



# Inflation Indexed Bond Valuation Introduction



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# Inflation Bond

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## Inflation Bond

### Inflation Indexed Bond Introduction

- Inflation indexed bonds, also called inflation linked bonds or real return bonds, are bonds where the principal is indexed to a reference inflation index, such as Consumer Price Index (CPI).
- The CPI is the proxy for inflation that measures price changes in a basket of goods and services.
- The main idea of inflation indexed bonds is that investing in the bond will generate a certain real return.
- Inflation indexed bonds pay a periodic coupon that is equal to the product of the daily inflation index and the nominal coupon rate.
- Unlike regular (nominal) bonds, inflation indexed bonds assure that your purchasing power is maintained regardless of the future rate of inflation.





## Inflation Bond

### The use of Inflation Indexed Bonds

- An inflation indexed bond is designed to hedge the inflation risk of the bond.
- Since inflation indexed bonds offer investors a very high level of safety, their coupons are typically lower than high-yield bonds.
- It is an important vehicle for investors whose liabilities indexed to changes in inflation or wages.
- Inflation indexed bonds have favorable performance and lower volatility relative to other risk assets.
- It is favorable to retirement planning and pension funds given its inflation protection feature.
- Inflation indexed bonds are less liquid than regular bonds.



# Inflation Bond

## Valuation

- The present value of an inflation indexed bond is given by

$$PV(t) = \sum_{i=1}^n \bar{C}_i D_i + \bar{P}_n D_n$$

where

- $t$  the valuation date.
- $\bar{C}_i = C * CPI(T_i)/CPI(T_I)$  the inflation adjusted coupon at payment date  $T_i$ .
- $\bar{P}_n = P * CPI(T_n)/CPI(T_I)$  the inflation adjusted principal at maturity date  $T_n$  where  $P$  is the principal.
- $CPI(t)$  the base reference CPI at time  $t$ .
- $CPI(T_i)/CPI(T_I)$  the CPI ratio at  $T_i$  where
- $T_I$  the issue date.
- $D_i = D(t, T_i)$  the discount factor from  $T_i$  to  $t$ .



# Inflation Bond

## Practical Guide

- First construct inflation curve by bootstrapping either breakeven inflation swap rates or treasury inflation protected securities (TIPS).
- Compute the base reference CPIs at the issue date and each payment date.
- Adjust the coupons and principal based on CPI ratio at each payment date.
- Discount all the coupons and principal to the valuation date.
- The bond price is the sum of all the present values.



# Inflation Bond

## A Real World Example

Buy Sell	Buy
Calendar	NYC
Coupon Type	Fixed
Coupon	0.00375
Currency	USD
Issue Date	7/31/2015
Interest Accrual Date	7/15/2015
First Coupon Date	1/15/2016
Last Coupon Date	1/15/2025
Maturity Date	7/15/2025
Settlement Date	7/31/2015
Settlement Lag	1
Day Count	dcActAct
Payment Frequency	6M
Pay Receive	Receive
Inflation Reference Index	CONSUMER PRICE INDEX US
Inflation Reference Index Level	237.14365
Notional	100



# Thank You

You can find more information at

<http://www.finpricing.com/lib/FilnflationBond.html>