

Inflation Indexed Bond Explained

1. Inflation Indexed Bond Introduction

- Inflation indexed bonds are bonds where the principal is indexed to inflation or deflation on a daily basis in terms of a reference index, such as Consumer Price Index (CPI).
- Inflation-linked bonds have historically been purchased by investors who focus on returns over a relatively long horizon or are looking for an inflation hedge. On the other hand, inflation-linked bonds have also had a relatively low correlation with the fixed-income, equity and commodities markets, and can therefore be used to reduce portfolio variance.
- 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.
- The special feature of inflation indexed instruments is that it requires notional to be indexed to the government published inflation index, such as Consumer Price Index, INPC index (in Mexico), etc.
- Unlike regular (nominal) bonds, inflation indexed bonds assure that your purchasing power is maintained regardless of the future rate of inflation.

2. The use of Inflation Indexed Bonds

- Inflation indexed bonds are designed to hedge the inflation risk of a 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.
- Inflation indexed bonds are less liquid than regular bonds.

3. Valuation

- It is important to realize that the proper valuation of an inflation linked bond requires knowing what the notional amount N was at some fixed date, and the lag ℓ as well as the correct CPI index are required so that the current notional can be correctly determined.
- The current notional $N(t)$ is determined from the reference index as:

$$N(t) = \frac{\text{RefCPI}_{t_0}}{\text{RefCPI}_t} N(t_0),$$

where $N(t_0)$ is the (known) notional at time t_0 , and the CPI is linearly-interpolated from the lagged CPI index as (CPI_m represents the CPI index as published at the start of month m , and we have decomposed times into (month, day): $t = (m, d)$):

$$\text{RefCPI}_{(m,d)} = \frac{D - (d - 1)}{D} \text{CPI}_{m-\ell} + \frac{(d - 1)}{D} \text{CPI}_{m-\ell+1}.$$

Here D is the number of calendar days in the *current* month, and the valuation date corresponds to calendar day d of the current month. Therefore, the lagged CPI (with an ℓ month lag) is interpolated based on the current month fraction.

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

$$PV_{RRB}(t) = \sum_{i=1}^N \bar{C}(T_i) \times DF(t, T_i) + \bar{P}(T_N) \times DF(t, T_N) + \bar{C}(t_c) \times \tau_b(t_c, t)$$

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

where

t the valuation date

$\bar{C}_i = C * CPI(T_i)/CPI(T_1)$ the inflation adjusted coupon at payment date T_i

$\bar{P}_n = P * CPI(T_n)/CPI(T_1)$ the inflation adjusted principal at maturity date T_n $CPI(t)$ the base reference CPI at time t .

$CPI(T_i)/CPI(T_1)$ the CPI ratio at T_i

T_1 the issue date.

$D_i = D(t, T_i)$ the discount factor from T_i to t .

Reference:

<https://finpricing.com/lib/EqBarrier.html>