Inflation-linked Bonds Explained

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After decades of benign inflation, it has reemerged as a major concern to investors. The rate of annual inflation has increased substantially in 2022, reaching a peak of 9.1% in the US and 10.6% in the Eurozone. Inflation erodes purchasing power and hence it constitutes an investment risk. Fortunately, there are ways to mitigate this risk which can be achieved with inflation-linked bonds (*linkers*).

What is the size of the market for inflation-linked bonds?

The global market for inflation-linked bonds has grown over the past decade from USD 1.72 trillion to USD 2.82 trillion as measured by the value of the amount of bonds outstanding.[1] The US Treasury Inflation Protected Securities (TIPS) account for USD 1.29 trillion. Within the Euro-zone, the countries issuing inflation linkers are France (USD 275 bn), Germany (USD 85 bn), Italy (USD 178 bn) and Spain (USD 82 bn).

What are inflation-linked bonds?

Inflation-linked bonds are Treasury bonds which means they have the same credit quality as nominal bonds issued by the same country. An inflation-linked bond explicitly provides investors with compensation for inflation. It is ensured with indexation of its principal amount to a specific inflation index. If inflation is positive, the principal increases, while in the case of deflation, it decreases. For example, if the cumulative inflation over a five-year life of an inflation bond amounts to 30%, the bond with an initial principal of 1000 USD will reach an adjusted principal at maturity of 1300 USD.[2]

Inflation-linkers also pay a coupon (typically semi-annually) which is set as a fixed percentage of the adjusted principal. Positive inflation from the time of bond issuance to a coupon payment date will translate into a proportionally higher coupon payment. In the case of deflation, the coupon will be calculated on the lowered adjusted principal.

Which reference inflation indices are used?

Inflation-linked bonds issued by the US Treasury are known as TIPS and have CPI-U[3] as the reference inflation index. In the Eurozone, the primary reference inflation index is the Euro Area HICP ex-Tobacco[4] index and it applies to inflation bonds issued by France, Germany, Italy and Spain. France additionally issues bonds that reference French CPI inflation.[5]

The principal of linkers is typically indexed according to realized inflation lagged by two months, which is to account for the time lag in announcement of inflation figures.

[1] Figures on the size of inflation-linked bond markets are from Barclays Live (28 April 2023).
[2] In case when inflation over the full life of an inflation-linked bond is negative, investors will receive the original principal of the bond. In other words, there is a deflation floor, which applies to bonds issued by the US and Eurozone countries, but not necessarily all linkers globally.
[3] Consumer Price Index for All Urban Consumers.
[4] Harmonised Index of Consumer Prices ex Tobacco.
[5] French Consumer Price Index, excluding tobacco, for all households in metropolitan France and its Overseas Départements.

What is the yield of an inflation-linked bond?

An inflation-linked bond offers a real-yield in addition to indexation of its principal to future inflation. For example, if the real yield is 2%, it means a bond held until maturity will provide a 2% annualized return in excess of inflation.[6]

The real yield is of fundamental importance to investors. A positive real yield implies that an investment's value increases in terms of purchasing power, so there is a reward for saving.

What is the breakeven inflation?

Investors may compare the real-yield of an inflation linker to the yield of a nominal Treasury bond with the same duration. Let us assume the real yield is 2% and the nominal yield is 5%. In such a case, an inflation-linked bond will outperform the nominal bond if future realized inflation exceeds 3%. The latter figure is known as the breakeven inflation rate, which is the level of future inflation that will equate the return on the inflation linker with that of a nominal bond.

The breakeven inflation rate is often interpreted as the market expectation of future inflation although there are some nuances. Inflation-linked bonds are less liquid than nominal bonds and hence they carry a certain illiquidity premium. Yields of nominal bonds embed a certain inflation risk premium to compensate for inflation risk, which is not the case for inflation-linked bonds. Hence, the breakeven inflation can be formulated as follows:

'Breakeven inflation'

= 'expected future inflation'
+ 'inflation risk premium'
– 'illiquidity premium'.

What is the market telling us?

Let us look at the current yields and breakeven inflation rates in the US (Table 1). Focusing on the one-year tenor, the nominal yield is 4.76%, while the real-yield implied by the pricing of TIPS is 2.70%. The difference being the one-year breakeven inflation stands at 2.06%.

The TIPS market provides a market consensus view of inflation. Interestingly, we are at the point when there is a substantial divergence between the past 12M US CPI inflation at 5.0% versus the forward looking one-year breakeven of only 2.06%. It suggests the market expects the FED will be effective at subduing future price growth. The breakeven inflation is fairly constant across the entire term structure from 1Y to 30Y with annualized inflation in the range of 2.06% to 2.24%, which is only slightly above the FED inflation target of 2%.

Real yields across the curve range from 1.22% to 2.70%, which means that investors who purchase the bonds today and hold them until maturity will earn such returns in excess of future inflation (excluding an unlikely event of default). These real yields are near their highest point in a decade and at a healthy positive level which is certainly good news for investors.

Table 1. Nominal yields, real yields, breakeven inflation in the US.

Tenor	Nominal Yield	Real Yield	Breakeven inflation
1Y	4.76%	2.70%	2.06%
2Y	4.01%	1.91%	2.10%
3Y	3.72%	1.56%	2.16%
5Y	3.49%	1.25%	2.24%
7Y	3.46%	1.22%	2.24%
10Y	3.43%	1.22%	2.21%
20Y	3.80%	1.57%	2.23%
30Y	3.68%	1.49%	2.19%

Source: Bloomberg, UBS Asset Management. Data as of 28 April 2023.

[6] The real yield is calculated as the discount rate that equates the market price of an inflation-linked bond with its future discounted payoffs assuming a future inflation of zero.

How have TIPS performed and what are the performance drivers?

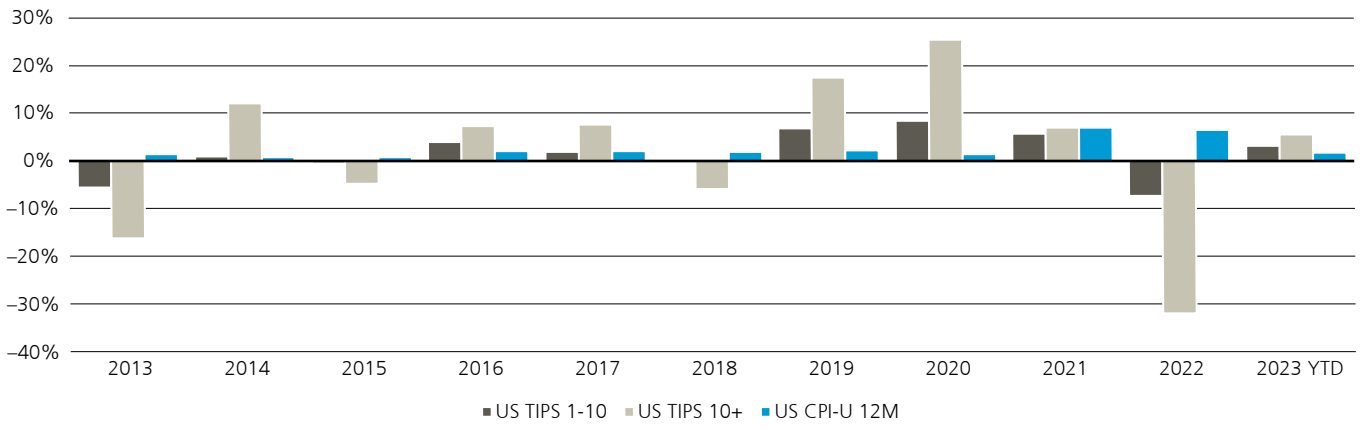
Let us consider TIPS performance across the 1–10Y and 10Y+ maturity buckets. The performance of TIPS has fluctuated over the past decade, but clearly the US TIPS 1–10Y has experienced less volatility in annual returns compared to US TIPS 10Y+ (Figure 3). We can further analyze these performance figures by looking at two major returns drivers: inflation and real yield changes.

Returns due to inflation indexation
Both US TIPS 1–10Y and US TIPS 10Y+ are fully indexed to inflation, so in each year their principal is increased by realized inflation (two month lagged). If inflation in a given year reaches 5%, then an inflation-linked portfolio will benefit from a 5% return on the principal.

Price fluctuations due to yield changes
Inflation-linked bonds are also subject to price fluctuations implied by changes in real-yields. These affect both maturity buckets, but the impact is more pronounced on the latter since it has a much longer duration. It is similar to how nominal bond prices respond to changes in yields. The difference for linkers is that only the real-yields matter for their valuations, while changes in interest rates due to inflation expectations are neutral.

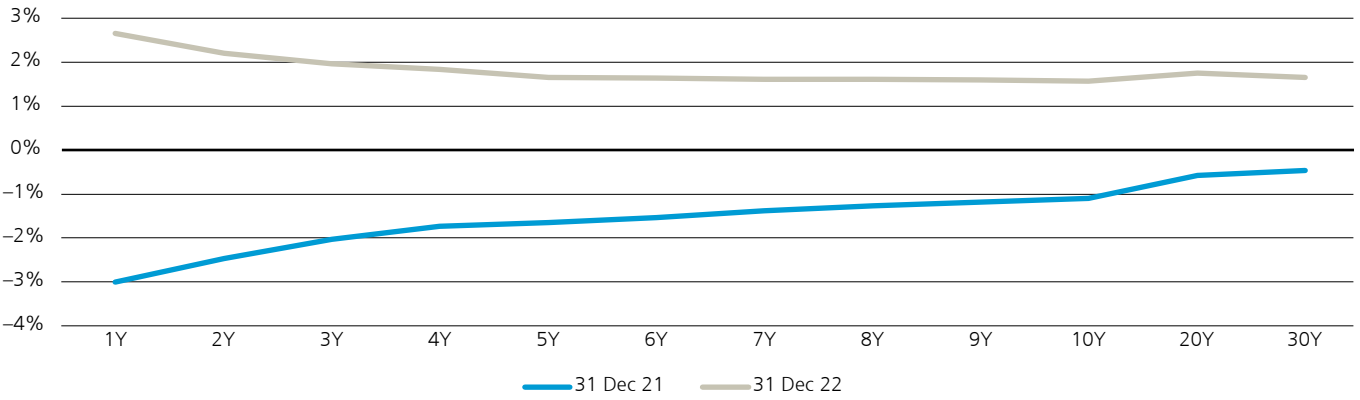
Between end-2021 and end-2022, we have observed a substantial increase in real yields, ranging from above 5.5% at 1Y tenor to 2.1% at 30Y (Figure 4). By historical standards, it was the largest such increase in decades.

Figure 3. Performance of US TIPS 1–10Y and 10Y+, and US CPI-U inflation 12M.



Source: Bloomberg, UBS Asset Management. Data as of 28 April 2023.

Figure 4. Real yield provided by US TIPS



Source: Bloomberg, UBS Asset Management. Data as of 31 December 2022.

Recent performance

It can be observed that between 2013 and 2020, inflation has generally been muted with an average of 1.6% per annum, which means in those years the returns on TIPS were primarily driven by changes in real-yields. In 2021, inflation reached 6.2%[7] and returns on TIPS were in the similar range (Figure 3). In stark contrast, in 2022 inflation totaled 7.7%[7], so it contributed positively to TIPS returns. However, the price impact stemming from a large increase in real-yields has pushed US TIPS 1–10Y to a –7.35% return and US TIPS 10Y+ to a –32% return (Figure 3).

Let us consider a stylized example to explain the negative performance of US TIPS 10Y+ in 2022. The US TIPS 10Y+ performance (-32%) is attributable to an inflation return (+7.7%) and a repricing due to a change in real yield (–39.70%), see Table 2. The latter number is implied as the difference between the US TIPS 10Y+ return [1] and the contribution from the inflation component [a].

Let us assume the portfolio duration was 21.1 and the change in real yield was 2.30% (approximate portfolio figures as of end-2021).

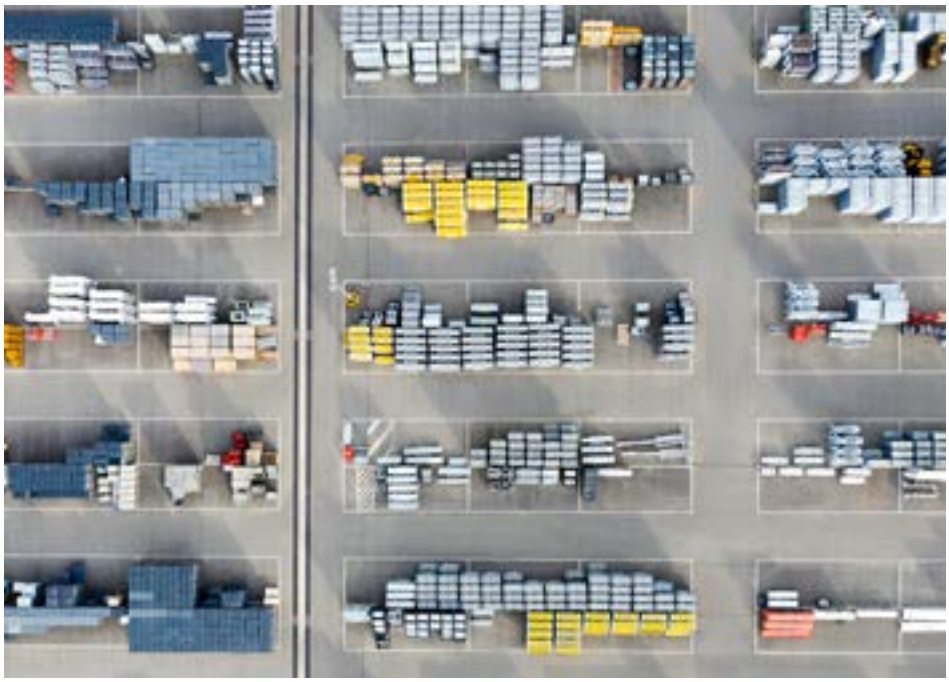
The repricing of TIPS 10Y+ due to an increase in real yield can be calculated as the product of duration and yield change, which gives a –48.63% (Table 2, b1).

However, when considering substantial yield changes, we should consider an adjustment of +8.93% [b2], among others due to the limiting impact of convexity. The sum of these two components is the repricing attributable to the change in real yield at -39.7% (Table 2, b).

Table 2. US TIPS 10+ Performance attribution

	2022 return
(1) US TIPS 10Y+	–32.00%
(a) inflation component	7.70%
(b) repricing due to change in real yield	–39.70%
duration	21.1
real yield change	2.30%
(b) repricing due to change in real yield	–39.70%
(b1) repricing due to duration (duration * yield change)	–48.63%
(b2) adjustment[8]	8.93%

The above illustrates that TIPS performance can be to a large extent driven by changes in real yields. However, it is important to emphasize that following a large downward repricing of TIPS in 2022, real-yields have come back from strongly negative to current positive levels (Table 1).



[7] Inflation for 2021 and 2022 delayed by two months.

[8] For illustration purposes, the adjustment is calculated such that a1+a2=a. One component of this adjustment is due to convexity. Moreover, in this stylized example we rely on approximate duration and convexity figures for the portfolio as of end-2021, while in practice the portfolio has changed over 2022.

How to make a decision whether to invest in inflation-linked bonds?

Inflation risk management
An investor may prefer to limit inflation risks and this can be achieved with inflation bonds when they are bought for the long term. The investor observes the current real-yield, which will represent their annual return in excess of inflation if they hold the bond until maturity. Over the life of the bond, an investor experiences mark-to-market valuation changes attributable to changes in prevailing real-yields.

Expressing a view on inflation
An investor may wish to express a view on the future path of inflation. Let us assume an investor has a certain inflation prediction. They may correct it for an illiquidity premium (possibly depending on the holding period) and an inflation risk premium reflecting his risk aversion to inflation. Hence, an investor calculates their 'adjusted inflation prediction.

adjusted inflation prediction

= 'inflation prediction'
+ 'inflation risk premium'
– 'illiquidity premium'.

If the adjusted inflation prediction exceeds the breakeven inflation, then an inflation-linked bond is advisable, otherwise a nominal bond is preferable.

Deciding on the maturity
An investor must also decide on the preferred duration or maturity of a bond, which applies similarly to both nominal and inflation-linked bonds. For inflation-linked bonds, an investor should look at the term-structure of real-yields to find duration that matches their preferences. Longer-duration implies larger price fluctuations when real-yields change, whilst in most market conditions longer duration provides a higher level of real-yields.

Investing in an index portfolio of inflation-linked bonds
Investing in a portfolio of inflation-linked bonds can be implemented based on indices. These can provide a flexibility in the choice of maturity buckets.

Index	Real-yield (28 April 2023)
Bbg US TIPS 1–10Y	1.44%
Bbg US TIPS 10Y+	1.56%
Bbg Euro Area Inflation Linked Bonds 1–10Y	0.38%
Bbg Euro Area Inflation Linked Bonds 10Y.	1.05%

Source: UBS Asset Management.

When investing in index-based portfolios, an investor may follow similar reasoning as for individual inflation bonds, although calculations must be aggregated at a portfolio level.

It is important to underscore that an indexed bond portfolio changes over time as newly issued bonds are added, while those crossing the lower maturity threshold are removed. The bonds are thus not held until maturity. The entire portfolio earns an inflation-linked return since all constituent bonds have their principals indexed to inflation. In addition, the portfolio valuation is dependent on changes in real-yields. A shorter-duration portfolio will be less impacted by changes in real-yields, while typically (although not currently) a portfolio with longer duration offers a higher real-yield.

Conclusions

Inflation-linked bonds allow investors to mitigate inflation risks when purchased for the long term. They may also represent a tactical opportunity for those who believe that future inflation will exceed the prevailing market consensus for inflation (the inflation breakeven rate).

Inflation-linkers combine the credit worthiness of the issuing country with inflation protection and may therefore be suitable when the aim is for a defined level of purchasing power in the future (e.g. pension planning).

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