

Macro-Tilted Equity Indices Protecting your equity portfolio against inflation

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Investors care about macroeconomic risks

Equity investors take on exposure to stock market risk and broader macroeconomic risks



Investors benefit from targeting such exposures

Portfolio managers want to align exposures with their **views**

Institutional investors want to gain protection for risks that arise **outside** of their equity portfolio



Why manage inflation risks in equity portfolios

- Investors optimally divide their allocation into a performance-seeking portfolio (PSP) and hedging portfolios (HP) for relevant state variables (Merton 1971).
- Hedging assets for inflation are *inflation-linked bonds*: they provide a reliable offset to realised inflation, but opportunity cost is high.
- In the PSP, investors seek high risk-adjusted returns. Among several candidate portfolios, they can select the one that provides protection against a relevant state variable (Coqueret, Martellini and Milhau 2017), e.g., inflation:
 - Investors may allocate to asset classes or sectors that are related to inflation (commodities, REITS, equities etc.).
 - Or they may use dedicated strategies that improve protection from inflation of a given asset class.
- We design a dedicated building block for the PSP that provides access to the equity premium, while protecting against shifts in inflation expectations.



Why manage inflation risks in equity portfolios

- When using inflation-friendly strategies in the PSP, investors have tactical and longer-term considerations for different asset classes:
 - Commodities
 - These are not candidates for a long-term allocation due to a lack of long-term premium.
 - In some cases of inflation, notably inflation with strong growth, commodities will not only benefit from the raw material demand cycle, but will protect against inflation that is driven by raw material prices. In the case of wage inflation, commodities will not provide protection.

• Equities

- Have a positive long-term risk premium and it is this long-term risk premium that justifies the long-term allocation to this asset class.
- The question that arises is to know which equities will react positively or negatively to a rise in inflation.



Capturing differences in inflation exposure across stocks is hard

- That different stocks react differently to changes in inflation appears intuitive. However, capturing such differences reliably is hard.
- Measured exposures are unreliable out of sample: When using *simple statistics* to measure a relationship with *realised inflation*, stocks acting as a hedge for inflation in the past fail going forward (Ang, Briere and Signori, 2012).
- This problem arises because asset prices move much faster than backward-looking economic fundamentals, making it hard to establish a relationship (Fama, 1990).
- We have developed a new approach to overcome these challenges and provide equity portfolios that target desired exposure to inflation.



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Reliable measurement of firm-level inflation exposures

Forward-looking variables

 Variables reflect surprises about expected inflation (see Amenc et al. 2019)

Reliable measurement

 We complement robust statistics with text-based measures of firm-level inflation exposure

Dedicated building blocks

• We use firm-level inflation exposures rather than offthe-shelf ingredients, such as factors or sectors



Why inflation surprises matter

- We can identify stocks that provide protection against inflation changes that investors have not anticipated:
 - The value of stocks is not formally linked to the realisation of inflation (contrary to inflation-linked bonds).
 - Investors do not have hindsight: current stock prices only reflect information that is known to investors.
 - When new information arrives (e.g., unexpected inflation), stock prices adjust.
 - From an econometric point of view, we can estimate surprises about expected inflation as a relevant state variable.
- Surprises of expected inflation are the relevant variable to protect portfolios:
 - Changes in inflation that were fully anticipated by investors do not lead to different price reactions across stocks (even if firms differ in how their business depends on realised inflation).
 - It is pointless to select stocks based on their exposure to levels of expected inflation.
 - Our approach will distinguish stocks based on sensitivity to inflation surprises, (i.e., changes in expectations).



Our measure of inflation surprises

- Expected inflation is derived from observable market prices as the difference between the yield of 10-Year TIPS and nominal Treasury bonds and reflects *investors' expectations* about inflation over the next 10 years (breakeven inflation).
- This measure is different from the Consumer Price Index which reflects only *past realisation* of inflation.
- We do not use the level of expected inflation because this reflects an equilibrium view about future inflation. What really matters are *surprises* or *unexpected changes* around this equilibrium.
- We estimate innovations in breakeven inflation as first differences. Innovations from a Vector Autoregressive Model yield similar results.



Measuring exposures to macro variables with robust statistics

- We obtain a robust measure of exposure of stock returns to surprises in expected inflation.
- Our objective is to exploit differences in stock-level inflation exposure without altering access to the market premium. Therefore, we **control** for a stock's market exposure.
- Our forward-looking proxy for inflation surprises is available at much higher frequency than slow-moving fundamentals. We exploit weekly frequency to improve **accuracy** of stock-level estimates.
- We use a long sample to estimate exposure while accounting for possible **time-variation** in exposure.
- Treating inflation exposures of identical magnitude as equal would ignore estimation risk. We account for differences in **uncertainty** across stocks and correct inflation exposures that are estimated imprecisely.



Measuring exposures to macro variables with robust statistics

- Our primary estimation method follows a robust statistical approach: $R_{i,t} = \alpha_i + \beta_i^{MKT} (R_{MKT,t} - R_{RF,t}) + \beta_i^{macro} (Macro_t - Macro_{t-1}) + \varepsilon_{i,t}$
- For higher accuracy, we use high frequency data (weekly).
- To capture changing exposures, we dynamically weight observations while using information from a long sample (20-years):

 $min\{\sum_{t=1}^{T} \varepsilon_{i,t} \times e^{-|T-t|\frac{\ln(2)}{260}}\}$, half-life converges to 5 years

• To avoid estimation error, we use Bayesian shrinkage that penalises estimates with high uncertainty:

$$\boldsymbol{\beta}_{s}^{adjusted} = \boldsymbol{\beta}^{prior} \frac{\sigma_{s,TS}^{2}}{\sigma_{s,TS}^{2} + \sigma_{XS}^{2}} + \boldsymbol{\beta}_{s}^{estimate} \left(1 - \frac{\sigma_{s,TS}^{2}}{\sigma_{s,TS}^{2} + \sigma_{XS}^{2}}\right)$$



Complementing exposure measures with textual data

- We complement statistical estimates of macro exposures with text-based measures.
- Our aim is to use additional information on exposures beyond what is contained in data on past returns.
- We count keywords related to inflation in the "Risk factors" section of firms' annual 10-K files.
- Our measure of macro exposure is the average of the crosssectional rank of the statistical and the text-based measures:
 - → We use statistical measures alone until June 2006 (when 10-K data commences).



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Use of mimicking portfolios

- We evaluate the reliability of the estimation method by constructing *mimicking portfolios* to the given macro variable:
 - → The mimicking portfolio goes long 20% of the stocks with the highest ex-ante exposure and goes short 20% with the lowest ex-ante exposure.
- The portfolios are equal-weighted and rebalanced quarterly.
- We compare our approach to a naïve approach where we estimate exposures using 5-year monthly OLS.
- We also compare our approach to using *levels* in inflation* instead of *surprises*, to highlight the importance of using surprises.
- If ex-ante exposure estimates are reliable, the high-minus-low portfolio is expected to have significant and positive realised exposure out-of-sample
- We look at both regression betas (estimated using weekly returns), as well as returns in different macro conditions (quartiles of macro surprises).

*We follow the exact same robust procedure to estimate exposures to breakeven inflation, but we use levels of breakeven inflation instead of surprises.



Exposures to backward looking macro variables are highly unreliable

- Applying a naïve estimation approach to backward-looking macro variables does not allow mimicking portfolios with desired macro exposures to be produced.
- Relying on forward-looking variables works better, but the low frequency measurement compromises out-of-sample reliability.

US LTTR Dec-1979 to Dec-2019	Realised Macro Exposure	T-stat		
Backward-looking variables				
Industrial Production	-0.51	-1.42		
СРІ	0.16	0.22		
Forward-looking variables				
Breakeven Inflation*	2.46	0.95		

Results for naïve approach: 5Y monthly OLS

The realised macro exposures are estimated in a bivariate regression that include the market factor and innovations in corresponding macro variable. * The analysis of inflation mimicking portfolios is done over a shorter time period, from 31/03/2008 to 31/12/2019, due to data limitations.



Robust estimation of fast-moving variables is reliable out-of-sample

- Our robust estimation approach, using both statistical and text analysis, produces high and statistically significant out-of-sample exposures to inflation surprises.
- Our variable selection and estimation approach enables inflation exposures outof-sample to be targeted, unlike approaches that rely on backward-looking proxies of realised inflation (see Ang, Briere and Signori 2012).
- Using levels instead of surprises in inflation leads to unreliable exposures.

US 31/03/2008 to 31/12/2019	Realised Macro Exposure	t-statistic
Breakeven Inflation <u>Surprises</u> (robust measurement)	4.24	2.31
Breakeven Inflation <u>Surprises</u> (<u>naïve</u> measurement)	2.46	0.95
Breakeven Inflation <u>Level</u> (<u>robust</u> measurement)	-0.22	-1.58

The realised macro exposures are estimated in a bivariate regression that includes the market factor and innovations corresponding macro variable. The realised exposures are estimated to the variable that was used during estimation. Levels refer to absolute value of breakeven inflation, surprises refer to innovations over a lag of one period. Robust measurement uses weekly frequency, weighted least squares, 20 years calibration window, Bayesian shrinkage; and complements this with textual analysis. Naïve measurement uses monthly data, ordinary least squares, and a 5-year calibration window.



Macro portfolios are more reliable than factor or sector allocation

- Selecting stocks based on firm-level macro exposures leads to reliable out-ofsample macro betas.
- Factor or sector allocation approaches fail to obtain the desired exposure.

US (31/03/2008 to 31/12/2019)	Breakeven Inflation
Macro Dedicated Portfolios	
Macro Exposure +	0.86
Macro Exposure -	-1.04
Difference in Macro Exposures	1.90
Factor Allocation	
Macro Factor Allocation +	1.57
Macro Factor Allocation -	2.04
Difference in Macro Exposures	-0.47
Sector Allocation	
Macro Sector Allocation +	2.70
Macro Sector Allocation -	2.70
Difference in Macro Exposures	0.00

The realised macro exposures are estimated in a bivariate regression that includes the market factor and innovations in corresponding macro variable. Macro Exposure + and Macro Exposure – select 30% of stocks respectively. Factor allocation selects 2 of 6 equity style factors. Sector allocation selects 3 of 10 sector indices (TRBC sectors).



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An inflation-friendly cap-weighted index

- Scientific Beta US *Inflation* + and *Inflation* indices are the first in a series of macroeconomic factor indices, to be expanded in the future to further macro variables such as short-term rates, term spread and default spread.
- The indices target *three objectives*:
 - 1. Provide an alternative to the cap-weighted benchmark while maintaining high investability.
 - 2. Capture the equity premium without targeting long-term outperformance.
 - **3.** Provide the desired conditionality with inflation while maintaining reasonable tracking error with the cap-weighted benchmark.
- Note that both indices can be provided with our Core ESG filter.



Weights anchored to the CW index

• Weights are anchored to the SciBeta US Cap-Weighted index and are based on the following formula:

$$w_{i} = \frac{(1 + score_{i})^{5} \times MarketCap_{i}}{\sum_{i=1}^{P} (1 + score_{i})^{5} \times MarketCap_{i}}$$

• Weights are then constrained for investability and tracking error objectives to respect the following constraint:

 $w_i = \min(3 \times CW_i, 1.5 \times \max(CW))$



Strong exposure to inflation surprises

- Our inflation indices exhibit statistically significant exposures to breakeven inflation surprises.
- The *Inflation* + index has a positive exposure which means that returns are driven by positive inflation shocks, while the *Inflation* – index has a negative exposure which means that returns are driven by negative inflation shocks.

SciBeta US 31-Dec-2008 to 31-Mar-2021	Inflation +	Inflation -
Inflation	1.22	-1.03
T-stat	3.89	-3.63

The analysis is based on weekly USD total returns from 31-Dec-2008 to 31-Mar-2021. The realised macro exposures are estimated in a bivariate regression that include the market factor and weekly inflation innovations defined as changes of the 10-Year Breakeven Inflation Rate. Statistics in bold are statistically significant at a 95% level. The indices used are the SciBeta US Inflation + and SciBeta Inflation –.



Inflation + index reacts positively to positive inflation surprises



The analysis is based on daily USD total returns from 31-Dec-2008 to 31-Mar-2021. Performances are computed as relative cumulative total returns of inflation indices compared to the CW index. The grey shaded area corresponds to periods (weeks) of positive inflation surprises. Positive surprises are defined as top quartiles of weekly inflation innovations defined as changes of the 10-Year Breakeven Inflation Rate. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



Conditional outperformance in the desired inflation surprise regimes

 The *Inflation* + index outperforms the Cap-Weighted index by 8% when inflation surprises are positive, while the *Inflation* – index outperforms the Cap-Weighted index by 5% when inflation surprises are negative.



The analysis is based on weekly USD total returns from 31-Dec-2008 to 31-Mar-2021. Outperformance figures are computed as annualised relative performance of inflation indices compared to the CW index in top (positive surprise) and bottom (negative surprise) quartiles of weekly inflation innovations defined as changes of the 10-Year Breakeven Inflation Rate. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



Conditional performance in line with expectations over the full sample

- The Inflation + index has a macro spread or the difference of relative returns in positive and negative inflation surprise regimes of 13.27%, while the Inflation Index has a negative macro spread of -11.49%.
- Both indices deliver outperformance in their desired inflation regimes.

SciBeta US 31-Dec-2008 to 31-Mar-2021	Number of Regimes (Weeks)	CW	Inflation +	Inflation -		
Absolute Performance in Different	Absolute Performance in Different Regimes (Inflation Surprises)					
Negative Inflation Surprises	153	-42.42%	-45.62%	-39.60%		
Stable Inflation	324	26.59%	27.37%	25.68%		
Positive Inflation Surprises	161	82.85%	97.10%	70.60%		
Relative Performance to Cap-Weighted Index in Different Regimes (Inflation Surprises)						
Negative Inflation Surprises	153	-	-5.35%	4.70%		
Stable Inflation	324	-	0.70%	-0.80%		
Positive Inflation Surprises	161	-	7.92%	-6.79%		
Macro Spread	-	-	13.27%	-11.49%		

The analysis is based on daily USD total returns from 31-Dec-2008 to 31-Mar-2021. Outperformance figures are computed as annualised relative performance of inflation indices compared to the CW index in top (positive surprise) and bottom (negative surprise) quartiles of weekly inflation innovations defined as changes of the 10-Year Breakeven Inflation Rate. Macro spread is the difference of returns between positive and negative inflation surprise regimes. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



2021 is mostly driven by positive inflation surprises



The analysis is based on daily USD total returns from 31-Dec-2020 to 21-May-2021. Figures are computed as relative cumulative total returns of inflation indices compared to the CW index. The grey shaded area corresponds to periods (weeks) of positive inflation surprises. Positive surprise are defined as top quartiles of weekly inflation innovations defined as weekly changes in the 10-Year Breakeven Inflation Rate from 31-Dec-2008 to 31-Mar-2021. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



Inflation + outperformed in 2021 in line with positive inflation surprises

- YTD, the Inflation + index outperformed the CW index by +3.08%, while the Inflation index underperformed by -1.78%.
- In positive inflation surprise regimes, the Inflation + index delivered a cumulative relative return of +4.81% in line with expectations.

SciBeta US 31-Dec-2020 to 21-May-2021	CW	Inflation +	Inflation -	
YTD Cumulative Returns	10.07%	13.15%	8.29%	
Ann. Volatility	15.08%	16.57%	14.09%	
Conditional Cumulative Relative Returns				
Positive Inflation Surprises	-	4.81%	-2.76%	

The analysis is based on daily USD total returns from 31-Dec-2020 to 21-May-2021. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index. Outperformance figures are computed as cumulative relative performance of inflation indices compared to the CW index in top (positive surprise) and bottom (negative surprise) quartiles of weekly inflation innovations. Innovations are computed as weekly changes in the 10-Year Breakeven Inflation Rate. The indices used are the SciBeta US Inflation + and SciBeta US Inflation - as well as the SciBeta US Cap-Weighted index.



Risk-adjusted performance in line with the CW benchmark

• Inflation indices deliver risk-adjusted performance in line with the Cap-Weighted index.

SciBeta US 31-Dec-2008 to 31-Mar-2021	CW	Inflation +	Inflation -
Ann. Returns	15.25%	16.26%	14.10%
Ann. Volatility	18.34%	19.11%	17.78%
Sharpe Ratio	0.80	0.82	0.76
Max. Drawdown	33.8%	36.2%	32.0%
Ann. Rel. Returns	-	1.01%	-1.15%
Ann. Tracking Error	-	2.72%	2.35%
Information Ratio	-	0.37	n/r

The analysis is based on daily USD total returns from 31-Dec-2008 to 31-Mar-2021. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



Low exposures to rewarded factors and market beta close to one

- Market betas of inflation indices are near 1, which reflects their CW anchor.
- Exposures to rewarded factors are low and implicit since they are not directly targeted in the index construction.
- Targeting inflation exposure is not redundant with factor allocation. It can be used as an overlay to a factor-based portfolio for inflation-aware investors.

SciBeta US 31-Dec-2008 to 31-Mar-2021	Inflation +	Inflation -
Ann. Unexplained	1.79%	-1.62%
Market Beta	1.04	0.96
SMB Beta	0.06	-0.04
HML Beta	0.04	-0.01
MOM Beta	0.01	-0.01
Low Vol Beta	-0.07	0.06
High Pro Beta	-0.09	0.09
Low Inv Beta	-0.07	0.10
Factor Intensity	-0.13	0.19

The analysis is based on weekly USD total returns from 31-Dec-2008 to 31-Mar-2021. The yield on Secondary US Treasury Bills (3M) is used as a proxy for the risk-free rate. The Market factor is the excess return series of the cap-weighted index over the risk-free rate. The other six factors are market neutral equal weighted factors obtained from Scientific Beta. Coefficients significant at 5% p value are highlighted in bold. The indices used are the SciBeta US Inflation + and SciBeta US Inflation – as well as the SciBeta US Cap-Weighted index.



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Inflation + delivers better protection & better long-term performance

- Our results suggest that Inflation + provides better protection from inflation and better access to a long-term premium than other assets that are often used to protect against inflation.
- **Commodities** and **REITs** are often used to protect portfolios from rising inflation:
 - We find that, while they provide some protection against inflation, they also come with high cost in terms of performance.
 - There is no economic reason for a long-term (long-only) commodity premium.
 - REITs provide exposure to equity, but lack diversification.
- Some also refer to specific equity styles or sectors as a good protector against inflation, e.g.,*, **financials** or **small-cap stocks**:
 - We find that financials and small-caps offer protection from inflation.
 - However, picking the financial sector or being overly exposed to the Size factor may lead to other sources of risks that equity investors may wish to avoid.

* See < https://www.wealthmanagement.com/etfs/inflation-rates-rise-look-financials-small-cap-stocks?NL=WM-27&lssue=WM-27_20210513_WM-27_425&sfvc4enews=42&cl=article_1&utm_rid=CPG09000069403325&utm_campaign=32420&utm_medium=email&elq2=03ed2aa615684c4eaee01ac886d4 9018&oly_enc_id= >



Conditional performance

- All assets considered higher returns in times of positive inflation shocks than in periods of negative shocks.
- The Inflation (+) index has the highest returns in times of positive surprises.
- Commodities and REITS underperform the market index in times of positive surprises.

31/12/2008 - 31/03/2021	Market	Commodities	REITS	Inflation (+)	
Absolute Per	formance in Diffe	rent Conditions (I	nflation Surprises)	
Negative Inflation Surprises	-42.4%	-56.7%	-33.1%	-45.6%	
Stable Inflation	26.6%	3.5%	24.0%	27.4%	
Positive Inflation Surprises	82.8 %	71.0%	55.0 %	97. 1%	
Macro Spread	125.3%	127.8%	88.1%	142.7%	
Relative Performance to Cap-Weighted Index in Different Conditions (Inflation Surprises)					
Negative Inflation Surprises	-	-25.4%	16.9%	-5.35%	
Stable Inflation	-	-19.0%	-2.3%	0.70%	
Positive Inflation Surprises	-	-8.4%	-14.6%	7.92 %	
Macro Spread	-	17.0%	-31.5%	13.27%	

The analysis was conducted using weekly returns in USD. The indices used are Scientific Beta United States Cap-weighted, S&P GSCI Commodities Index (GSCITOT), FTSE USA REITS Index (F3USRN\$), and Scientific Beta United State Inflation +. Negative/Positive inflation surprises are defined as weeks (Friday to Friday) when changes in 10-year breakeven inflation was in the bottom/top 25%. The remaining 50% of the sample is defined as stable inflation conditions. Macro spread is the difference between returns in Positive and Negative Inflation surprises. Data source: Scientific Beta, Datastream, Federal Reserve Bank of St. Louis.



Unconditional performance

- Performance of REITS and especially commodities has been lower than the equity market, while Inflation (+) matches equity market performance.
- Both commodities and REITs come with very high tracking error w.r.t to the equity market, while the tracking error of Inflation (+) is moderate.

31/12/2008 - 31/03/2021	Market	Commodities	REITS	Inflation (+)	
	Absolute Perfo	ormance (Uncondit	ional)		
Ann. Absolute Return	15.25%	-4.58%	12.77%	16.26%	
Ann. Volatility	18.34%	22.07%	27.89%	19.11%	
Sharpe Ratio	0.91	N/A	0.51	0.92	
Max. Drawdown	33.77%	78.37%	43.66%	36.24%	
Relative Performance (Unconditional)					
Ann. Relative Return	-	-19.83%	-2.48%	1.01%	
Ann. Tracking Error	-	21.50%	18.64 %	2.72%	
Information Ratio	-	N/A	N/A	0.37	
Max. Relative Drawdown	-	93.07%	47.01%	11.16%	

The analysis was conducted using daily returns in USD. The indices used are Scientific Beta United States Cap-weighted, S&P GSCI Commodities Index (GSCITOT), FTSE USA REITS Index (F3USRN\$), and Scientific Beta United State Inflation +. Data source: Scientific Beta, Datastream.



Conditional performance

- We check a recommendation that "As Inflation Rates Rise, Look to Financials, Small-Cap Stocks".
- Indeed, both financials and small-cap stocks provide strong outperformance of market when expected inflation increases surprisingly.

31/12/2008 - 31/03/2021	Market	Financials	Small-Caps	Inflation (+)			
Absolute	Absolute Performance in Different Conditions (Inflation Surprises)						
Negative Inflation Surprises	-42.4%	-53.2%	-52.4%	-45.6%			
Stable Inflation	26.6%	22.7%	21.8%	27.4%			
Positive Inflation Surprises	82.8%	113.2%	131.9%	97. 1%			
Macro Spread	125.3%	166.4%	184.4%	142.7%			
Relative Performance to Cap-Weighted Index in Different Conditions (Inflation Surprises)							
Negative Inflation Surprises	-	-17.9%	-16.5%	-5.35%			
Stable Inflation	-	-2.8%	-3.6%	0.70%			
Positive Inflation Surprises	-	18.5%	28.2%	7.92 %			
Macro Spread	-	36.4%	44.7%	13.27%			

The analysis was conducted using weekly returns in USD. The indices used are Scientific Beta United States Cap-weighted, FTSE Russell 2000 (FRUSS2L), Scientific Beta Financial Cap-Weighted (based on TRBC classification), and Scientific Beta United State Inflation +. Negative/Positive inflation surprises are defined as weeks when changes in 10-year break-even inflation was in the bottom/top 25%. The remaining 50% of the sample is defined as stable inflation conditions. Macro spread is the difference between returns in Positive and Negative Inflation surprises. Data source: Scientific Beta, Datastream, Federal Reserve Bank of St. Louis.



Unconditional performance

- Picking individual sectors or factors obviously leads to a lack of diversification, and poor risk-adjusted returns in the long term.
- In contrast, Inflation (+) maintains access to the Sharpe ratio of broad equity exposure.
- Also, Inflation (+) operates in a large/mid cap universe and can be complemented with small cap exposure if desired by investors.

31/12/2008 - 31/03/2021	Market	Financials	Small-Caps	Inflation (+)	
	Absolute Perfo	ormance (Uncondit	ional)		
Ann. Absolute Return	15.25%	11.98%	14.46%	16.26%	
Ann. Volatility	18.34%	26.31%	24.10%	19.11%	
Sharpe Ratio	0.91	0.51	0.58	0.92	
Max. Drawdown	33.77%	45.56%	41.75%	36.24%	
Relative Performance (Unconditional)					
Ann. Relative Return	-	-3.27%	-0.79%	1.01%	
Ann. Tracking Error	-	13.12%	10.64%	2.72%	
Information Ratio	-	N/A	N/A	0.37	
Max. Relative Drawdown	-	40.01%	39.12%	11.16%	

The analysis was conducted using daily returns in USD. The indices used are Scientific Beta United States Cap-weighted, FTSE Russell 2000 (FRUSS2L), Scientific Beta Financial Cap-Weighted (based on TRBC classification), and Scientific Beta United State Inflation +. Data source: Scientific Beta, Datastream.



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Conclusion

An alternative to CW indices with inflation characteristics

- The indices deliver "market-like" characteristics while providing the desired conditionality to inflation.
- Equities are often used as inflation hedges and our *Inflation* + index improves inflation protection properties compared to traditional capweighted indices, allowing long-term investors to improve excess returns in the case of high inflation.
- This allows compensating losses in bond portfolios which are often used to hedge liabilities that are explicitly or implicitly linked to inflation and for which hedging through TIPS is often prohibitively expensive.
- Investors can use the indices to replace the cap-weighted index and position for inflation shocks, or as an overlay for factor strategies to protect the portfolio against inflation shocks.



Appendix

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High level of investability and replicability

- Inflation indices are highly investable. Liquidity measured with the average daily dollar traded volume over the last 1-Year is close to the Cap-Weighted index.
- Days-to-Trade measures are also very low, which underscores that inflation indices can be easily replicated.

SciBeta US 31-Dec-2008 to 31-Mar-2021	CW	Inflation +	Inflation -
Average Liquidity	915	946	795
Worst 5% Liquidity	634	508	509
Average Capacity	145'926	129'136	146'890
Worst 5% Capacity	68'767	54'420	80'207
Eff. Days-To-Trade	0.00	0.08	0.08
Max Days-To-Trade	0.21	0.34	0.36

The analysis is based on quarterly review weights from 31-Dec-2008 to 31-Mar-2021. Liquidity and capacity are expressed in millions of USD. ADDTV is the average daily dollar traded volume. Eff. DTT is the average of worst 5% days-to-trade at annual review. Max DTT is the worst 5% days-to-trade of selling the full portfolio. DTT is computed assuming USD 3 billion investment and a participation rate of 10%. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



Controlled turnover

- Annual 1-Way turnover ranges from 21% to 24%.
- Expected transaction costs are low and negligible.

SciBeta US 31-Dec-2008 to 31-Mar-2021	CW	Inflation +	Inflation -
Ann. 1-Way TO	3.5%	24.2%	21.5%
Standard deviation	1.4%	7.3%	6.1%
Worst 5%	5.0%	40.7%	36.0%
Transaction Costs	0.002%	0.011%	0.009%

The analysis is based on quarterly review weights from 31-Dec-2008 to 31-Mar-2021. Annualised one-way turnover is the sum of absolute deviations of individual weights between the end of a quarter and the beginning of the following quarter. This results in a two-way quarterly turnover, which is then annualised and set to a one-way figure. Transaction Costs are estimated using the closing quote bid-ask spread measure (effective spread) as shown by Chung and Zhang (2014). The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



Sector deviations are strong

- Sector deviations are driven by stock exposures to inflation surprises.
- They can be particularly strong, such as for Financial, Technology or Healthcare.

SciBeta US As of 31-Mar-2021	Inflation +	Inflation -
Energy	3.4%	-1.9%
Basic Materials	1.1%	-0.8%
Industrials	4.6%	-1.7%
Cyclical Consumer	0.4%	0.7%
Non-Cyclical Consumer	-1.8%	0.8%
Financials	4.3%	-2.3%
Healthcare	-4.6%	5.7%
Technology	-8.1%	-0.1%
Telecoms	-1.1%	1.0%
Utilities	1.9%	-1.2%

The analysis is based on end of March 2021 weights. The analytics show the relative sector allocation compared to the SciBeta US Cap-Weighted index. The iIndices used are the SciBeta US Inflation + and SciBeta Inflation –.



Controlled level of tracking error

- The tracking error of inflation-friendly indices is controlled and ranges between 2.3% and 2.7%.
- Extreme levels range between 3.7% and 4.6% or 3.2% and 3.6% for a 1year or 3-year rolling window respectively.

SciBeta US 31-Dec-2008 to 31-Mar-2021	Inflation +	Inflation -
Ann. Tracking Error	2.72%	2.35%
1Y Rolling TE - Avg	2.28%	2.15%
1Y Rolling TE - Worst 5%	4.61%	3.73%
3Y Rolling TE - Avg	2.13%	2.05%
3Y Rolling TE - Worst 5%	3.60%	3.23%

The analysis is based on daily USD total returns from 31-Dec-2008 to 31-Mar-2021. The rolling window analysis is computed using weekly steps. Worst 5% statistics corresponds to the lowest 5% percentile of rolling tracking error. The indices used are the SciBeta US Inflation + and SciBeta Inflation – as well as the SciBeta US Cap-Weighted index.



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