

## Hedging inflation risk

The large increase in government debt and the associated fall in (current and projected) GDP growth during the pandemic has led to discussions around the possibility of the erosion of the nominal value of the debt through inflation. How should investors respond to this inflationary risk? This note aides the discussion by studying how different assets have performed in hedging inflation across three inflation regimes over the past 50 years.

### Two types of inflation hedges

It is important to note that an asset may hedge inflation risk in two different ways. First, an asset may be a viable inflation hedge if exhibits a significant “return correlation” with inflation, i.e. that its return varies with, and therefore provides some insurance against, inflation. Assets such as these may be valuable for investors, for example, whose liabilities are linked with the level of inflation, or for investors who mark-to-market their portfolios at shorter frequencies.

Second, an asset may be a viable inflation hedge if it can insure against “price-level risk”. This is essentially whether an asset can maintain its real value over a period of time. Asset such as these may be valuable to investors with longer time horizons who do not care about the real value of the portfolio in the interim.

### Methodology

We split the past 50 years into three inflation regimes as shown in Figure 1. The first period – “rising inflation” – runs from 1971-1980 and features the run up in quarterly inflation going from 2% to more than 16% in annualised terms. The second period – “falling inflation” – runs from 1981-1995, and features the same measure of inflation falling back down to around 3%. The final period – “stable inflation” – runs from 1996 until the present – and features a stable mean of inflation.

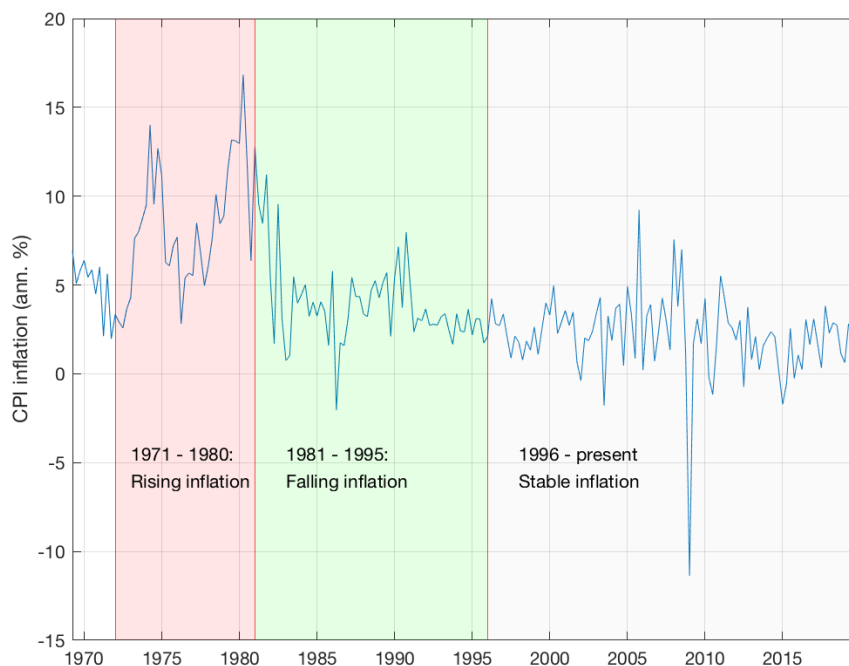
Within each of these sub-periods, we study which assets performed well under the two types of hedging concepts outlined above. Our asset universe and sources are generally standard and shown in Table 1. The only asset to note is oil where we splice WTI spot prices to the GSCI Oil Total Return Index before 1987 due to data availability issues. We also include a 60-40 portfolio between S&P 500 and 10-year US Treasuries. Although US TIPS existed and were traded since 1997, their liquidity was very low and may impact our calculations. Therefore, we only include TIPS data from 2004 when liquidity risk had moderated and did not dominate returns.

To evaluate return-correlation, we calculate the simple correlation between the asset’s return

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For further information, please contact [macro.research@fulcrumasset.com](mailto:macro.research@fulcrumasset.com)

**Figure 1. Inflation regimes in US CPI inflation**



and inflation at both quarterly and annual frequencies. We focus on these low-frequency co-movements since higher frequencies may contain transitory shocks that mask underlying relationships that simple correlations will be unable to uncover. Moreover, investors are generally evaluated on quarterly or annual reporting cycles.

To evaluate price-level hedging, we calculate annualised nominal and real returns over the three regimes. Assets which exhibit price-level hedging characteristics within a sub-period are those whose real returns are non-negative. It is important to remember that although an asset satisfies this characteristic, it may still have had a large volatility in real returns *within* the period.

**Results**

Table 2 shows the return-correlation of our asset universe under the three regimes at the quarterly and annual frequency.

Our calculations show that short-term US Treasuries have the most stable positive correlation with inflation across all regimes and frequencies. This is somewhat unsurprising since it is closely related to the monetary policy instrument of the central bank, who throughout these regimes were conducting monetary policy to promote low and stable inflation.

**Table 1. Data description and sources**

Data	Description	Source
Inflation	CPI index	Bureau of Labour Statistics
S&P 500	S&P Total Return Index	CRSP through WRDS
3m T-Bill	90-day Treasury Bill Total Return Index	CRSP through WRDS
10y Treasuries	10y Treasury Bond Total Return Index	CRSP through WRDS
0-3y TIPS	0-3y TIPS Total Return Index	Standard & Poor's
10y TIPS	10y TIPS Total Return Index	Standard & Poors
REITs	US Total Return Index	NA REITs
Gold	GSCI Gold Total Return Index	Standard & Poor's
Oil	WTI price (pre-1987)	EIA
	GSCI Oil Total Return Index (post- 1987)	S&P
Commodities	GSCI Broad Commodity Total Return Index	Standard & Poor's

Other assets of note are oil and commodities more generally, whose returns generally correlate positively with inflation. Again, this is somewhat unsurprising give the significant weight that commodities have in the CPI, and the fact that some of the inflation shocks may historically have originated from the commodity sector (e.g. oil). Gold had a positive correlation with inflation in the rising and stable inflation regimes, but not when inflation was falling between 1981-1995.

Since US TIPS data is only available for the final period, we are unable to evaluate its correlation under true inflationary shocks. However, short-term TIPS exhibit a strong positive return correlation in the stable inflation regime. REITs have only correlated positively with inflation in the current stable inflation regime.

**Table 2. Asset correlations with CPI inflation under different regimes**

Inflation regime	Quarterly			Annual		
	1971 - 1980	1981 - 1995	1996 - 2019	1971 - 1980	1981 - 1995	1996 - 2019
	Rising	Falling	Stable	Rising	Falling	Stable
S&P 500	-0.23	-0.13	0.20	-0.20	-0.46	0.14
3m UST	0.71	0.33	0.19	0.90	0.71	0.43
10y UST	-0.05	-0.18	-0.37	-0.23	-0.26	-0.08
0-3y TIPS*	-	-	0.68	-	-	0.77
10y TIPS*	-	-	-0.04	-	-	0.16
REITs	-0.27	-0.38	0.20	-0.30	-0.41	0.24
Gold	0.43	-0.07	0.18	0.60	-0.63	0.40
Oil	0.44	0.53	0.63	0.66	0.27	0.69
Commodities	0.11	0.23	0.65	0.27	-0.15	0.75
60/40 Eq-bond	-0.22	-0.17	0.11	-0.23	-0.42	0.13

\*TIPS data begins from 2004.

Table 3 shows nominal and real annualised returns of the asset classes within each inflation regime. Most assets had positive nominal returns throughout each regime – the only anomalies are gold and commodities in the regime of falling inflation. Gold returned the most in the inflationary regime, equities had the highest return in the disinflationary regime and REITs returned the highest in the current regime Note that although equities returned almost 8% annually during the rising inflation regime, this is masked by high short-term volatility, where they had sharply negative (nominal and real) returns in the early part of the regime and recovered thereafter.

Looking at real returns, our calculations show that the three assets to increase their real value in the inflationary regime were gold, oil and commodities. Gold and commodities fared poorly, however, in the subsequent disinflationary regime, while oil managed to hold its real value.

Equities provided the fourth highest real return during the inflationary regime, losing -0.7% annually in real terms. They also provided the one of the highest real returns in the two subsequent periods. A similar story can be made for REITs across all three regimes.

US Treasuries lost value in real terms during the inflationary regime, with longer duration bonds devaluing more as one would expect. TIPS by construction have held their real value during the stable period – the only period where data are available.

**Table 3. Asset returns under different regimes**

Inflation regime	Nominal returns (% , ann.)			Real returns (% , ann.)		
	1971 - 1980	1981 - 1995	1996 - 2019	1971 - 1980	1981 - 1995	1996 - 2019
	Rising	Falling	Stable	Rising	Falling	Stable
S&P 500	7.8	14.8	9.4	-0.8	10.5	7.0
3m UST	7.6	8.0	2.4	-1.0	3.9	0.2
10y UST	4.6	12.2	5.1	-3.7	8.0	2.8
0-3y TIPS	-	-	2.3	-	-	0.2
10y TIPS	-	-	4.2	-	-	2.1
REITs	7.1	10.6	10.3	-1.4	6.4	7.9
Gold	33.7	-2.8	5.7	23.1	-6.5	3.5
Oil	29.7	4.0	1.4	19.4	0.1	-0.8
Commodities	10.2	-1.8	3.2	1.5	-5.5	1.0
60/40 Eq-bond	7.0	13.9	8.3	-1.5	9.6	6.0
Δ Inflation (ppts)	+9.1	-6.4	-1.1			
Avg Inflation (% , ann.)	8.7	3.9	2.2			

\*TIPS data begins from 2004.

Though equities and the 60-40 benchmark portfolio lost 0.8% and 1.5% in real terms over the inflationary regime as a whole, this masks large drawdowns in the interim. Table 4 focuses on asset returns during the first 3 years of the inflationary regime – the worst period

for risk assets such as equities and the 60-40 benchmark portfolio, where inflation rose by 9 percentage points and average annual inflation was 8.2%. The 60-40 portfolio lost 10.5% annualised in real terms and equities lost 16% annualised in real terms, while assets such as gold, oil and commodities in general performed well during this time of intense market stress.

**Table 4. Returns during the onset of the Inflationary Regime (1971-1974)**

	Nominal return (% , ann.)	Real return (% , ann.)
S&P 500	-9.3	-16.1
3m UST	6.6	-1.4
10y UST	4.6	-3.2
0-3y TIPS	-	-
10y TIPS	-	-
REITs	-22.4	-28.2
Gold	61.7	49.6
Oil	46.4	35.4
Commodities	33.1	23.1
60/40 Eq-bond	-3.2	-10.5
$\Delta$ Inflation (ppts)	+9.0	
Avg Inflation (% , ann.)	8.2	

### What about TIPS as a hedge?

Treasury Inflation Protected Securities (TIPS) are real bonds that provide insurance against unexpected inflation by paying coupons that are indexed by 3-month rolling inflation. By buying an  $n$ -year TIPS, the investor locks in the real return and will receive the full uplift in inflation for  $n$  years into the future. However, the investor will still be exposed to changes in the real rate and therefore subject to mark-to-market risk (should they choose to mark-to-market their portfolio). This risk is more pronounced in bonds with higher maturity, due to its duration. For example a 1% increase in the yield of a 10-year TIPS approximately leads to a -10% return, while a 1% increase in the yield of a 3-month TIPS approximately leads to a -0.25% return.<sup>1</sup> This is one of the main reasons that the return-correlation of the 10-year TIPS with inflation is so low in Table 2. Short-term TIPS are not a panacea however, since the investor will still be subject to roll-over risk when the short-term TIPS matures.

### Conclusion

This note studies how our universe of assets have fared in hedging different types of inflation risk over the past 50 years. Our analysis suggests that no asset is the perfect unconditional hedge.

<sup>1</sup>See Blackrock Education for a simple yet useful explanation of duration and its effect on returns

Investors with short time-horizons may favour commodities and short-term Treasuries since they have had the most stable positive correlation with returns across the three regimes. Under a stable inflation regime, short term US TIPS – almost by construction – provide the highest return correlation. At current negative yields however, we think short-term US TIPS are an effective but expensive inflation hedge, not to mention potential illiquidity issues in times of market stress such as earlier this year.

Price-level hedging is important for longer term investors. Gold, oil and commodities more generally provide the best price-level hedge empirically in a period of rising inflation. Equities provide a good hedge as long as inflation is either falling or low. Short-term TIPS also provided a good hedge in the short-time period for which data are available.

The above analysis splits up the past 50 years into regimes of rising, falling and stable inflation, ignoring the source of the inflation. It is also important to think the problem with respect to whether the inflation was due to a demand-pull or cost-push inflation shock. This distinction would have differing implications for choosing the best hedging instrument. Quantitative analysis along this dimension requires a structural and/or econometric model that is beyond the scope of this note.

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