

Truflation PCE Comparison Index

Methodology

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1. Executive Summary

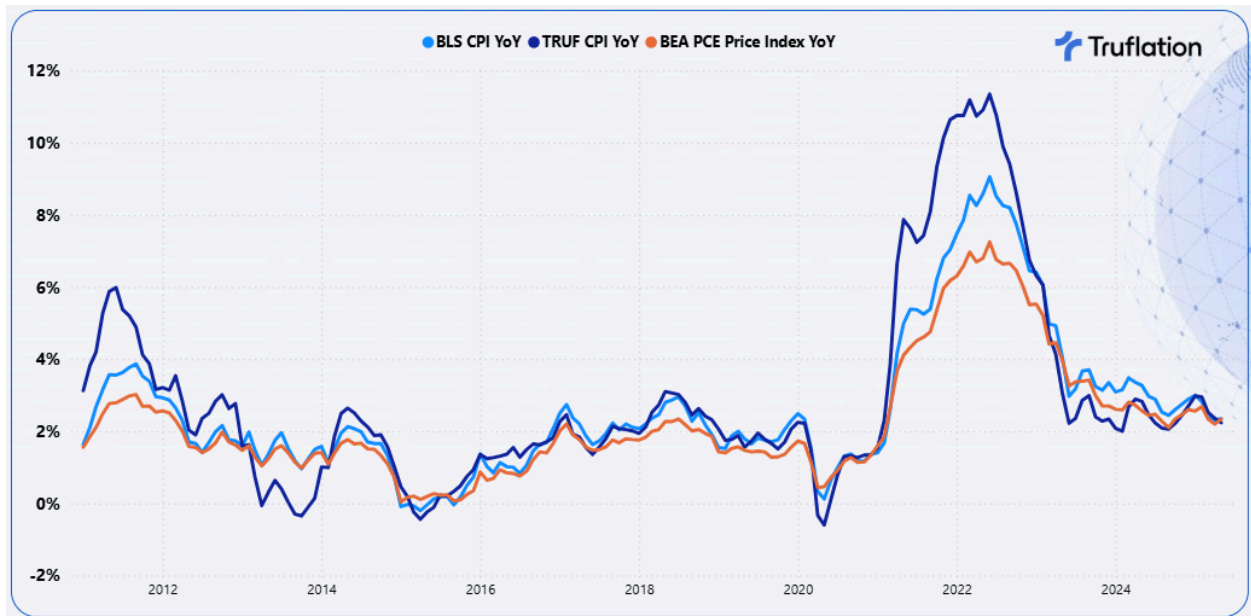
In the intricate nature of economic analysis, understanding the ebb and flow of an economy's health is of paramount importance. Economic indicators serve as compass points, helping policymakers, business leaders and the retail investors to navigate the financial landscape.

These indicators provide insights into the current state of an economy, predict potential future trends and shape decisions that have far-reaching consequences. Among these indicators, measures of inflation stand out due to their direct impact on purchasing power, monetary policy, and overall economic stability.

Enter the realm of inflation measurements: the Personal Consumption Expenditures (PCE) Price Index, the Consumer Price Index (CPI), and Truflation's alternative real-time US inflation index. Each offers a unique lens through which to view the intricate dynamics of price changes within an economy.

Each of these indexes are constructed differently and as a result behave differently over time. Exhibit 1, shows the monthly year on year growth rates of the three indexes from January 2011 through to May 2025. Although the magnitude and direction of these indexes vary, on average, the Truflation Index reacts 45 days ahead of the CPI and PCE, which is driven by its methodology and the daily update of its index.

Exhibit 1 – CPI-Urban, PCE Price Index & Truflation Index: Percentage change at annual rates



Source: Bureau of Economic Analysis, Bureau of Labor Statistics & Truflation

Following the launch of Truflation BLS Inflation Comparison Index, there has been growing interest to launch a Truflation PCE Comparison Index given that this is the primary inflation index used by the Federal Reserve when making monetary policy decisions.

2. The Personal Consumption Expenditure (PCE) Price Index.

Consumer spending is an important factor that drives the US economy and a key part of the GDP, and the PCE sheds light on buying habits and savings levels. The Bureau of Economic Analysis uses consumer spending to calculate its inflation gauge, the PCE Price Index, which gives this measure its economic importance.

The PCE Price Index is compiled monthly and measures the prices consumers pay for goods and services and changes in those prices. It is considered a gauge of inflation in the US economy and calculated using PCE data. It may indicate whether prices are inflating or deflating and how consumer spending behavior changes in response.

The PCE Price Index provides two figures:

- The first is derived from all of the PCE spending categories

- The second excludes data for food and energy and is known as the core PCE Price Index

The core PCE Price Index makes an underlying inflation trend more visible as food and energy prices can obscure this trend due to their more frequent volatility compared to other prices.

The BEA uses the current dollar value of the PCE to calculate the PCE Price Index and reports the total value every month. Like most economic breakdowns, the PCE is split between consumer goods (including durable and nondurable goods) and services. Below is a breakdown of the subcategories included in the PCE:

- **Durable Goods:** Motor vehicles and parts, furnishings and durable household equipment, recreational goods and vehicles, and other durable goods
- **Nondurable Goods:** Food and beverages purchased for off-premises consumption, clothing and footwear, gasoline and other energy goods, and other nondurable goods
- **Services:** Housing and utilities, healthcare, transportation services, recreation services, food services and accommodations, financial services and insurance, and other services

According to the BEA, most of the PCE (valued by market prices, including sales tax) comes from household purchases of new goods and services from private businesses. It also includes household purchases of new goods and services from the government.

The PCE also consists of spending by non-profit institutions to provide services to households, household purchases of used goods, and the purchases of goods and services by US residents in foreign countries.

In addition, the PCE includes spending on behalf of households by third parties, such as employer-paid health insurance and medical care financed through government programs, life insurance expenses, and pension plan expenses.

PCE Formula

The PCE derives its data from multiple sources. The primary ones include the US Census Bureau's Monthly Retail Trade Report and the Service Annual Survey. It also uses data from the Bureau of Labor Statistics, particularly the Consumer Expenditure Survey, for the housing price changes.

The PCE is a chained index, so it's calculated using a complex formula that compares prices over two periods. The idea behind chaining is to frequently update expenditure weights in the index, making it more responsive to changes in consumer spending patterns.

The PCE Price Index is also weighted by data acquired through business surveys, which tend to be more reliable than the consumer surveys which is used for from the Consumer Expenditure Survey for the housing data. The PCE Price Index uses a formula that allows for changes in consumer behavior, including those that occur in the short term.

The Personal Consumption Expenditures and the PCE Price Index are two different measurements. PCE measures consumer spending on goods and services, while the PCE Price Index measures the prices of those goods and services. As mentioned, the PCE Price Index shows price inflation or deflation that occurs from one period to the next.

The PCE Price Index is the primary inflation index used by the Federal Reserve when making monetary policy decisions. The Federal Reserve prefers the PCE Price Index as their primary inflation metric because:

- The PCE Price Index better reflects changes to consumer spending, such as selecting substitute goods due to price changes
- It covers a broader range of spending
- Past information can be adjusted to support recent information

3. Truflation's assessment and critique of the PCE Price Index

The primary goal of both metrics is to track the change in the prices of goods and services over time, offering insights into consumers' purchasing power and overall economic health. This information is important for economic policy purposes and business decision-making.

The PCE estimates aggregate spending for a large number of goods and services, which represent a typical consumption pattern and can indicate the status of an economy given that consumer spending in the US accounts for 2/3 of the GDP, as noted by the BEA.

With all the recognized benefits, there are several concerns associated with the PCE Price Index.

- **Too comprehensive:** Given the coverage of the PCE Price Index, it can provide a view of spending that accounts for more goods and services than actually purchased. The reason is that the PCE PI includes household purchases from the government, spending by non-profit institutions to provide services to households, household

purchases of used goods, and the purchases of goods and services by US residents in foreign countries. In addition, it also includes spending on behalf of households by third parties, such as employer-paid health insurance and medical care financed through government programs, life insurance expenses and pension plan expenses. All these inclusions add distortions to the movements in the data.

- **Lag in Publication:** The PCE is published with a lag, as it is updated monthly, offering a snapshot of inflation trends over the past month. This means that the most recent data might not always reflect the very latest economic conditions.
- **Revisions:** PCE data is subject to revisions. While this ensures accuracy as more comprehensive data becomes available, it can also create challenges for analysts and policymakers who require stable and consistent data.
- **Uses the flawed Housing Prices data from the BLS:** Housing data used in the PCE Price index is sourced from the Bureau of Labor and Statistics, specifically the "owners' equivalent rent" concept in their Consumer Expenditure (CE) data. In addition to this the BLS also directly collects price data on rental units through the CPI Housing Survey which includes surveys on about 40,000 residences. Truflation's CPI Index includes the price of home purchases by factoring in mortgage payments, providing a more direct reflection of the housing market's impact on consumers' expenses.

Exhibit 2 – Comparison between the PCE Price Index vs Truflation CPI Index

	Personal Consumption Expenditure Price Index	Truflation US CPI Index
Publication	Bureau of Economic Analysis (BEA)	Tru Labs Inc.
Data Source	Census Bureau's Monthly Retail Trade Survey BLS Consumer Price Index; Housing Survey	Market price data from 40+ data sources
# of Data Points	Data not available	14+ million items
Publish Frequency	Monthly	Daily
Markets/Indexes	Headline, Core, Goods & Services & 16 subcategory data	Headline, Core, Goods, Services & 32 categories & sub-categories
Weighting	Flexible	Flexible
Substitution	Yes; Chain-type	Not needed
Calculation	$\frac{(\text{PCE in the current period} - \text{PCE in the previous period})}{\text{PCE in the previous period}} \times 100\%$	$\frac{(\text{Truflation in the current date} - \text{Truflation in the previous date})}{\text{Truflation in the previous date}} \times 100\%$
Exclusions	Prices of homes sold for residential purposes	- Household purchases from the government - Non profits institutions providing a service to households - Household purchases of used goods - Purchases of goods and services by US residents in foreign countries - Excludes any 3rd party spending on behalf of household
Main Users	Federal Reserve, Economists, Analysts & Financial institutions.	Economists, Analysts, Financial institutions, Retail Investors, Web3 etc

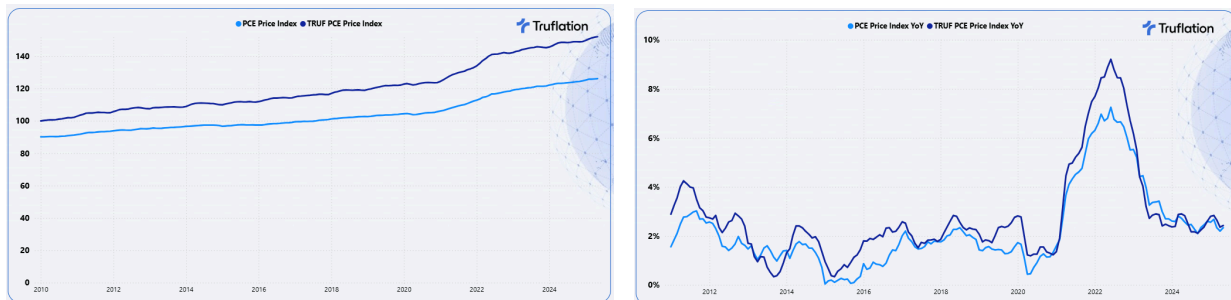
4. Truflation PCE Comparison Index

Truflation has emerged as an alternative data source and provided a fresh perspective to truly understand inflationary trends using real time price data from 40+ independent sources covering more than 14 million prices of goods and services across the US. Truflation validates, harmonizes and calculates outputs using open-source algorithms. This is done to achieve the most transparent and accurate snapshot of the changes in consumer prices on a daily basis. The new metrics enable individuals, investors, businesses and institutions to make more informed decisions based on unbiased and transparent information.

As a result of the growing interest to have a PCE Comparison Index, Truflation has launched the 'Truf PCE Comparison Index', which takes all the data from the 40+ Truflation data partners and aligns the data to the PCE Price Index product hierarchy and then assigns the PCE associated weighting for each category. This Index facilitates the ability to forecast the PCE given that we have an average 45-day lead time on the PCE and the BLS.

As is evident from Exhibit 3, which shows the monthly index trends of the Truf PCE Comparison Index and the PCE Price Index from January 2010 to May 2025, the consistency of the two indexes as well as the Year on Year changes are very strong aligned.

Exhibit 3 – Truf PCE Comparison vs PCE Price Index: Index & Percentage change at annual rates



Source: Bureau of Economic Analysis & Truflation

A linear regression analysis, which is a statistical method used to examine the relationship between an independent variable (the Truf PCE Comparison Index) and the dependent variable (the BEA PCE Price Index) was conducted. A regression correlation coefficient, which provides a range from -1 to +1 to represent the strength and direction of a relationship between two variables. A value close to +1 indicates a strong positive relationship, meaning as one variable increases the other also tends to increase. The coefficient between the Truf PCE Comparison Index and the PCE Price Index was 0.99827339.

In addition, the R-squared (R²) score, also known as the coefficient of determination, is another statistical measure that represents the proportion of variance in a dependent variable that is explained by the independent variable in a regression model. In simpler terms it indicates how well the model predictions match the actual data. The R² values ranges from 0 to 1, with 0 indicating that the model explains none of the variability in the dependent variable, in this case the PCE Price Index. The model's predictions are no better than simply predicting the mean of the dependent variable. A score of 1 indicates the model perfectly explains all of the variability in the dependent variable. The R² score between the Truf PCE Comparison Index and the PCE Price Index was 0.99654977.

To achieve this outcome of the regression analysis, firstly Truflation aligns all the Truflation CPI data from its 40+ different data partners to the product categorization of the PCE Price Index. This means aligning all our data sets to the hierarchy as defined by the PCE, which is outlined in Exhibit 4 and applying the associated weights of the BEA PCE to the Truflation data.

Exhibit 4 –PCE Price Index Product Hierarchy

Personal Consumption Expenditure (PCE) Price Index			Weights
	Goods		33.12%
	Durable goods		10.74%
		Motor vehicle and parts	3.64%
		Furnishings and durable household equipment	2.38%
		Recreational goods and vehicles	3.23%
		Other durable goods	1.49%
	Nondurable goods		22.38%
		Food and beverages purchased for off premise consumption	9.16%
		Clothing and footwear	3.03%
		Gasoline and other energy goods	2.03%
		Other nondurable goods	8.16%
	Services		66.88%
	Household consumption expenditures (for services)		63.62%
		Housing and utilities	17.29%
		Health care	17.53%
		Transportation services	3.22%
		Recreation services	2.99%
		Food services and accommodations	6.40%
		Financial services and insurance	0.53%
		Other service	15.66%

	Final consumption expenditure of nonprofit institutions serving households	3.26%
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Source: Bureau of Economic Analysis

Given that Truflation doesn’t cover consumption expenditure of nonprofit institutions serving households, Truflation uses this data from the PCE and added it to the Truf PCE Comparison Index.

Then Truflation converts its Truf PCE Comparison Index daily data into a monthly index by creating an average monthly index. Using this average monthly data we have a direct to the monthly PCE Price Index with 185 observations of monthly data from January 2010 to May 2025, which is what the regression analysis is based on.

The headline Truf PCE Comparison Index is available on the Truflation website

5. Version History

Version	Date Released	Notes
1.0	2025-07-29	Genesis of Truf PCE Comparison index