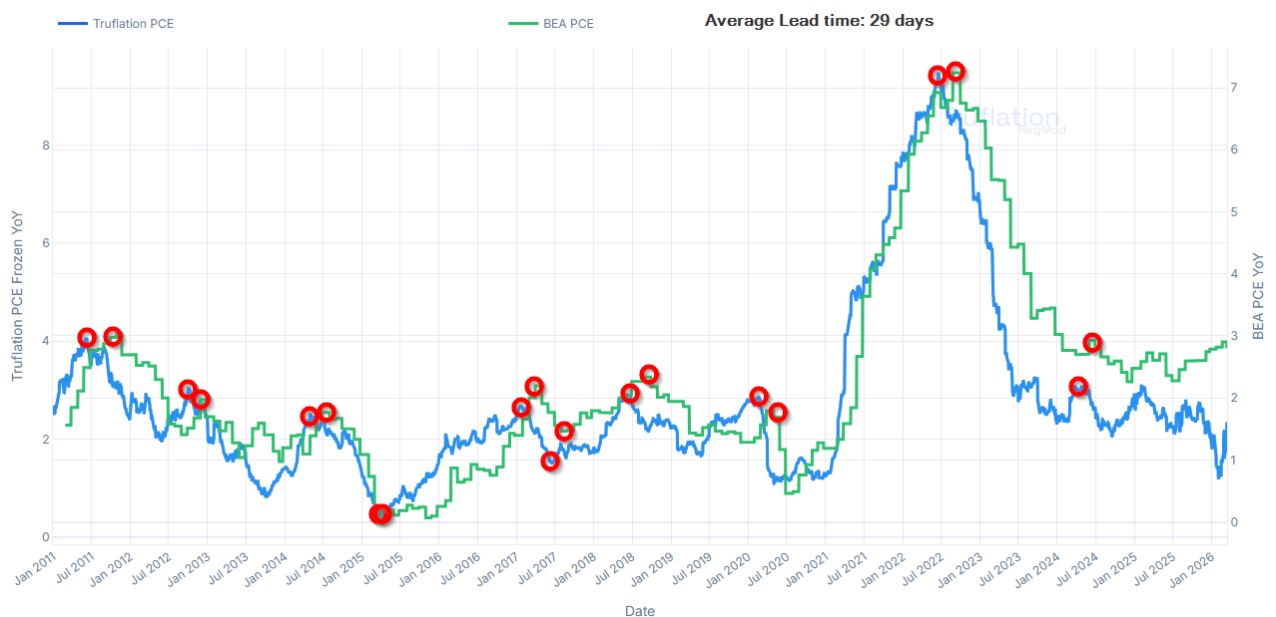


Truflation BEA PCE as a Leading Indicator of the BEA PCE Price Index Inflation Measure

Empirical Evidence of Signal Lead and Regime Dependent Dynamics



April 10, 2026

Version 1.0

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1. Introduction

Truflation provides a high frequency, data driven measure of inflation designed to reflect real time price dynamics across the economy. Traditional measures such as the Personal Consumption Expenditure Price Index (PCE), published by the U.S. Bureau of Economic Analysis (BEA), remain the preferred inflation benchmark for the Federal Reserve; however they are structurally backward looking due to:

- Monthly data collection cycles
- Business survey, retail sales and administrative datasets that are delayed
- Publication lags in the reporting schedule

These characteristics introduce a systematic information delay for policymakers, investors and risk managers. Truflation addresses this limitation by aggregating over 15 million price points across 30+ data sources, producing a daily inflation index that reflects current market conditions.

The Truflation BEA PCE Index differs from the Truflation U.S. CPI Inflation Index in that it maps all 30+ underlying Truflation data sources to the BEA PCE Price Index classification framework and applies the corresponding category weightings. This ensures alignment in both definitions and weights, providing a more consistent and directly comparable measure relative to the preferred measure of the Federal Reserve, PCE Price Index benchmark.

Empirically, Truflation not only tracks BEA PCE Price Index closely but also systematically leads it. This paper formalizes that relationship through statistical analysis across distinct macroeconomic regimes.

2. Key Differences in Methodology

The Bureau of Economic Analysis, Personal Consumption Expenditure Price Index is designed to capture total consumer spending across the economy, not just out of pocket purchases but also goods and services directly purchased by household as well as services paid on behalf of households such as employer provided healthcare or government funded programs e.g. Medicare, Medicaid. PCE aims to also measure inflation in a way that reflects actual consumer behavior over time incorporating changes in spending patterns (substitution between goods and services) and shifts in consumption weights as a relative price change. However, there are fundamental differences between BEA PCE and Truflation in data coverage, timeliness, and calculation methodology:

- **Data Frequency & Timeliness:** Truflation operates on a daily, real time basis, continuously ingesting price data, whereas PCE is published monthly with a lag and relies on data that is often weeks or months old. This makes Truflation inherently forward looking, while PCE is retrospective.
- **Data Collection Approach:** Truflation uses a high-frequency, multi source census approach, aggregating millions of price points from digital platforms, private datasets, and public sources. In contrast, PCE is built from aggregate national accounts data, including business surveys, retail sales, and administrative records, rather than direct price observation at scale.
- **Treatment of Substitution & Adjustments:** PCE explicitly incorporates substitution effects and imputation techniques, adjusting for changes in consumption and estimating missing components. Truflation largely avoids these by using real transaction and price data, allowing changes in behavior to appear organically in the dataset.
- **Housing Measurement:** PCE (similar to CPI) relies heavily on imputed measures such as Owner's Equivalent Rent (OER) and rental surveys. Truflation instead incorporates actual housing market dynamics, including home prices, mortgage rates, and rental data, providing a more immediate reflection of housing costs.
- **Revisions vs. Finality:** PCE is frequently revised, sometimes significantly, as new data becomes available. Truflation publishes frozen values, meaning once released, they are not revised; making them more useful for real time decision making and backtesting.
- **Responsiveness to Economic Shocks:** Because of its high frequency inputs and lack of smoothing, Truflation reacts quickly to supply shocks, demand shifts, and price volatility. PCE, due to aggregation, smoothing, and lagged inputs, adjusts more slowly, especially during periods of rapid inflation or disinflation.

In essence PCE is designed for accuracy and completeness, making it ideal for policy benchmarking, while Truflation is designed for speed, transparency, and real time insight, making it more effective as a leading indicator of inflation dynamics.

3. Data and Analytical Methodology

The analysis compares the year over year percentage change of the Truflation BEA PCE Index (TruPCE) with the PCE Price Index published by the U.S. Bureau of Economic Analysis, covering January 2011 through February 2026.

To ensure comparability, differences in data frequency are reconciled through temporal aggregation. Specifically, Truflation's daily observations are aggregated to a monthly frequency to align with the lower frequency BEA PCE Price Index data.

To quantify the lead lag relationship, a Pearson correlation based time series approach is employed, using cross correlation to identify the temporal offset between the two series. Aggregating Truflation data to a monthly frequency ensures a consistent number of observations for robust statistical comparison.

The PCE data is aligned to its reference month; however, the official release typically occurs with a lag of 28–30 days into the following month. For example, the January 2026 PCE reading was released on March 13, 2026, due to a government shutdown, whereas under normal conditions it would have been published in late February.

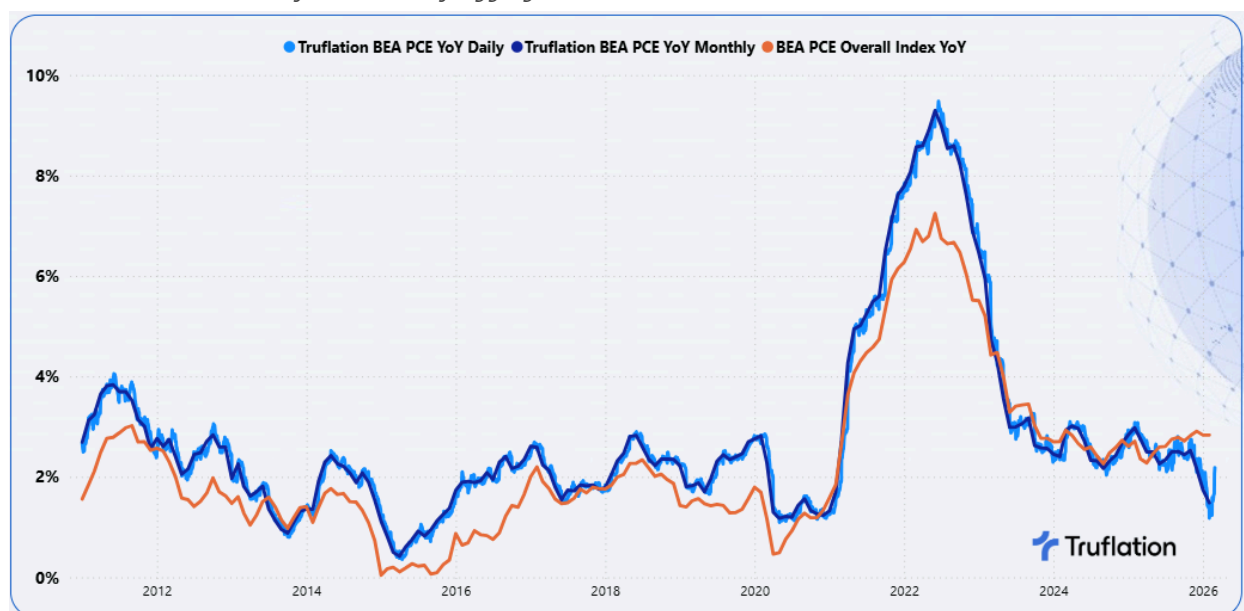
Truflation evaluates the data based on the reference month while also incorporating the timing of information availability to market participants. To account for this, an approximate 28-day lag is applied, capturing the effective real time informational delay embedded in the PCE release process.

For lag analysis, a shifted Truflation series is constructed by delaying the index across a range of intervals. At each shift, the correlation coefficient is calculated against the corresponding PCE values, producing a correlation profile that identifies the lead at which the relationship is strongest.

4. Results

The chart in Exhibit 1 plots the monthly PCE Price Index data published by the U.S. Bureau of Economic Analysis alongside both the daily Truflation BEA PCE Price Index and its aggregated monthly equivalent.

Exhibit 1: TruPCE YoY (Daily and Monthly Aggregated) vs BEA PCE Price Index YoY



Visual analysis appears to show that Truflation consistently leads the BEA PCE series. Peaks, troughs and turning points in inflation are observed marginally earlier in the Truflation data, supporting the view that Truflation functions as a leading indicator.

To quantify this relationship, a linear regression analysis was conducted, with TruPCE as the independent variable and BEA PCE Price Index as the dependent variable. The regression analysis over the full sample (January 2011 to February 2026) yields a correlation coefficient is 0.951, indicating an exceptionally strong positive relationship between the two series.

Cross correlation analysis confirms these results, with the highest correlation occurring when Truflation PCE index leads the BEA PCE Price Index by approximately 29 days, suggesting a structural lead of approximately four weeks relative to BEA PCE. This reflects the fundamental differences in methodology, including data collection frequency, publication lags, and imputation techniques.

However, these results should be interpreted with caution, as inflation dynamics vary significantly across the sample period. From 2010 through 2020, inflation was generally low, stable and often below the Federal Reserve target. In contrast, the period from 2021 to 2023 was highly atypical, characterized by stimulus driven demand, supply chain disruptions, sharp increases in housing costs, and broad based price volatility, followed by an unusually rapid disinflation phase. These shifts affected both the speed and transmission of price changes across the economy.

As a result, the full sample correlation coefficient reflects a mixture of heterogeneous inflation regimes rather than a single stable relationship. The Table in Exhibit 2, presents an analysis of how closely the Truflation PCE Index tracks and leads the BEA PCE Price Index measure across different macroeconomic environments.

Exhibit 2 – Segmented Inflation Periods

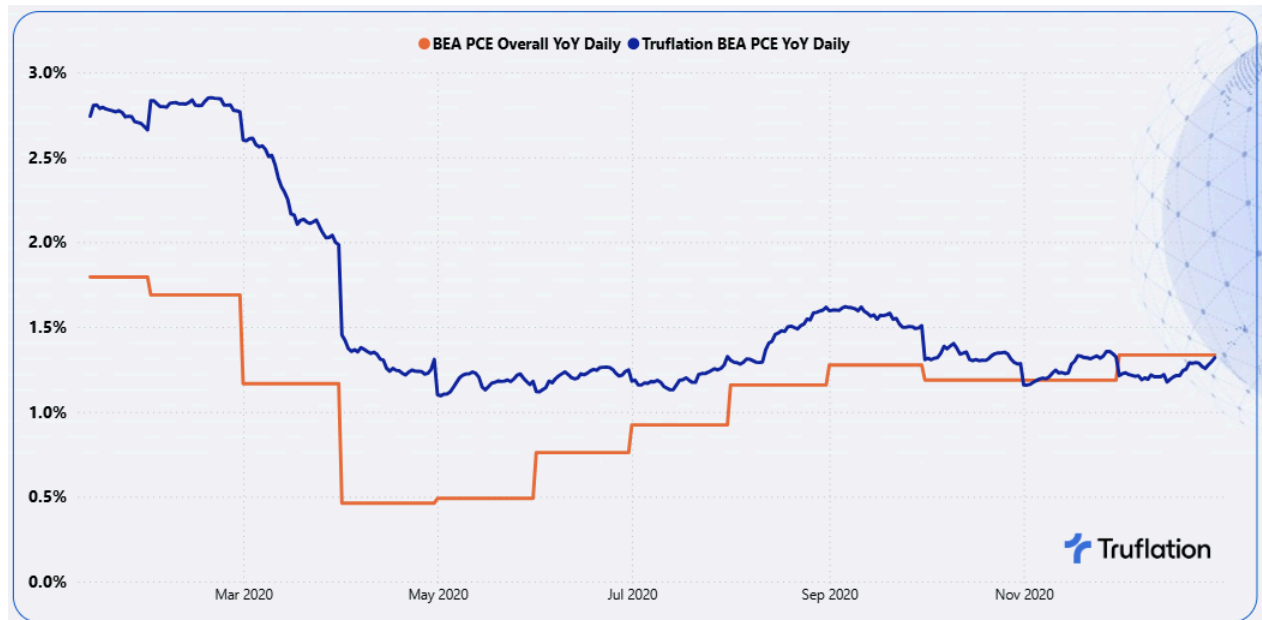
Inflationary Environments	Dates	Correlation Coefficient	Lead
Low Consistent & Stable Inflation	Jan 20 – Dec 20	0.736	~28 days
High Volatile Inflation	Jan 21 – Jun 23	0.988	~29 days
Disinflation / Return to Normalization	July 23 – Feb 26	0.389	~28 days

The results of the correlation coefficients and lead days shows a consistently strong relationship no matter the economic environment. There is a marginally stronger and longer lead observed during the high volatility period (~29 days) but nothing overly significant.

Low Consistent & Stable Inflation (January 1, 2020 – December 31, 2020)

During this period of relatively stable inflation, the Truflation PCE exhibits a strong correlation of 0.736 with the BEA PCE Price Index. The R^2 of 0.541 indicates that Truflation PCE explains approximately 54% of the variation in the BEA PCE year on year movements within this regime.

Exhibit 3 – TruPCE YoY vs the BEA PCE Price Index YoY

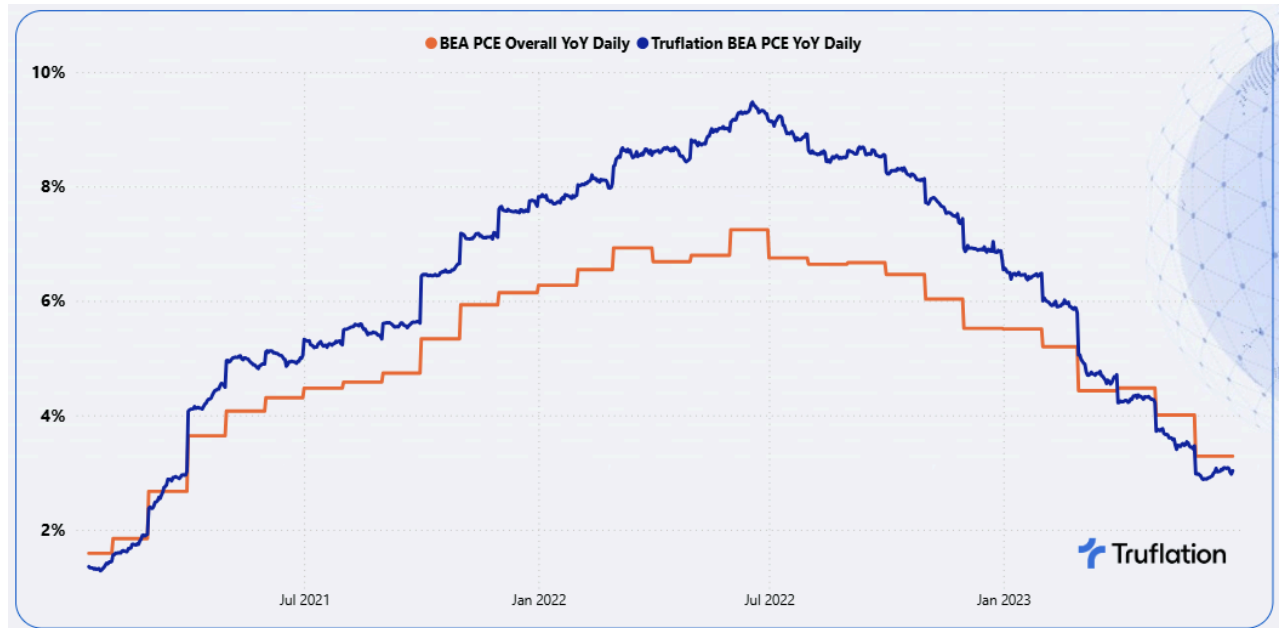


High Volatile Inflation (January 1, 2021 – June 30, 2023)

This period was characterized by significant fiscal stimulus, demand driven inflation, supply chain disruptions and heightened commodity volatility exacerbated by the Ukraine War, particularly impacting global food and energy markets.

These conditions led to rapid repricing across goods and services, while BEA PCE Price Index components, especially shelter adjusted more slowly due to methodological smoothing, imputations and sampling lags. When the Truflation PCE Index is used, it leads the BEA PCE by approximately 28 days, with a correlation coefficient of 0.988 and R^2 of 0.978. This suggests that Truflation explains around 97% of the variation in the BEA PCE Price Index movements during periods of heightened inflation volatility. This indicates a near perfect alignment between the two indexes as well as its effectiveness in capturing rapid price changes in real time.

Exhibit 4 – TruPCE YoY vs the BEA PCE Price Index YoY

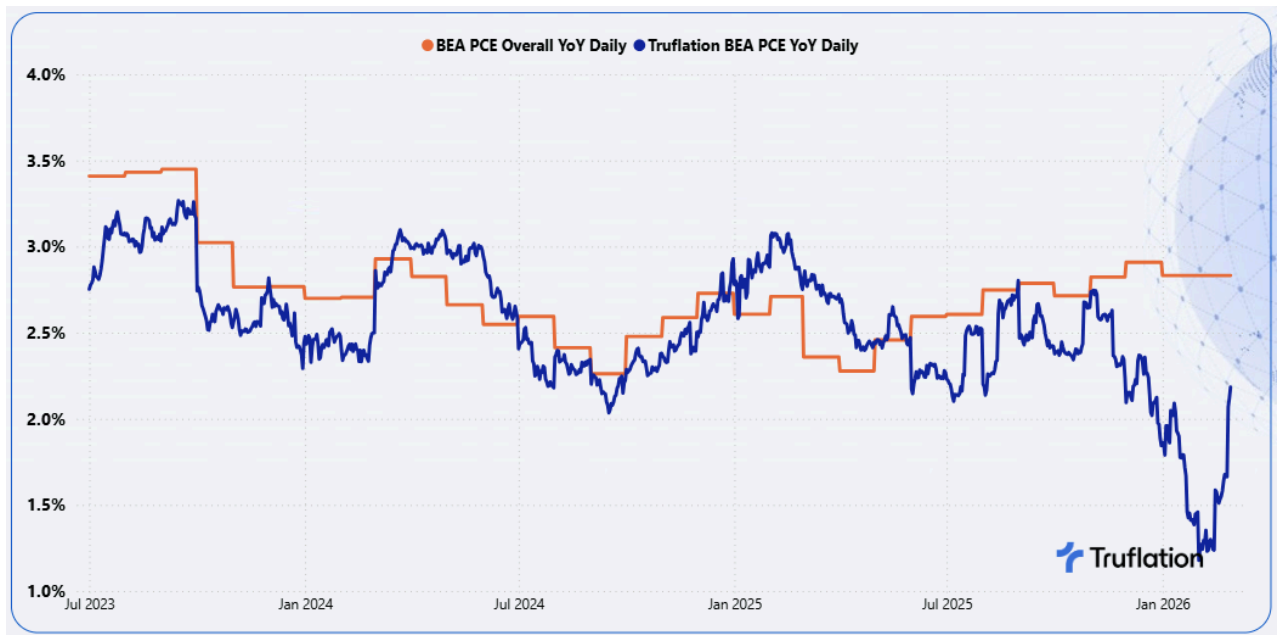


Disinflation / Return to Normalisation (July 1, 2023 – February 28, 2026)

As inflation moderated and the economy transitioned toward normalization and a return to more predictable pricing dynamics, the Truflation PCE's lead returned back to approximately 28 days. The correlation coefficient declined slightly to 0.390, with an R^2 of 0.152. This indicates a moderate positive relationship between the two variables. As one variable increases, the other does as well but the relationship is not particularly strong. This is likely to be a reflection of three important factors during this period:

- *Government shutdowns* in October 2025 and January 2026, which not only disrupted data collection but had a considerable impact on the reporting timelines and returning them to normal cycles.
- *Tariff related price shocks* which were captured more immediately in Truflation but reflected more slowly in BLS CPI
- *Housing in particular* experienced an increased influence from slower moving inflation as it is collated from the BLS CPI Housing survey data.

Exhibit 5 – TruPCE YoY vs the BEA PCE Price Index YoY



The key takeaways of the analysis between Truflation's PCE Index versus the official BEA PCE Price Index are:

- **Stronger Alignment:** The TruPCE Index shows a 3% higher correlation and a 5% higher R^2 score compared to the TruCPI-US Index.
- **Consistent Lead:** Truflation leads official inflation data by approximately 28-30 days across all economic environments.
- **High Reliability:** The correlation between Truflation and BEA PCE remains high in all regimes, indicating strong relationships.
- **Best in Volatility:** The relationship is strongest during periods of high and volatile inflation, when real time data provides the most value.
- **Slight Weakening in Stability:** As inflation stabilizes, the relationship weakens slightly due to the increased role of lagging components in official measures.

5. Why Truflation Acts as a Leading Indicator

The evidence clearly demonstrates that Truflation systematically leads the PCE Price Index published by the U.S. Bureau of Economic Analysis in a structural, predictable, and consistent manner. This lead is not incidental; it is a direct result of fundamental differences in methodology and data collection between the two indices. Truflation's forward looking signal is underpinned by several persistent structural advantages:

- **Real time price collection** of millions of daily prices from both public and private sources, capturing price changes as they occur rather than a lagged macroeconomic data (retail sales, business surveys, administrative datasets), which are reported with delays.

- **Continuous updating** as Truflation updates daily, while PCE is released monthly with a roughly 28-30 day publication lag. By the time PCE is published, the underlying economic conditions may have already shifted which Truflation has already captured.
- **No smoothing** as the PCE uses chain-weighting and imputation techniques (for housing) to reflect evolving consumption patterns and reduce volatility. While methodologically robust, this dampens and delays the recognition of turning points. Truflation applies no smoothing, allowing it to detect inflection points in inflation much earlier.
- **Faster transmission of economic shocks** especially during periods of rapid inflation or disinflation, prices in the real economy adjust quickly. Truflation captures this high frequency repricing immediately, while PCE reflects it only after data collection, aggregation, and release cycles, creating a structural lag.

These features create an index that is inherently more responsive to rapid changes in economic conditions, explaining its consistent and structural lead over the BEA PCE.

6. Conclusion

Overall, Truflation serves as a robust leading indicator of inflation, consistently providing an early signal ahead of the official BEA PCE Price Index. Its ability to track inflation dynamics is particularly strong during periods of rapid change, making it a valuable tool for real time economic analysis and decision-making.

7. Version History

Version	Date Released	Correlation Coefficient
1.0	April 1, 2026	Genesis of the Truflation BEA PCE Index Correlation Analysis