PRICEACT

Updated: 31 Mar 2016

Use PRICEACT to calculate the price from yield of a bond where the coupon amounts are calculated as the actual number of days in the coupon period divided by the number of days in the year. This means that the coupon amounts will vary from period. The number of days in the year is either 360, 365, or 366 based upon the day-count convention. PRICEACT also allows the entry of a forced redemption schedule.

The price of the bond is the discounted cash flow value of all the remaining payments minus the accrued interest.

The formula for the price of a bond with more than one coupon period to redemption using the actual number of days in each coupon period is:

$$\text{PRICE} = \text{DF}_1 \times \left(\text{CF}_1 + \cdots \left(\text{DF}_{n-2} \times (\text{CF}_{n-2} + \text{DF}_{n-1} \times (\text{CF}_{n-1} + (\text{CF}_n \times \text{DF}_n)))) \right) \right) - \text{R} \times \text{P} \times \frac{A}{\text{DIY}}$$

Where:

A	=	Actual number of days from the previous coupon date to the settlement date
CF_n	=	Cash Flow for period n
DF_n	=	Discount factor for period n
DIY	=	Number of days in the year in which the coupon payment occurs
n	=	Number of coupons from settlement date to maturity date
P	=	Par value of the security
R	=	Coupon rate

and

$$\text{DF}_n = 1 \Big/ \left((1 + \frac{Y}{F})^{t_n} \right)$$

Where

F	=	The number of coupon payments per year
t_1	=	Time, in years, from the settlement date to the first coupon date
t_n	=	Time, in years, of the coupon period
Y	=	Annual yield

and

$$\text{CF}_n = \begin{cases} \text{When } N = n \text{ then } P \times (1 + R \times t_n) \\ \text{Else } P \times R \times t_n \end{cases}$$

Where

P	=	Par value of the security
R	=	Coupon rate
t_n	=	Time, in years, of the coupon period

In the case where there are forced redemptions (i.e. partial repayments of principal prior to the maturity date of security), then the formula needs to be adjusted to reflect those redemptions in the cash flows (CF_n) and the price calculation then becomes:

$$PRICE = \frac{DF_1 \times \left(CF_1 + \cdots \left(DF_{n-2} \times \left(CF_{n-2} + DF_{n-1} \times \left(CF_{n-1} + (CF_n \times DF_n) \right) \right) \right) \right) \times P}{Prin}$$

$$- R \times P \times \frac{A}{DIY}$$

Where P/Prin is the par value divided by the outstanding principal balance as of the coupon date immediately prior to the settlement date.

In the case where the settlement date is in the final coupon then the formula for the price of the bond is the same as the formula used in PRICE function.

Syntax

```
Public Shared Function PRICEACT(
    ByVal Settlement As Date,
    ByVal Maturity As Date,
    ByVal Rate As Double,
    ByVal Par As Double,
    ByVal Yield As Double,
    ByVal Frequency As Double,
    ByVal Basis As String,
    ByVal Repayments As String,)
```

Arguments

Settlement

the settlement date of the security. *Settlement* is an expression that returns a **Date**, or of a type that can be implicitly converted to **Date**.

Maturity

the maturity date of the security. *Maturity* is an expression that returns a **Date**, or of a type that can be implicitly converted to **Date**.

Rate

the security's annual coupon rate. *Rate* is an expression that returns a **Double**, or of a type that can be implicitly converted to **Double**.

Par

the par value of the security. Any forced redemptions are subtracted from the par value on the redemption date and the adjusted balance is used in calculating the subsequent coupon interest. *Par* is an expression that returns a **Double**, or of a type that can be implicitly converted to **Double**.

Yield

the security's annual yield. *Yield* is an expression that returns a **Double**, or of a type that can be implicitly converted to **Double**.

Frequency

the number of coupon payments per year. For annual payments, *Frequency* = 1; for semi-annual, *Frequency* = 2; for quarterly, *Frequency* = 4; for bi-monthly, *Frequency* = 6, for monthly, *Frequency* = 12. *Frequency* is an expression that returns a **Double**, or of a type that can be implicitly converted to **Double**.

Basis

the type of day count to use.

Basis	Day count basis
1, "ACTUAL"	Actual/Actual
2, "A360"	Actual/360
3, "A365"	Actual/365
11, "ACTUAL NON-EOM"	Actual/Actual non-end-of-month
12, "A360 NON-EOM"	Actual/360 non-end-of-month
13, "A365 NON-EOM"	Actual/365 non-end-of-month

Basis is an expression that returns a **String**, or of a type that can be implicitly converted to **String**.

Repayments

a SELECT statement, as a string, which identifies the coupon dates and the forced redemption amounts to be used in the price calculation. *Repayments* is an expression that returns a **String**, or of a type that can be implicitly converted to **String**.

Return Type
Double

Remarks
- If *Basis* is invalid then an error is returned.
- If *Frequency* is invalid then an error is returned.
- If *Maturity* < *Settlement* then NULL is returned.
- If *Repayments* returns NULL then *Par* is used for all interest calculations and as the redemption value.
- If *Settlement* is NULL, *Settlement* equals the current system processing date.
- If *Frequency* is NULL, *Frequency* = 2.
- If *Basis* is NULL, *Basis* = 1.
- PRICEACT forces the principal balance of the bond to zero at maturity.

- If *Par* is NULL then *Par* = 100.
- If *Rate* is NULL then *Rate* = 0.
- If *Yield* is NULL then *Yield* = 0.
- If *Maturity* is NULL then PRICEACT returns NULL.
- If *Basis* = 3 or *Basis* = 13 then the number of days in a year is always 365.
- If *Basis* =2 or *Basis* = 12 then the number of days in a year is always 360.
- If *Basis* =1 or *Basis* = 1 then the number of days in a year is determined by the actual number of days in the year of coupon period end date.

See Also

- BONDCF - Cash flows for a bond paying regular periodic interest
- DIRTYPRICE - Dirty price of a bond
- DIRTYYIELD - Yield of a bond from the dirty price
- DIS - Price, discount rate, and/or yield of a discount security
- DISC - Discount rate
- DISFACTORS - Factors for the price calculation of a discount security
- IAM - Price and/or yield of a security paying interest at maturity
- IAMFACTORS - Factors for the price calculation of a security paying interest at maturity
- ODDFPRICE - Price of a bond with an odd first coupon
- ODDFYIELD - Yield of a bond with an odd first coupon
- ODDLPRICE - Price of a bond with an odd last coupon
- ODDLYIELD - Yield of a bond with an odd last coupon
- OFC - Calculate the price and/or yield of a bond with an odd first coupon using the ODDFPRICE equation
- OFCFACTORS - Returns the components of the ODDFPRICE equation
- OFL - Calculate the price and/or yield of a bond with an odd first and an odd last coupon using the OFLPRICE equation
- OFLFACTORS - Returns the components of the OFLPRICE equation
- OFLPRICE - Calculate the price of a security with an odd first and odd last period
- OFLYIELD - Calculate the yield of a security with an odd first and odd last period
- OLC - Calculate the price and/or yield of a bond with an odd last coupon using the ODDLPRICE equation
- OLCFACTORS - Returns the components of the ODDLPRICE equation
- PRICE - Price of a security paying regular periodic interest
- PRICEACTV - Cash flows and discount factors for a bond where coupon amounts are based on number of days in the coupon period
- PRICEDISC - Price of a discounted security
- PRICEFR - Price of a bond with forced redemptions
- PRICEMAT - Price of an interest-at-maturity security
- PRICESTEP - Price of a security with step-up rates

- RPI - Calculate the price and/or yield of a bond with regular periodic coupons
- RPIFACTORS - Factors for the calculation of the price of a bond that pays regular periodic interest
- TBILLEQ - Bond equivalent yield of a Treasury Bill
- TBILLPRICE - Price of a Treasury Bill
- TBILLYIELD - Yield of a Treasury Bill
- YIELD - Yield of a bond paying regular periodic interest
- YIELDACT - Yield of a bond where coupon amounts are based on number of days in the coupon period
- YIELDDISC - Yield on a discount security
- YIELDFR - Yield of a bond with forced redemptions
- YIELDMAT - Yield on an interest-at-maturity security
- YIELDSTEP - Yield of a security with step-up rates