}} \times \text{AOR}) = 1,000,000 \times (1 + \frac{120}{365} \times 0.014) = 1,004,602.74 \approx 1,004,603$$

A and C are incorrect. The correct answer is $ 1,004,603 as shown in the calculation above.

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Q.2677 A USD 1,000 face value T-bill is paying a Bank Discount Yield of 2.6%. The amount of the discount if the bill is maturing in 180 days is *closest to*:

A. USD 13

B. USD 26

C. USD 52

The correct answer is **A.**

The bank discount yield is calculated as follows;

$$\text{BDY} = \frac{\text{Discount}}{\text{Face value}} \times \frac{360}{\text{Time to maturity}}$$

Therefore;

$$\text{Discount} = \frac{\text{BDY} \times \text{Face value} \times \text{Time to maturity}}{360} = \frac{0.026 \times 1,000 \times 180}{360} = \$13$$

B is incorrect. It assumes the following calculation;

$$\text{Discount} = \frac{2.6}{100} \times 1,000 = \$26$$

C is incorrect. It assumes the following calculations;

$$\text{Discount} = \$26 \times \frac{360}{180} = \$52$$

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Q.2679 Which of the following return measures ignore(s) the effect of compound interest in calculating the yield to maturity?
I. Money Market Yield
II. Bank Discount Yield
III. Bond Equivalent Yield

A. I only

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B. I & II only

C. I, II & III

The correct answer is **C.**

The Bank Discount Yield (BDY), the Bond Equivalent Yield (BEY), and the Money Market Yield (MMY) all ignore the compounding effect, $(1 + i)^n$ where i is the interest rate and n the time, in the calculation of the YTM. For example, if the semiannual YTM is 3.75%, the bond equivalent yield is simply 3.75% * 2 = 7.5%.

Note: Formula for:

$$\text{Money Market Yield} = \text{HPY} \times \frac{360}{t}$$

, where HPY is the Holding Period Yield and t the time to maturity. HPY is obtained using the formulae

$$\text{HPY} = \frac{P_1 - P_o + D_1}{P_o}$$

, where P_o is the beginning price, P_1 the ending price and D_1 the cash distributions.

$$\text{Bank Discount Yield} = r_{BD} = \frac{D}{F} \times \frac{360}{t}$$

, where D is the discount, F is the face value and t the time to maturity.

$$\text{Bond Equivalent Yield} = \frac{F - P}{P} \times \frac{365}{t}$$

, where F is the face value, P the purchase price and t the time to maturity of the bonds.

Bond equivalent yield, when given a semi-annual yield is simply 2 × Semi annual Yield

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Q.3416 A $100 face-value T-Bill is currently trading for $95.78. If the residual maturity of the T-Bill is 90 days, then its bank discount yield is *closest* to:

A. 4.22%.

B. 4.41%.

C. 16.88%.

The correct answer is **C.**

$$\text{Bank Discount Yield(BDY)} = \frac{(\text{Face value} - \text{Price})}{\text{Face value}} \times \frac{360}{\text{Days to maturity}}$$
$$= \frac{(100 - 95.78)}{100} \times \frac{360}{90} = 0.1688 \text{ or } 16.88\%$$

A is incorrect. It assumes the following calculation for BDY;

$$\text{BDY} = \frac{(100 - 95.78)}{100} \times 100\% = 4.22\%$$

B is incorrect. It assumes the following calculation for BDY;

$$\text{BDY} = \frac{(100 - 95.78)}{95.78} \times 100\% = 4.406\%$$

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Q.3417 A T-Bill is currently trading at a price of $98.30 and has a residual maturity of 70 days. Assuming a face value of $100, and 365-day year, the effective annual yield is *closest* to:

A. 1.73%

B. 8.74%.

C. 9.35%.

The correct answer is **C.**

We need to calculate holding period yield:

$$\text{HPY} = \frac{(100 - 98.30)}{98.30} = 1.729\%$$

So that,

$$\text{Effective Annual Yield (EAY)}) = (1 + \text{HPY})^{\frac{365}{t}} - 1 = (1 + 0.01729)^{\frac{365}{70}} - 1 = 0.0935 \text{ or } 9.350\%$$

A is incorrect. It relates to the value of HPY as calculated above.

B is incorrect. The figure relates to the value of Bank Discount Yield as calculated below;

$$\text{Bank Discount Yield (BDY)} = \frac{(\text{Face value} - \text{Price})}{\text{Face value}} \times \frac{360}{t} = \frac{(100 - 98.30)}{100} \times \frac{360}{70} = 0.08743 \text{ or } 8.743\%$$

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Q.3418 A T-Bill is currently trading at $97.35 and has a residual maturity of 70 days. Assuming a face value of $100, the money market yield for this T-Bill is *closest* to:

A. 2.72%

B. 13.63%.

C. 14%.

The correct answer is **C.**

Money market instruments are instruments that have a maturity of less than 1 year. Therefore, the return must be translated into 360 days since money market instruments have a year that is considered to be 360 days.

1. First, calculate the holding period yield:

$$\text{HPY} = \frac{(100 - 97.35)}{(97.35)} = 2.72\%$$

2. Then, translate the yield into a money market yield:

$$\text{MMY} = \frac{360}{70} \times 2.72 = 14\%$$

A is incorrect. It relates to the HPY rate as calculated above.

B is incorrect. It relates to the value of the Bank Discount Yield as follows;

$$\text{BDY} = \frac{(100 - 97.35)}{100} \times \frac{360}{70} = 0.13629 \text{ or } 13.629\%$$

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Q.3419 For a 360-day year, the bond equivalent yield of a 120-day banker's acceptance quoted at a discount rate of 3.75% is *closest* to:

A. 1.266

B. 3.75%

C. 3.85%

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The correct answer is **C.**

We need first to find the present value of the banker's acceptance calculated as:

$$\text{PV} = \text{FV} \times (1 - \frac{\text{Days}}{\text{Year}} \times \text{DR})$$

Where

PV = present value or price of the money market instrument

FV = future value paid at maturity, or face value of the money market instrument

Days = number of days between settlement and maturity

Year = number of days in the year

DR = discount rate stated as an annual percentage rate

Thus, in this case we have:

$$\text{PV} = 100 \times (1 - \frac{120}{360} \times 0.0375) = 98.75$$

The bond equivalent rate is also called the add-on rate (AOR) which is given by (all variables are as defined above):

$$(\frac{365}{120}\times)(\frac{100 - \text{PV}}{\text{PV}}) = (\frac{365}{120}\times)(\frac{100 - 98.75}{98.75}) = 0.03850 \approx 3.85\%$$

Note: We are using a 360-day year for the PV and a 365-day year for the AOR.

A is incorrect. It indicates the HPY as follows;

$$\text{HPY} = \frac{(100 - 98.75)}{98.75} = 1.266\%$$

B is incorrect. It indicates the BDY as follows;

$$\text{BDY} = \frac{(100 - 98.75)}{100} \times \frac{360}{120} = 3.75\%$$

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Q.3420 The money market yield of a T-Bill with a residual maturity of 90 days is 9.80%. Assuming a face value of $100, the price of the T-Bill is *closest* to:

A. $96.61.

B. $98.61.

C. $97.61.

The correct answer is **C.**

$$\text{Money market yield} = \text{HPY} \times \left(\frac{360}{\text{Days to maturity}}\right)$$

where;

$$\text{HPY} = \text{MMY} \times \frac{t}{360} = 9.8$$

$$\Rightarrow \text{HPY} = \frac{\text{Discount}}{\text{Price}} = \frac{\text{FV}}{\text{Price}} - 1$$

Making the price the subject:

$$\text{Price} = \frac{\text{FV}}{1 + \text{HPY}} = \frac{100}{1 + 0.0245} = \$97.609$$

A and B are incorrect. The correct answer is $97.61 as calculated above.

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Q.3421 The bank discount yield of a T-Bill with a residual maturity of 110 days is equal to 2.30%. Assuming a face value of $100, the price of the T-Bill is *closest* to:

A. $98.30.

B. $99.30.

C. $97.30.

The correct answer is **B.**

$$\text{Bank Discount Yield} = \frac{\text{Discount}}{\text{FV}} \times \frac{360}{\text{t}}$$

$$\Rightarrow \text{Discount} = \text{BDY} \times \frac{\text{t}}{360} \times \text{FV} = 2.30\% \times \frac{110}{360} \times 100 = 0.70$$

$$\therefore \text{Price} = \text{FV-Discount} = 100 - 0.70 = \$99.30$$

A and C are incorrect. The correct answer is $97.30 as calculated above.

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Q.3422 A T-Bill with a residual maturity of 100 days has an effective annual yield of 4.45%. Assuming a face value of $100, the price of the T-Bill is *closest* to:

A. $98.81.

B. $100.

C. $97.81.

The correct answer is **A.**

$$\text{Effective Annual Yield} = (1 + \text{HPY})^{\frac{365}{t}} - 1$$

Where

$$\text{HPY} = (1 + 4.45\%)^{\frac{100}{365}} - 1 = 1.20\%$$

So that:

$$\text{Price} = \frac{\text{FV}}{1 + \text{HPY}} = \frac{100}{1 + 0.012} = \$98.814$$

B is incorrect. This is the future value.

C is incorrect. The correct answer is $98.814 as shown in the calculation above.

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Q.3423 If a bond with a residual maturity of 4 months has a holding period return of 2.60%, then the semiannual bond equivalent yield is *closest* to:

A. 7.99%.

B. 7.85%.

C. 8.00%.

The correct answer is **B.**

The bond equivalent yield is twice the semi-annual discount rate. The HPY is indicated for 4 months. The best method to solve this problem is converting the HPY into an annual rate:

Since 4 months * 3 = 12 months,

$1 + \text{Annual rate} = (1 + \text{HPY})^3$

$\text{Annual rate} = (1+ 2.60\%)^3 - 1 = 8.00\%$

Once we have the annual rate, we must convert the rate into a semi-annual rate.

$1+ \text{Annual rate} = (1+ \text{Semi-annual rate})^2$

$\text{Semi-annual rate} = (1+ \text{Annual rate})^{0.5} -1$

$= (1+8\%)^{0.5} – 1= 3.92\%$

Bond equivalent yield = 2 * 3.92% = 7.85%

A and C are incorrect. 8.00% is the annual rate.

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Q.3424 If a bond with a residual maturity of 3 months has a bond equivalent yield of 9.20%, then the holding period yield of the bond is *closest* to:

A. 9.41%.

B. 2.0%.

C. 2.3%.

The correct answer is **C.**

Step I - Find the semi-annual yield:

Semi-annual yield = BEY/2 = 9.20%/2 = 4.60%

Step II - Compute the annual yield from the semi-annual yield:

Annual yield = $(1+ \text{Semi-annual yield})^2-1$

$= (1+4.60\%)^2-1 = 9.41\%$

Step III - Compute the holding period yield:

$1 + \text{Annual yield} = (1+ \text{HPY})^{(12/\text{Residual maturity})}$

$1+9.41\% = (1+\text{HPY})^{(12/3)}$

$1+\text{HPY} = (1+9.41\%)^{(3/12)}$

1 + HPY = 1.023

HPY = 1.023 – 1 = 0.023= 2.3%

A and B are incorrect. The correct answer is 2.3% as calculated above.

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Q.3745 A US pension fund pays a 180-day banker's acceptance (BA) with a quoted add-on rate of 5% for a 365-day year. The BA has an initial principal of $ 100 million. The redemption value of the BA is *closest* to:

A. $102.47 million.

B. $102.50 million.

C. $106.75 million.

The correct answer is **A.**

The pricing formula for the money market instruments quoted on add-on rates is given by:

$$PV = \frac{FV}{(1 + \frac{Days}{Year} \times AOR)}$$

Where

PV = Principal amount (the price of the money mar)

FV = redemption value of the money market instrument at maturity (including the interest)

Days = number the days between the settlement and maturity periods

Year = number of days in a year

AOR = add-on rate (usually stated as an annual percentage rate)

So in our case,

$$\$100 \text{ million} = \frac{FV}{(1 + \frac{180}{365} \times 0.05)}$$

$$\Rightarrow FV = \$100 \times 1.024658 = \$102.47 \text{ million}$$

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Q.3746 A Canadian pension fund pays a 120-day banker's acceptance (BA) with a quoted add-on rate of 4.5% for a 365-day year. The BA has a redemption value of CAD 10.68 million and is priced at CAD 10.4 million. The applicable add-on rate is *closest* to:

A. 8.08%.

B. 8.19%.

C. 7.05%.

The correct answer is **B.**

The add-on rate can be calculated as:

$$\text{AOR} = (\frac{\text{Year}}{\text{Days}}) \times (\frac{\text{FV-PV}}{\text{PV}})$$

PV = principal amount (the price of the money mar)

FV = redemption value of the money market instrument at maturity (including the interest)

Days = number the days between the settlement and maturity periods

Year = number of days in a year

AOR = add-on rate (usually stated as an annual percentage rate)

So in our case,

$$\text{AOR} = (\frac{365}{120}) \times (\frac{10.68 - 10.4}{10.4}) = 8.19\%$$

A and C are incorrect. The correct answer is 8.19% as shown in the calculation above.

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