Entrenched Inflation Update for 12/24

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Executive Summary

Entrenched inflation is now 3.02%. This currently warrants a Federal Funds Rate target of 4.03%.

Entrenched Inflation

With the Jan. 31 release of the Dec. 2024 PCE-PI, the AR(1) Adaptive Least Squares (ALS) forecast of long-run entrenched inflation is now 3.02%, up from 2.95% last month, and substantially down from 3.52% as recently as last April.

Entrenched inflation is plotted in blue in Figure 1 below, along with observed year-over-year inflation in red. It was consistently over 4.00% throughout 12/21 – 4/23, warranting a Fed Funds rate of at least 5.50% throughout that period. However, entrenched inflation was only twice above 4.57 % during that period, despite year-over-year inflation that exceeded 6.00% throughout 12/21 – 8/22 and even touched on 7.00%. It has consistently been 3.60% or less since 10/23, warranting a rate of no more than 4.90% since that time. Its latest value of 3.02% currently warrants a Fed Funds Rate of 4.03%, up from 3.92% last month.

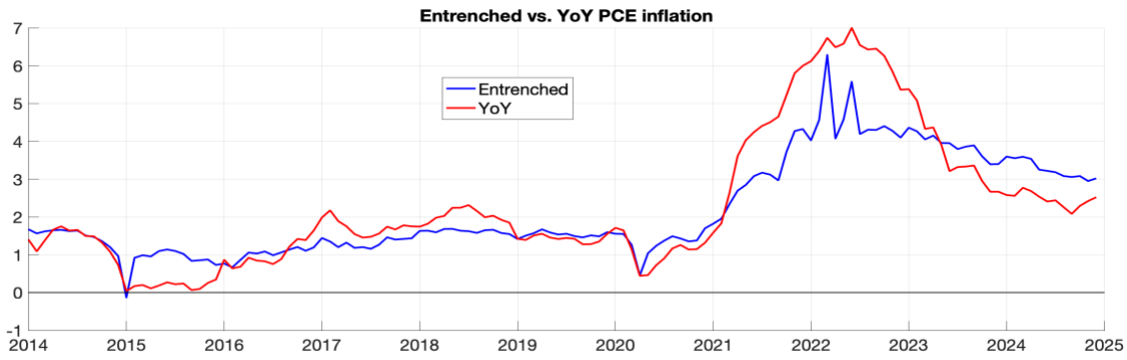

Figure 1

Entrenched (blue) and year-over-year (red) PCE Inflation

ALS is my refinement the Recursive Least Squares (RLS) estimator advocated by Sargent (1993, 1999) and by Evans and Honkapohja (2001). It can parsimoniously estimate

a general linear regression with time-varying parameters. See McCulloch (2024) below for details and references. In that paper I find that a simple model of monthly PCE inflation with a time-varying constant and no autoregressive parameters, as in the early Adaptive Expectations model, can be globally rejected in favor of a model with time-varying AR(1) transients. However, AR(1) cannot be globally rejected in favor of AR(2), AR(3), or AR(4). The likelihood-maximizing noise/signal ratio of 21.2 months implies an asymptotic average lag of 21.7 months.

Since YoY inflation has an average lag of only 6 months, much of the variation in it is indeed "transitory." It consistently overestimated entrenched inflation from early 2021 through early 2023. However, it has consistently underestimated entrenched inflation since that time.

The Taylor Rule

The above Fed Funds Rate recommendations are based on a "Taylor Rule" with a 2.0% inflation target, 150% feedback from expected inflation to interest rates, and a 0.5% "natural" real interest rate, while setting aside the unemployment gap.

The ALS model with AR(1) transients gives a different inflation forecast at each horizon, thus giving any Taylor rule a menu of possible policy horizons to work with. The blue line in Figure 2 below shows predicted average inflation from 12/24 to the dates indicated. The observed 12/24 month-over-month annualized inflation rate of 3.06%, as shown by the green star, together with the time-varying AR(1) coefficient of 0.46, predicts 3.04 % inflation over the coming month, 3.03% over the coming 3 months, and 3.02% over the coming year. However, *marginal* month-over-month predicted inflation, as shown by the red line, rises much more quickly toward the common asymptotic value of 3.02%, which it reaches within rounding error already at 3 months. The differences this month are negligible, but are much more apparent when lagged inflation is far from entrenched inflation, as it was for instance in 11/24, archived below.

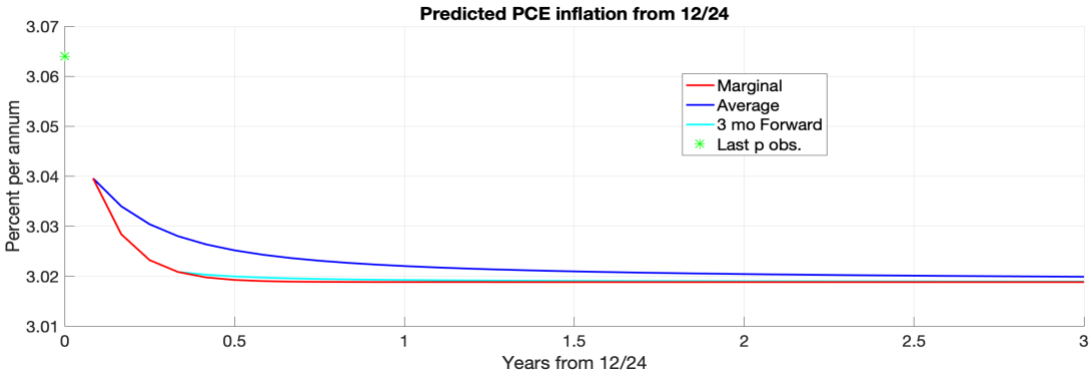

Figure 2

Predicted average (blue), marginal (red), and 3-mo. forward (cyan)

By the time a given month's PCE-PI is announced at the end of the following month, the following month's inflation is already history and can no longer be affected by Fed policy. Since the FOMC only meets 8 times a year, an additional six or seven weeks might also go by before it even meets. It therefore is appropriate, for Taylor Rule policy purposes, to look beyond the first few months, and to focus instead on the forecasts farther into the future. The cyan line in Figure 2 shows the forward forecast for average inflation, beginning 3 months in the future. In most cases this forward forecast is virtually indistinguishable from the long-run inflation rate, even in months like 11/24, when the lagged rate was far below the entrenched rate.

Empirical Taylor Rules typically find that the FOMC has placed a large coefficient on the lagged policy rate itself. However, the ALS estimate of entrenched inflation already optimally balances the newest information with the old information that may or may not have entered into earlier policy rates, so that adding the lagged policy rate itself would only unnecessarily lengthen the "Implementation Lag" portion of the already excessive Friedman-Schwartz "Inside Lag" in monetary policy. The lags inherent in the ALS estimator are already part of the "Recognition Lag" portion of the "Inside Lag."

Even though the probability is virtually unity that the new inflation data that arrives between FOMC meetings will call for a change in its target rate of at least 1 basis point in one direction or the other, the committee never changes its target rate by less than 25 basis points, presumably because a change of just a couple of basis points would not be newsworthy and might need to be reversed next meeting. On the other hand, it is reluctant to actually make a 25 basis point change when it is finally called for, for fear markets would pay too much attention, and so it allows its rate to get so far out of line with inflationary conditions that a series of several sequential changes in the same direction becomes

necessary. If its policy were truly data-driven and not inertia-driven, its rate would change up or down by a few basis points at almost every meeting, and the changes would be virtually uncorrelated.

All-Item vs. Core or Hardcore Inflation

So-called "Core Inflation," which excludes volatile food and energy prices, is often preferred by Fed officials, particularly when it comes in closer to the Fed's 2% inflation target than the all-item price indices. For example, the Holston-Laubach-William estimates of the U.S. natural rate of interest on the NY Fed's website make exclusive use of the Core PCE PI, without even a consideration of the all-items version. (https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr1063.pdf?sc_lang=en)

While it is true that Core Inflation is less volatile and more predictable than all-item inflation, the ideal measure by these desiderata would in fact be what I call "Hardcore Inflation": Hardcore Inflation is computed using *no price data at all*. As a result, it has zero volatility and is perfectly predictable. Its "only" drawback is that it tells us nothing at all about inflation. Likewise, Core Inflation tells us less about inflation than does all-item inflation.

It is not inconceivable that decomposing inflation into components such as core and non-core, could improve the overall forecast of all-item inflation. However, preliminary calculations suggest that this is not the case.

PCE-PI vs. C-CPI-U

Dean Croushore ("Revisions to PCE Inflation Measures: Implications for Monetary Policy," *Int'l. J. of Central Banking*, 10/2019, pp. 241-65) has pointed out that the substantial revisions to the PCE-PI one and two months after its first release, and in particular the first annual revision one year later, make the initial PCE-PI announcements only a rough approximation to their ultimate values.

In my opinion, this consideration means that the Chained CPI-U (C-CPI-U) would be a more satisfactory index for Taylor Rule purposes than PCE-PI. It has an upward bias relative to the PCE-PI of only 0.12% per annum since 2000, versus 0.40% for the traditional CPI-U, and is already being used to index federal income tax brackets. Like the CPI-U, it is

final on first announcement and never revised. It does have the minor drawback at present that it is not published in seasonally adjusted form. However, it would be trivial for the BLS to seasonally adjust it. Alternatively, seasonal intercepts could be included in the ALS AR(1) model.

However, since the FOMC officially prefers the PCE-PI despite its flaws for real-time policy making, I focus on it in these memos.

What information set should the Taylor Rule use?

The best single predictor of future inflation is past inflation itself. It is not inconceivable that other observed variables, such as unemployment or even interest rates themselves, have supplementary predictive power, and perhaps should be included in the information set the Taylor Rule uses for its inflation forecast. ALS could easily estimate a Vector Autoregression (VAR) that incorporates such variables. I plan to investigate that option in the future.

I plan to update this memo's entrenched inflation estimates monthly.

Hu McCulloch is Adjunct Professor at New York University and Professor Emeritus at Ohio State University. *The referenced paper is, "Adaptive Least Squares: Recursive Least Squares with Constant Noise-to-Signal Ratio," Aug. 9, 2024, online via <www.asc.ohio-state.edu/mcculloch.2/papers/ALS/>.*
Future updates of this memo will also be posted via that site, along with past editions back to 9/24. Comments are welcome at mcculloch.2@osu.edu.