INFOCUS

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Measuring US inflation

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With the Federal Reserve facing the difficult issue of deciding when to reduce bond purchases, investors have followed US inflation developments closely in recent months. In this issue of *Infocus*, EFG chief economist Stefan Gerlach compares the two main measures of US inflation.

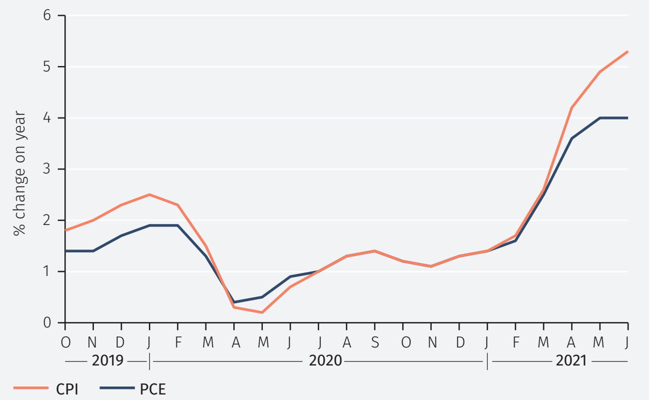
With the likelihood and timing of any Fed decision to taper bond purchases depending in part on the outlook for inflation, investors have followed US price developments closely in recent months. The central issue from the Fed's perspective is whether the recent increase in inflation will require a tightening of monetary policy to return it towards the 2% level or if it will do so on its own. Investors are keenly watching for any evidence that inflation pressures are abating.

The behaviour of CPI and PCE inflation

In doing so they are helped by the fact that the US authorities publish two indices that can be used to measure inflation. The first of these is the Consumer Price Index, CPI, which is published by the Bureau of Labor Statistics.[1] The second price index is the deflator for Personal Consumption Expenditures, PCE, which is published by the Bureau of Economic Analysis.[2]

As Figure 1 shows, inflation computed using these two price indices behaves somewhat differently. While it is sensible for market analysts to look at both measures, it is important to be aware of the differences and why they arise.

1. Annual inflation in the US



Source: Bureau of Labor Statistics. (CPI) and Bureau of Economic Analysis (PCE). Data as at 20 August 2021.

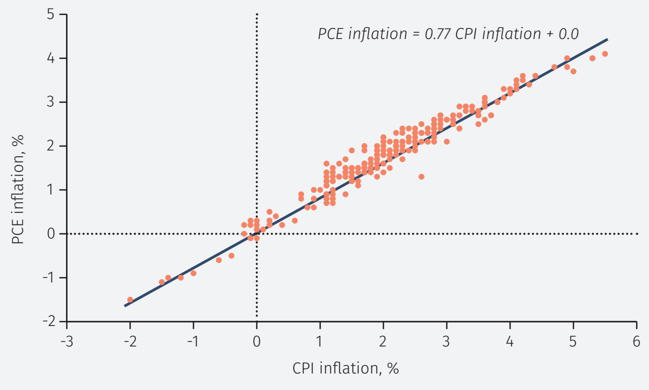
Figure 2, which contains the mean and standard deviation of inflation over 12 months over the period January 2001 – June 2021, shows that CPI inflation has on average been a little higher and more volatile than PCE inflation.

2. Inflation over 12 months, Jan 2001 – June 2021

	CPI Inflation	PCE inflation
Mean	2.1%	1.8%
Standard deviation	1.3%	1.0%

To get a better sense of these differences, Figure 3 shows a scatter plot of CPI and PCE inflation.

3. Annual CPI and PCE inflation



Source: Bureau of Labor Statistics. (CPI) and Bureau of Economic Analysis (PCE). Data as at 20 August 2021.

There is an almost perfect relationship between the two variables, as evidenced by a correlation coefficient of 0.98. A fitted line through the data shows that PCE inflation can be thought of as being about 0.8 times CPI inflation. This implies that CPI inflation is above PCE inflation when inflation is positive, but below PCE inflation when inflation is negative. Overall, PCE inflation varies less than CPI inflation.

Which measure is more important?

Whether observers should focus on PCE or CPI inflation depends on the nature of the interest in inflation. If it arises from a concern about the outlook for monetary policy, however, then the answer is clear: PCE inflation is more important than CPI inflation.[3]

The reason is that in its *Monetary Policy Report to Congress* of 17 February 2000, the Fed stated that it would henceforth

[1] See https://www.bls.gov/cpi/
[2] See https://www.bea.gov/data/personal-consumption-expenditures-price-index
[3] In contrast, the CPI is used to adjust social security payments and is also a reference rate for some financial contracts.

present FOMC participants' inflation forecasts as measured by the PCE index because it has several advantages relative to CPI inflation:[4]

1. The PCE index reflects the changing composition of spending and avoids some of the upward bias associated with the fixed-weight nature of the CPI.

2. The PCE weights are based on a more comprehensive measure of expenditures than the CPI weights.

3. Historical data used in the PCE price index can be revised to account for newly available information and for improvements in measurement techniques.

This announcement has since been seen as indicating the Fed's preference for PCE inflation.

However, CPI inflation is available about two weeks before PCE inflation is released. For instance, CPI inflation for July 2021 was released on 11 August, but PCE inflation will only be released on 27 August. Since the two inflation measures are so strongly correlated, commentators interested in PCE inflation will pay close attention to the behaviour of the CPI as an early indicator.

How do the CPI and PCE measures differ?

The two price indices differ in several important ways.[5]

- ➡ The **formula effect** arises because each index uses a different formula. The PCE is computed using a Fisher ideal index that captures the fact that as the price for a good rises, consumers buy less of that good. By contrast, the CPI is computed using a Laspeyres index that uses weights, that only rarely change, taken from a designated base period. As noted by the Fed, the CPI index therefore tends to overestimate the rate of inflation.

- ➡ The **weight effect** arises because the expenditure patterns differ between the indices. The weights in the PCE are derived from business services while those used in the CPI are derived from consumer surveys. Importantly, shelter is much more important in the CPI than in the PCE.

- ➡ The **scope effect** is a result of the different types of expenditures CPI and PCE track. While the CPI reflects the price of out-of-pocket expenditures made by urban consumers, the PCE price index reflects the price of expenditures made by all households, including expenditures made on behalf of households. For instance, the PCE index includes health care paid for by households (as does the CPI), but also health care expenditure made by employers and government programs. It is therefore a broader index which, all else being equal, tends to reduce its variability.[6]

It is possible to use past data to form an estimate of how large these differences have been, and the BEA does so regularly.[7] Figure 4 shows its reconciliation of the two inflation rates for the first two quarters of 2021.[8]

The recent behaviour of CPI and PCE inflation

Given these differences, it is not surprising that CPI and PCE inflation provide different perspectives of the run-up in inflation during the spring. With PCE inflation about four-fifths of CPI inflation and being less volatile, PCE inflation has risen less than CPI inflation.

4. A reconciliation of PCE and CPI inflation

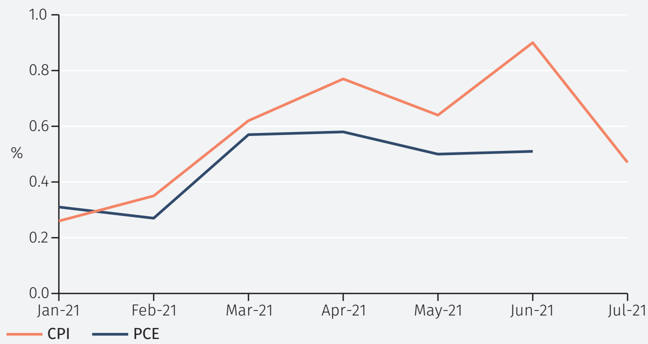
% change on previous quarter, annualised rate	Q1 2021	Q2 2021
PCE Chain-type price index (percent change)	3.8	6.4
Less: Formula effect (percentage points)	0.16	-0.13
Less: Weight effect (percentage points)	-0.97	-2.62
Less: Scope effect - PCE price index items out-of-scope of the CPI (percentage points)	1.52	1.62
Plus: Scope effect - CPI items out-of-scope of the PCE price index (percentage points)	0.25	0.13
Less: Other effects (percentage points)	-0.37	-0.76
Equals: CPI (percent change)	3.7	8.4

Source : BEA. Data as at 20 August 2021.

[4] See footnote 1 on page 4 in https://www.federalreserve.gov/boarddocs/hh/2000/February/FullReport.pdf
[5] See this discussion in 'Differences between the consumer price index and the personal consumption expenditures price index,' in *Focus on Prices and Spending*, BLS, May 2011, available at: https://www.bls.gov/opub/btn/archive/differences-between-the-consumer-price-index-and-the-personal-consumption-expenditures-price-index.pdf
[6] For the same reasons as a more diversified portfolio tends to have a more stable return.
[7] See https://apps.bea.gov/iTable/iTable.cfm?1903=2075&1921=underlying&isuri=1&reqid=19&step=3#1903=2075&1921=underlying&isuri=1&reqid=19&step=3
[8] The category "other" captures differences in prices used (most are the same in the two indices, but the BEA also utilizes some price data) and differences in seasonal adjustment. See *A comparison of PCE and CPI: Methodological Differences in U.S. Inflation Calculation and their Implications* by Noah Johnson, BLS, 2017. https://www.bls.gov/osmr/research-papers/2017/pdf/st170010.pdf

Interestingly, it has also peaked earlier: the month-on-month change rose gradually from 0.3% in January, reached 0.6% in April and fell to 0.5% in June. In contrast, CPI inflation rose from 0.3% in January to 0.9% in June, before falling to 0.5% in July. While PCE inflation may be leading CPI inflation in the present situation, generalising from this episode is hazardous. The evidence suggests that neither series leads the other in a systematic way.

5. Monthly CPI and PCE inflation



	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21
CPI	0.26	0.35	0.62	0.77	0.64	0.90	0.47
PCE	0.31	0.27	0.57	0.58	0.50	0.51	

Source: Bureau of Labor Statistics. (CPI) and Bureau of Economic Analysis (PCE). Data as at 20 August 2021.

Since CPI inflation for July has been released, but PCE inflation has not, we can use the fact that the two series are correlated to provide a forecast of monthly PCE inflation in July of 0.35%. As with all forecasts, it is surrounded by considerable uncertainty. A 70% confidence bands spans the range of 0.27% to 0.43%. The resulting year-over-year inflation rate would be 3.9% with a 70% confidence band of 3.7% - 4.1%.

Conclusions

US inflation can be measured by the CPI and PCE price indices. CPI inflation is generally a little higher and more volatile than PCE inflation. But the inflation rates computed using the two indices are very highly correlated and not affected by any lead-lag relationships.

Which measure one should focus on depends on why one is interested in inflation. The Fed focuses on PCE inflation because it reflects the changing composition of spending better and is broader than the CPI, and it is revised. However, it is published two weeks after CPI inflation, which gives some insight into how PCE inflation is likely to have evolved.

In 2021, CPI has risen more sharply than PCE inflation, and appears to have turned two months later. The question now is whether it will subside more rapidly.

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