Entrenched Inflation Update for 4/25

J. Huston McCulloch

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Executive Summary

Entrenched PCE inflation is now 2.90%. This currently warrants a Federal Funds Rate target of 3.85% to 4.31%, depending on how aggressively the Fed chooses to achieve its inflation target.

Entrenched Inflation

With the May 30 release of the April 2025 PCE-PI, the AR(1) Adaptive Least Squares (ALS) forecast of long-run or "entrenched" inflation is now 2.90%, down slightly from 2.93% last month, but still well above The Fed's 2% target.

Entrenched inflation is plotted in blue in Figure 1 below, along with year-over-year inflation in red. It was consistently over 4.00% throughout 12/21 – 4/23. 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%.

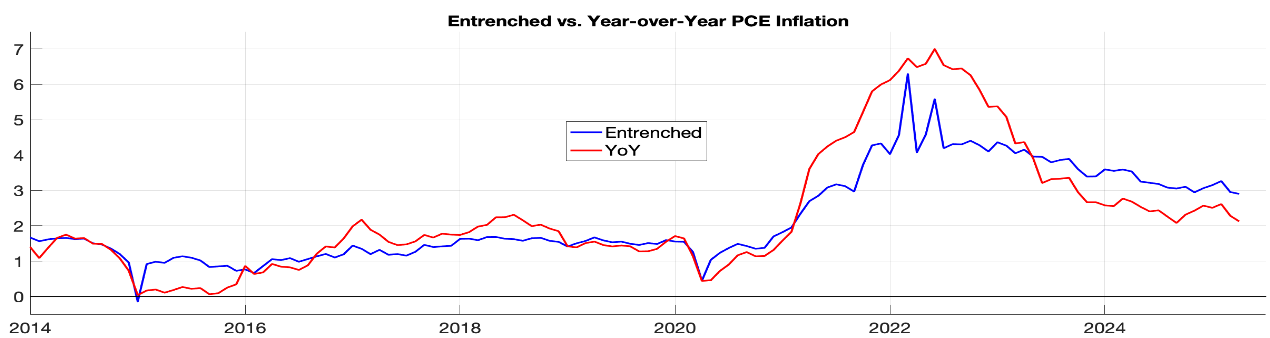

Figure 1

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 the elementary AR(0) model of monthly PCE inflation with a time-varying constant and no autoregressive parameters, as in the early Adaptive Expectations model, can easily 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 21.1 months implies an average lag of 21.6 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, a 0.5% "natural" or "neutral" real interest rate, and 150% or 200% feedback from expected inflation to interest rates, 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 4/25 to the dates indicated. The observed 4/25 month-over-month annualized inflation rate of 1.20%, as shown by the green star, together with the time-varying AR(1) coefficient of 0.44, predicts 2,20% inflation over the coming month, 2.53% over the coming 3 months, and 2.80% over the coming year. However, *marginal* month-over-month predicted inflation, as shown by the red line, rises much more quickly toward the common long-run value of 2.90%, which it reaches within rounding error already at 7 months.

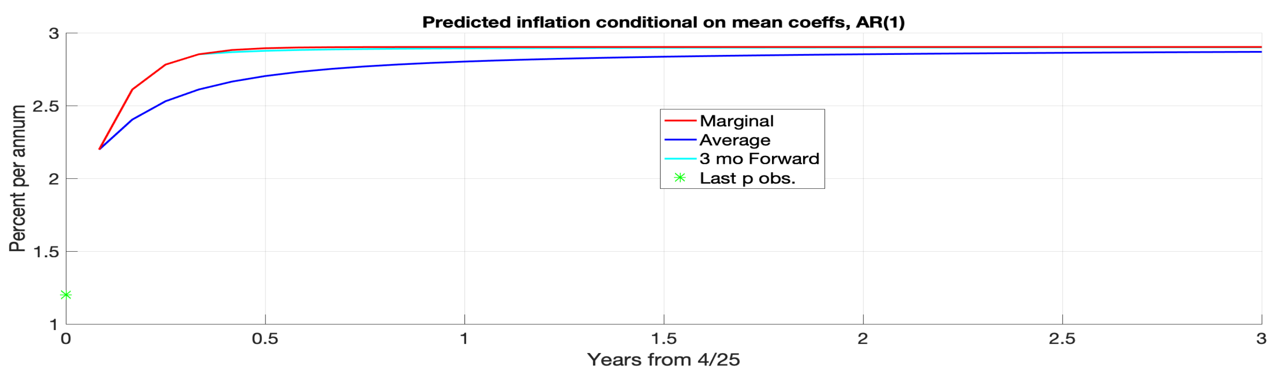

Figure 2

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

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, the 3-month forward forecast of one year inflation is virtually indistinguishable from the long-run, "entrenched" inflation 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 unavoidable "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 and journalists would pay *too much* attention. It therefore typically allows its rate to get so far out of line with inflationary conditions that a series of several sequential changes in the same direction ultimately becomes necessary. If its policy were truly data-driven and not inertia-driven, its rate would change unpredictably up or down by a few basis points at almost every meeting.

Figure 3 below shows the actual Effective Fed Funds Rate (blue line) versus a moderate Taylor Rule with 150% feedback from entrenched inflation to interest rates (red line) and a more aggressive Taylor Rule with 200% feedback (magenta line). In both cases the "natural" real rate is taken as 0.5%, and unemployment is set aside.

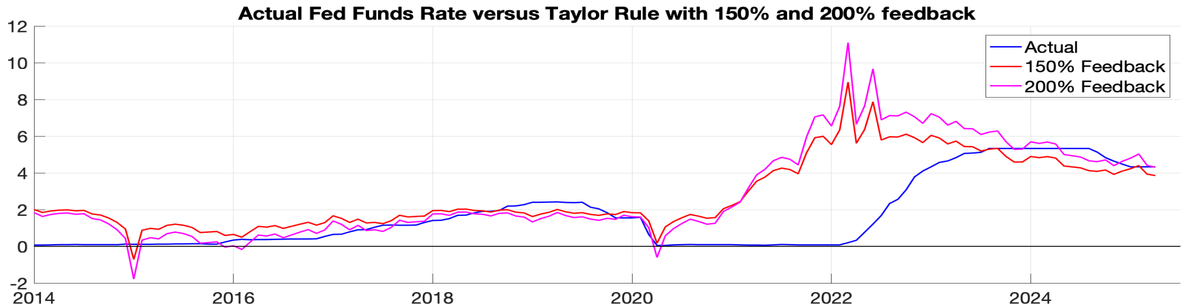

Figure 3

Actual Fed Funds Rate (blue) versus Taylor Rule with 150% (red) or 200% (magenta) feedback.

It may be seen that although the near-zero Fed Funds rates prior to 11/2014 were not justified, the sharp deflations of 12/14 and 1/15 did briefly warrant a zero or near-zero rate. Policy was reasonably in line with entrenched inflation thereafter through early 2020. The sharp covid deflation again did briefly call for a zero rate. However, rates should have returned to pre-covid levels by May 2020, and should have exceeded those rates by the beginning of 2021. The rate should have been at least 6% by the beginning of 2022. The FOMC did not catch up with the Taylor Rule until the second half of 2023. It was actually somewhat too tight by either measure in mid-2024,* but now is about right. Had the FOMC followed these recommendations from May 2020 on, inflation would presumably have come out different, as would the recommendations.

What information set should the Taylor Rule use?

The best single predictor of future inflation is past inflation itself. Indeed, John Taylor's original 1993 paper just used year-over-year inflation as its proxy for expected inflation. 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 expected inflation. ALS could easily estimate a time-varying Vector Autoregression (VAR) that incorporates such variables. I plan to investigate that option in the future.

All-Item vs. Core and Hardcore Inflation

So-called "Core Inflation," which excludes volatile food and energy prices, is often preferred by Fed officials to All-Item inflation, particularly when it comes in closer to the Fed's 2% inflation target than does All-Item inflation itself. For example, the Holston-Laubach-Williams estimates of the U.S. natural rate of interest on the NY Fed's website

* See my letter in the 6/26/24 WSJ, calling for easing.

make exclusive use of the Core PCE PI, without even a mention of the All-Item 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 criteria 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 All-Item 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. CPI-U and 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 rough approximations to their ultimate values. The PCE-PI is therefore a moving target and an ambiguous standard for monetary policy.

However, since the FOMC officially prefers the PCE-PI, despite its flaws for real-time policy making, I focus on it in this memo. Even if the Fed sticks to the PCE-PI as its standard, it could easily cut approximately 2 weeks off its Friedman-Schwartz "Recognition Lag" if it used month-over-month CPI-U inflation to *predict* the coming PCE-PI announcement for the same month with a simple regression line, since the CPI figures are announced near the middle of the following month, rather than at the end of the following month, and the correlation is quite high.

In earlier versions of this report, I mistakenly asserted that the Chained CPI-U (C-CPI-U) is final on first release and therefore would be superior to the PCE-PI for policy purposes. In fact, it is revised after first release using subsequent data, though perhaps not as severely as the PCE-PI. This index deserves future study.

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 via mcculloch.2@osu.edu.