The CPI and the PCE Price Index: A (Former) Policymaker's Perspective

Laurence H. Meyer[1]

Macroeconomic Advisers

December 2007

Sometimes, forecasters and policymakers likely say to themselves: "If only I had *more* data, I could forecast and make policy more effectively." But the point of this session is that sometimes, in reality, forecasters and policymakers have a different challenge, in a sense they have *too much* data, and the task of reconciling different data series which, in some broad sense, are attempting to measure the same phenomenon.

The organizers of this session did a good job of identifying some of the most interesting challenges in this regard: (1) how to reconcile different series on compensation, which is interesting in an of itself, and also because of its implications for price inflation; (2) how to reconcile different series on employment, which is especially important because it is the earliest hard data for a given month and a very market sensitive report; and, finally a topic covered by my paper and the title in the program at least; and (3) how to reconcile different measures of consumer price inflation. I would add a fourth reconciliation, which was especially important while I was on the Board, and occasionally remains so, how to reconcile different measures of real GDP (the income and product sides) and, specifically, the correspondingly different measures of productivity.

I have to say at the outset that I generally find as a forecaster, and found as a policymaker, that the other three examples are much more interesting than the one I was assigned. So I will tell some stories about the issues that arise from having two prominent series on consumer price inflation, comment briefly on the reconciliation exercise itself, and then go on to discuss what I believe *are* the important issues for forecasters and policymakers who are monitoring inflation and for the FOMC when communicating about an inflation objective.

[1] I want to thank Andy Levin, Douglas Elmendorf, David Lebow, and Brian Sack for helpful comments on an earlier draft and Christina Aylward for her research assistance.

The bottom line is that when you have more than one series to measure some phenomenon, one may be your preferred measure, but it is rare that there is no information content in the others. For monitoring and forecasting, as well as for deciding how to respond to "inflation", policymakers therefore follow a variety of measures.[2]

What is clearly important and relevant to the reconciliation exercise is that forecasters and policymakers should be aware of the prevailing differential among the various measures they are monitoring and policymakers should set implicit ranges for the various measures that are consistent with their prevailing differentials. But the issue of whether to respond to core vs headline inflation, for example, is much more important than whether to focus more on the headline CPI or headline PCE. And when it comes to setting an explicit inflation objective, you have to pick one measure. Then the question is what criteria you should use to make this choice.[3]

A Story

My first story comes from my very first FOMC meeting on July 3 – 4, 1996. It was by far the most interesting meeting during my 5½ years on the Board. During two-day meetings at that time, there was typically a special topic, not necessarily related to the current forecast or monetary policy decisions, but broader, often about the strategy of monetary policy. At this meeting, the subject was: "What does price stability mean to members of the Committee." Al Broaddus and Janet Yellen made short presentations and then there was an opportunity for everyone else to give his or her own view.

---

[2] The Board staff, for example, does not see their job as dictating which measure the FOMC should focus on, but as providing a set of internally consistent measures of headline and core inflation to inform the monetary policy decision. Views among FOMC members, in addition, vary on which measure (or measures) policymakers should respond to and which measure should be the focus of communication with the public.

[3] We would argue that this is true of an implicit inflation objective, as we interpret the FOMNC as giving, if that implicit objective is as explicit as it is in the case of the FOMC.

Janet, sorry, President Yellen, gave a quite brilliant and provocative presentation on the costs and benefits of higher or lower inflation, re-introducing the possibility of a permanent trade-off at low levels of inflation, balancing the one-time cost of reducing inflation against any permanent gain from lower inflation, but more generally, making the case that inflation can be too low as well as too high, in part because a little inflation may “grease the wheels” of the labor market by facilitating adjustment in relative pay when workers deeply dislike nominal pay cuts.[4]

Let’s listen in on the discussion:[5]

MS. YELLEN. Mr. Chairman, will you define "price stability"?

CHAIRMAN GREENSPAN. Price stability is that state in which expected changes in the general price level do not effectively alter business or household decisions.

MS. YELLEN. Could you please put a number on that? [Laughter]

CHAIRMAN GREENSPAN. I would say the number is zero, if inflation is properly measured.

MS. YELLEN. Improperly measured, I believe that heading toward 2 percent inflation would be a good idea, and that we should do so in a slow fashion, looking at what happens along the way.

CHAIRMAN GREENSPAN. Tomorrow morning I am going to argue that we are already at 2 percent inflation. [Laughter]…

---

[4] Later the more widely accepted justification of a positive target for inflation became that it allows policymakers more flexibility by permitting them to drive the real funds rated into modest negative territory if needed in a severe downturn, and thereby avoid the limitations otherwise posed by the zero nominal bound for the nominal funds rate.

[5] The discussion that follows is taken from the transcript of the July 3 – 4, 1996 FOMC meeting [13], pp. 51 -65.

What followed was a go-around where every member of the Committee offered his or her own thoughts on what price stability meant to them. Then Greenspan summed up the discussion.

CHAIRMAN GREENSPAN. Since we have now all agreed on 2 percent, my question is, what 2 percent? What is the appropriate inflation indicator that we should focus on, recognizing that it is not appropriately measured and has various biases. The consumer price index is flawed with respect to the biases that are in it on a continuing basis…Clearly…the PCE chain weighted index is unquestionably far superior as a measure of the real consumer inflation rate...

MR. PARRY. It seems to me that when Janet and Al were talking, they had implicit in their minds something like a CPI or core CPI. [There was] some consensus or agreement about the desirability of reducing the rate of CPI inflation from its current level of 3% down to 2 percent. If one wants to focus on a different index, let the staff make a suggestion and maybe we will start out with an inflation rate of, say, 2 percent and go down to 1 percent.

MR. MEYER. What do you think the PCE deflator is now?

MR. PARRY. I don't know.

CHAIRMAN GREENSPAN. It is 2 percent.

MR. MEYER. So we are there. Congratulations…I came too late to take credit for it but I am an instant winner. [Laughter]

That comment was amusing, I suppose, but it missed a key issue that policymakers must confront when dealing with multiple measures of inflation. Fortunately, that message did not go unnoticed.

MR. MCTEER. If you want to change the measure, you have to change the numbers.

MS. YELLEN. I agree with Governor Meyer and support the statements he has made. I regret that I have not thought through this measurement issue carefully, and so you should not take my 3 percent and 2 percent inflation numbers as necessarily focusing on the CPI

There are several messages here. First, the FOMC was, and is, faced with precisely the problem we are discussing: how to reconcile two different measures of inflation, how to monitor inflation and adjust policy in light of the signals coming from the two measures, which measure to use for internal discussion, and finally, which measure to use in case the Committee wants to move toward an explicit inflation objective.

Second, there was a strong preference then, and there remains one today, that the inflation objective should be positive, not zero: the sum of the inflation bias (which can differ among measures) and some "cushion" to balance the goal of low inflation with the potential for better stabilization of output (or in Yellen's argument, possibly a higher level of output) when there is positive true inflation.

Third, while there was a strong consensus about the preferred level of inflation, 2%, there was some disagreement about which measure was preferred, and at least some recognition that the point and range selected for a target has to be appropriately calibrated to the measure chosen and will therefore be different for different measures.

The reconciliation

Now I turn briefly to the reconciliation exercise, specifically the paper by McCulley, Moyer, and Stewart, "A Reconciliation between the Consumer Price Index and Personal Consumption Price Index," released in September, 2007.[6] [3] I first summarize the

[6] There have been other papers that discuss this reconciliation, but this is the latest and is the one that in part motivated the selection of this topic as part of this session.

findings and then turn to the relevance for forecasters and policymakers. This exercise provides some background for the discussion of which measure might be most representative of the prices faced by consumers.

I am not going to go through the gory details of the differences in construction of the two measures. As the paper points out, they are constructed differently: specifically the CPI is a based on a Laspeyres index and the PCE is based on a Fisher-Ideal index; the relative weights of the component indexes are based on different sources (a household survey in the case of the CPI and business surveys for the PCE); and there are differences is "scope" or coverage (some items in the CPI are not in the PCE and vice versa) ; and finally there are differences in seasonal adjustment procedures and in the detailed price indexes used to construct the respective aggregate indexes.

The paper then reconciles the two measures over a specific and brief period: from the first quarter of 2002 through the second quarter of 2007. Over this period, the CPI increased 0.4 percentage points faster than the PCE measure. About half the difference—0.17 percentage point--was due to differences in the index-number formulas. This is at least relevant to the question of differential in measurement bias between the two measures.

After adjusting for the formula differences, which leave CPI higher than the PCE, differences in relative weights –primarily for rent of shelter—further raised the CPI relative to the core while differences in scope between the two measures lowered the CPI relative to the PCE, with the net effect of weighting and scope accounting for the remaining 0.2 percentage point difference between the CPI and PCE measures.

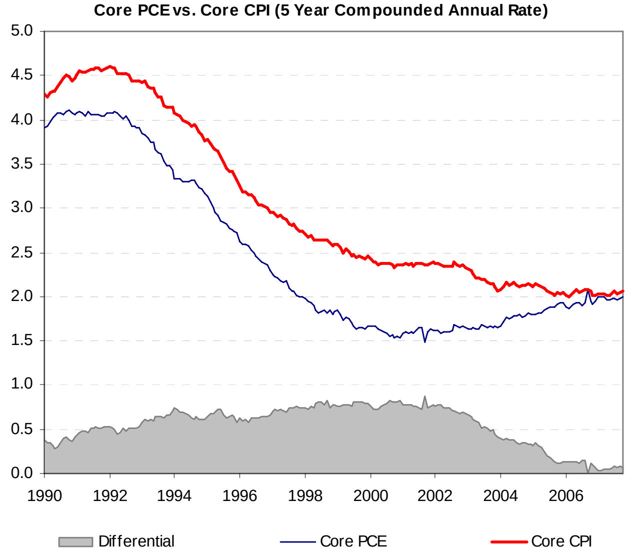
What was especially interesting to me was the large absolute size and offsetting nature of the differentials from the weight effect and net scope effect. One differential I would have preferred to see more focus on is the differential due specifically to the inclusion of imputed prices in PCE and not in CPI, part of the differential due to coverage. Also I would have liked to see more discussion to how the differential moves over time, especially with the large swings we have seen in shelter costs which have a large weight and substantially different weights in the two measures.

So what measure is likely to be most representative of prices facing consumers? Not a clear call unfortunately and the reconciliation paper does not try to address this question. I will have a few comments on this in a moment.

But frankly, I never felt that the reconciliation of the core CPI and core PCE measures of inflation was a very challenging issue, especially if one didn't stress out about monthly or even inflation rates over a short, say 3 or 6 month, horizons. I have quietly switched from comparing headline to core measures for the CPI and the PCE, previewing that, for monitoring purposes, some measure of "underlying" inflation is the appropriate choice. In any case, all I wanted was to have some sense of the prevailing differential between the two measures to identify periods when some explanation was needed for why the differential moved unexpectedly up or down, whether it suggested a new "normal" differential or was more likely to be transitory. So the major limitation of this exercise, from the perspective of a monetary policymaker, is that is limited to a very specific period of time, and there is no attempt to assess how and why this differential might change over time.

Figure 1

Core PCE vs. Core CPI (5 Year Compounded Annual Rate)



For a measure of the “prevailing: differential, I have typically relied on the differential in the 5-year compound annual growth rates for the two measures, shown in Figure 1 for the core measures for the period since 1990.[7] During the time I was on the Board, from mid 1996 to early 2001, the differential, measured this way, was usually about 0.6 percentage point, so I rounded it in my thinking to ½ percentage point, good enough, I like to say, for government work! I still find it useful to define comfort zones for both core CPI and core PCE and simply use the 5 year moving average to make the two ranges consistent. That leads me to my second story.

A Second Story

When now Chairman Bernanke first introduced the concept of a comfort zone, and identified a comfort zone of 1% - 2%, centered on 1½%, where did he get the “1½%”?[8] Was he being so bold as to offer a different level for the inflation objective than others had talked about, at least internally? The answer is no; he simply took the 2% for the CPI (undoubtedly based in part on the discussion at the July 1996 FOMC meeting) and subtracted the ½ percentage point prevailing differential to get the mid-point of the range for the PCE. Not too hard.

In Figure 1, you can also see that, since the time I left the Board, the differential has declined, first to ¼ percentage point and, more recently, to close to zero. That is interesting. And the staff view has been that the decline to at least ¼ percentage point made sense in light of the progress in refining the CPI measure that the differential due to measurement bias would narrow.

[7] In the comparison her and those below, I use the research series for the CPI and core CPI that is designed to reflect the current methodology. Otherwise our comparisons would also reflect the effects of methodological revisions over time in the CPI.
[8] As part of my comprehensive “research” for this paper, I wanted to identify who first used the term “comfort zone” and identified it as 1% – 2% as the zone for the PCE measure. I was sure it was Governor Bernanke before he became Chairman Bernanke. But to my surprise, it apparently first surfaced in a *New York Times* article by Richard Stevenson [12] on August 4, 2002, which extensively quoted my views on the FOMC’s inflation objective and appeared to attribute that phrase to me. In any case, the first “official” use of that phrase was by Ben Bernanke [2] in a speech on the economic outlook on March 8, 2005, and this was the first time the specific 1% - 2% zone was mentioned.

What I do today is to begin with the measure that the FOMC focuses on in its communication (the core measure for the PCE index), and then use the prevailing differential to construct consistent an implicit comfort zones for the core CPI.

What Measure(s) to Use to Monitor Inflation and Guide Monetary Policy

I suppose that if I insisted on remaining within the scope of the assigned topic, I would end here. But I do not think I have said anything very useful yet about how forecasters and especially monetary policymakers use multiple measures of inflation for purposes of monitoring inflation and adjusting monetary policy to incoming data on inflation or which measure policymakers should use for communication. So I extend my mission, and will keep going.

Indeed, I think there are other issues that are much more important than this reconciliation exercise for monetary policymakers, including: (1) which measure belongs in the loss function that policymakers are trying to minimize; (2) which measure or measures should be used monitor inflation relative to the Committee's objective and to therefore to guide near-term policy decisions; and, (3) which measure to use in communication with the public, especially with respect to an explicit inflation objective.

What measure belongs in the objective function?

I am assuming that policymakers want to use a consumer price measure as their preferred objective and focus on the choice between the CPI and PCE measures, leaving aside questions pertaining to whether the inflation measure in the objective function should be a broader measure of prices in the economy.

The formula difference between the CPI and the PCE seems to be a distinct advantage for the latter, increasing the accuracy of the measurement (or equivalently reducing the measurement bias). I also expect that the weights for the PCE are likely to be more accurate than those for the CPI. Who knows how close I would be if someone knocked on my door and asked me how much I spent on various goods and services. So the PCE measures jumps into the lead.

I am not sure what to say about the differences in scope (e.g., only out of pocket expenses for the CPI and a broader scope for the PCE) and differences in price indexes used for medical care.[9] But I have a distinct aversion to the inclusion of imputed prices for financial services in a measure of inflation for any of the purposes identified above, given my deep suspicion that we have no idea how to measure these "prices", compounded by the fact that this component of the PCE is also one subject to large revisions. The CPI is catching up.

On balance, I would opt for market based PCE in the objective function, keeping the chain weighting and the component index weights of the PCE, while eliminating the imputed price component of the overall measure. The CPI would be my second choice and that would be a closer call if the BLS switches the official measure to the chain measure.

Which Measure to Use as a Short-run Guide for Monetary Policy Decisions

A key issue in choosing among inflation measures—and one debated among central banks—is what measure of inflation is more useful for understanding the underlying trend in inflation and therefore for monitoring success relative to any implicit or explicit inflation objective and adjusting policy in response to any divergence from that objective.

This issue is principally about whether a core measure or some other measure of underlying inflation is a better predictor of future headline inflation than current headline inflation. But other issues that are relevant here are whether there are different degrees of residual seasonality in the various measures of underlying inflation, whether policymakers prefer to rely on a measure that is or is not subject to revisions, and, a discussed above, whether we have sufficient confidence in imputations for financial

[9] For most items, the PCE uses the CPI sub-indexes, but for medical care, the PCE uses mostly PPI's and imputations. The agencies might provide a public service by reconciling the various price measures that exist, in particular the PPIs and CPIs for hospitals and physicians.

services to include these in our measure of "inflation." Finally a measure that is easy to explain to the public and does not seem overly manipulated is an advantage, as the Committee will naturally find itself communicating in terms of the measure it is monitory and responding to.

Identifying the underlying trend in headline inflation and the role of "core" measures: The most widely used approach to identifying the underlying trend in inflation is to use a "core" measure, usually defined as consumer price inflation net of the volatile food and energy price components. This is sometimes known as the "exclusion approach" to identifying underlying inflation.

This is part of a broader issue: What inflation shocks should policymakers accommodate and which should they lean against? As a general rule, policymakers, well at least the FOMC, tend to accommodate bursts of inflation that reflect a sharp change in some relative price (energy and food obviously come to mind), but lean against more generalized changes in inflation. The fact that, operationally, policymakers respond to movements of core rather than headline does not imply that they believe core measures are intrinsically more important than headline measures.[10] The choice of core is simply a question of how to operationally conduct monetary policy to achieve some medium term objective for headline inflation, while taking into account the trade-off between output and inflation variability.

At the heart of this issue is whether the Committee wants to preserve an average rate of inflation, and therefore offset periods when headline inflation is above the target with periods of inflation below the target, or simply wants to target a forecast for inflation over some medium term timeframe (say, 2 – 3 years). Consider the case of a sharp rise in the price of energy. Policymakers have a choice between aggressively offsetting the effect on near-term headline inflation at the expense of slower growth for a while and a higher

[10] Part of the FOMC's motivation for reporting forecasts of both headline and core PCE was likely to lean against any public impression that the Committee does not know that people eat or drive. The addition of the third year, at the same time, allowed the FOMC to provide a clear indication that it sees headline as converging to core rather than vice versa.

unemployment rate for a period; or accommodating the resulting rise in the aggregate price level, treating the outcome as a one time price-level shock, and focusing on keeping the forecast for headline inflation over the medium term lined up on its objective.

Using a core measure in effect means that policymakers let "bygones be bygones" for price level shocks, but work hard to keep the underlying inflation rate (that is, the expected headline inflation rate) constant. This approach is easiest if the issue is pure volatility. But it also implies that policymakers will tolerate a deviation of headline inflation from its objective for a while in response to a persistent rise in the price of energy, as long as they still believe that, once the economy has adjusted to the higher price of energy, headline inflation will return to a level consistent with their objective.

There are two empirical issues relevant here. First, is prevailing core or prevailing headline a better predictor of future headline. This is relevant if you accept that the objective is to achieve your objective over the medium term and are willing to let bygones be bygones. Second, which measure better explains how the FOMC has responded to inflation.

Blinder and Reis [3] compared the ability to forecast headline inflation over several periods based on the prevailing rate of core and headline inflation (measured over the previous 12 months) and concluded that "recent core inflation is a better predictor of future headline inflation than is recent headline inflation itself," based on both in-sample and out of sample forecasting performance over the period from October 1987 – March 2005.[11]

There are a couple of clear indications that the FOMC does in fact respond to near-term changes in core rather than in headline inflation. First, the FOMC communicates in terms of core PCE inflation and when the staff computes prescriptions from calibrated and estimated policy rules, using variants of the Taylor rule (the "holy grail" for

[11] Blinder and Reis, pp.44 -45. They find that "using core inflation always leads to a smaller in-sample prediction error, a smaller out-of-sample forecasting error, and receives a larger coefficient in multivariate regressions. It is also a very significant predictor, unlike headline inflation."

understanding monetary policy strategy), it measures inflation relative to its objective using the core PCE. In addition, Taylor rules fit better when they use core measures of inflation rather than headline, confirming that the FOMC acts as if it responds to core rather than headline inflation.[12]

While a good case can be made for responding to core rather than headline, as the Committee has appeared to do, the issue is still a bit more complicated. The FOMC strategy is to “look through” the “direct” effect of a price-level shock, but lean against any “indirect “or secondary effect that might raise core and leave a more lasting imprint on underlying inflation. The aggressiveness with which the FOMC will have to lean against secondary effects in turn depends on whether there are pass-through from price level shocks to core inflation (and whether any pass through is a one time event or gets embedded in underlying corer inflation and in longer-term inflation expectations). While adverse supply shocks appear to have passed through to core inflation and inflation expectations in the 1970s, as inflation expectations became better anchored since the mid 1980s, there is less evidence of any such pass through today.[13]

Figure 2a
Headline PCE vs. Core PCE
(5 Year Compounded Annual Rate)

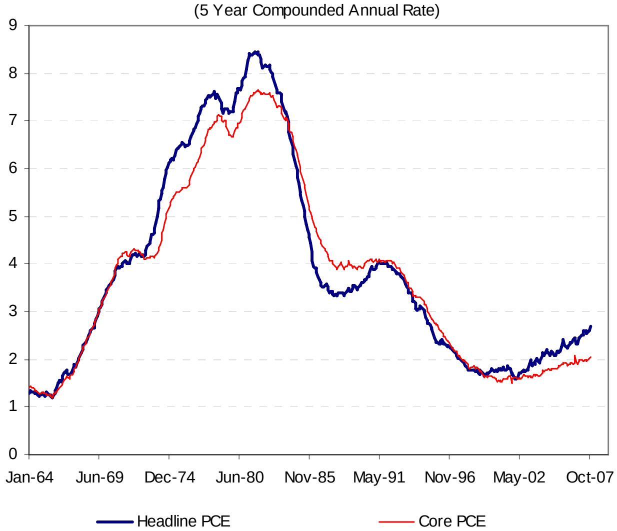
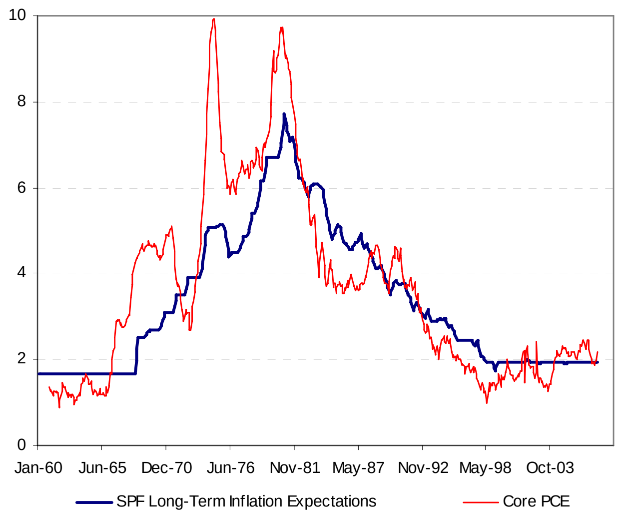


Figure 2b
Core PCE vs. SPF Long-Term Inflation Expectations



[12] See, See, for example, Brian Sack , “Does the Fed Focus on Core or Headline Inflation,” Macroeconomic Advisers, June 30 2005. Blinder and Reis [4] and Nordhaus [8] reach a similar conclusion.

[13] See Joel L. Prakken, “Will Higher Energy Prices Boost Core Inflation,” Macroeconomic Advisers, October 31, 2005.

Deleted:

The recent period, however, raises a real challenge to policymakers, because there has been a relatively long, ongoing upward trend in energy prices and a more recent upward trend in food prices. Figure 2a shows five year compound annual growth rates for the PCE and core PCE over the period from 1964 onward and Figure 2b for the headline CPI and a measure of long-term inflation expectations derived from the Survey of Professional Forecasters.[14] You can see that core inflation and long-term inflation expectations moved with headline in the 1970s and early 1980s, but more recently, even in the face of persistent increases in energy prices and a more recent upward trend in food prices, core CI inflation and long-term inflation expectations have apparently been little affected.

Other measures of underlying inflation: An alternative approach to determining the underlying rate of inflation--we will call it the "statistical" approach—eliminates whatever components in a given month have increased or decreased the most. An example for the PCE is the "trimmed mean" approach fathered by my discussant, Steve Cecchetti [4], and maintained for public access by the Federal Reserve Bank of Dallas.

Frankly, this measure was not discussed much by the Board staff when I was on the FOMC, but the trimmed mean is a very sensible concept and empirically seems to work very well, at least in the simple tests I have run to identify the underlying trend in inflation, that is, to predict future headline inflation, indeed better than the other core concepts. So for monitoring inflation, focus on core measures, including the trimmed mean, don't be afraid to have favorites, but don't ignore other measures entirely. Note, however, as illustrated in Figure 3a, that there is typically some differential between core PCE and the trimmed mean inflation rates, so that 1½% inflation rate for the core PCE will be associated, recently, with a trimmed mean inflation rate which is slightly higher

[14] This measure of long-term expectations is based on work at the Board to convert the Survey of Professional forecasters' long-term forecasts for the CPI to the PCE measure, but adjusted by Macroeconomic Advisers. Adjustments were made to the more recent data to reflect some narrowing of the spread between the two measures and we also used a different approach to back-cast the measure for periods before the survey was available.

Figure 3a
Trimmed-Mean PCE and Core PCE
(5 Year Compounded Annual Rate)

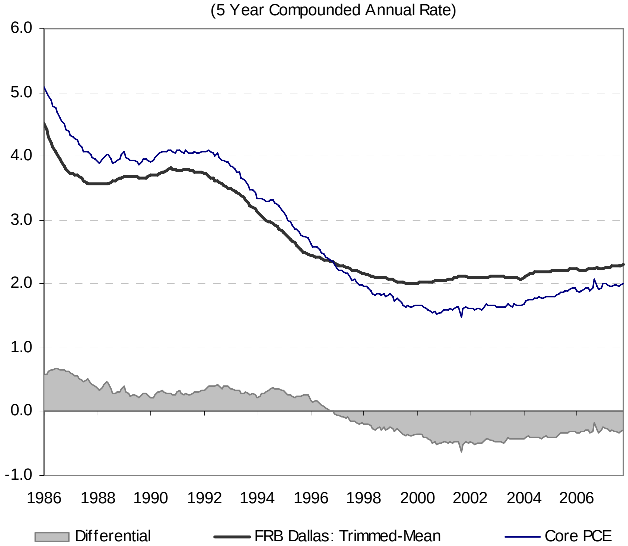
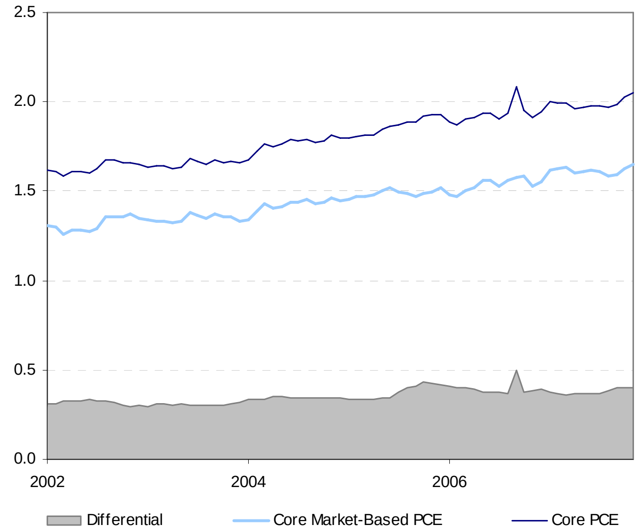


Figure 3b
Core Market-Based PCE and Core PCE (5 Year Annual Rate)



Another consideration between core CPI, core PCE, and the trimmed mean that is relevant to which measure to use to guide the short-run policy response is which measure's high frequency data is more trustworthy. OK, I told you to ignore the higher frequency data. That was a bit of an exaggeration. I always looked at 3 and 6 month as well as 12-month inflation rates to try to discern more quickly any change in the underlying trend. That is related to my next two topics.

<u>Revised or not</u>?: Should forecasters and policy makers prefer a measure like the CPI that is never revised (except for seasonals) or the core PCE which is revised on a monthly cycle (for two months back) and in the annual NIPA revisions for at least the last 3 years. The CPI is not revised (seasonal adjustment aside) because there is no additional information collected. Its sample for a given month is never changed, and methodological revisions are not back-dated to the historical data in the official measure. To the extent that PCE prices are based on CPIs, the explanation for revisions to the PCE

must be revisions to the additional data in the PCE other than CPI's, specifically the PPIs and imputations. The question in this case is whether the additional information in the non-CPI components of the PCE is helpful, and whether the revisions to this data improve the accuracy of the PCE measure. But let's withhold judgment until I cover the next topic.

<u>Imputations and monitoring inflation</u>: I am skeptical that we know how to measure imputed prices of financial services. This potential ignorance becomes even more problematical because revisions to imputed price component of the PCE are one of the principle reasons why the PCE gets revised. It is particularly counter-productive to be second-guessed about your policies based on revisions to data about which there is little confidence in the first place (and in this case in the second and third cases).

The experience of July 2005 highlights some of the issues here. Figure 4a shows the sizeable upward revision to the core measure of the PCE inflation rate as part of the annual revisions of the NIPA in July 2005 and Figure 4b makes clear that this revision had nothing to do with the market-based component; it was virtually all in the imputed prices component of the PCE. Core PCE inflation (measured by its four-quarter percentage change), after the revision, had been lingering at or even above the upper end of the FOMC's comfort zone for the past five quarters, whereas it had appeared to be running well within the comfort zone before the revisions. For example, the inflation measure (using 4 quarter inflation rates) ending in the first quarter of 2005 was revised up by 0.6 percentage points, from 1.6% to 2.2%. One minute you look brilliant, and the next negligent.

Figure 4a

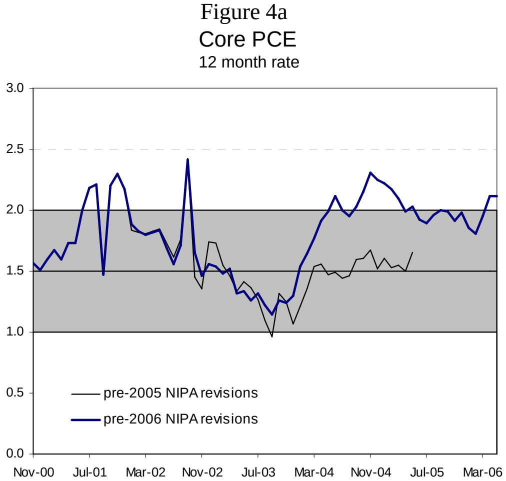
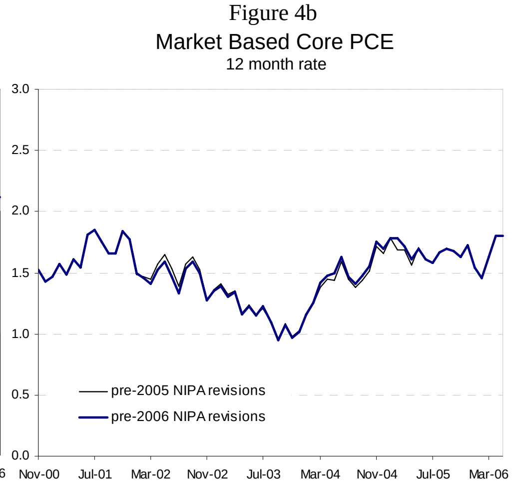


Figure 4b



While I prefer a measure that is revised so you are always using the best available information, that is not a disadvantage for the CPI because no additional information becomes available to revise this series, and the fact that imputed prices are an important source of the revisions to the PCE seems to me to be a distinct disadvantage of the PCE measure relative to the CPI for making policy adjustments and communicating about inflation. Why get second guessed when the reason for the revisions is a price component that we don't know how to measure in the first place?

Residual seasonality: Another possibly important but neglected issue related to trusting higher frequency inflation data is the possibility of residual seasonality in measures of consumer price inflation, and for the purpose of this paper, differences in the degree of residual seasonality between the core PCE and core CPI measures.

By residual seasonality, I mean the occurrence of a significant seasonal pattern in a seasonally adjusted series. For the purpose of this paper, I define it more narrowly as a tendency for "seasonally adjusted" inflation to rise significantly faster over the first three months of the year than over the subsequent nine months of the year.[15]

There is some, but relatively little, residual seasonality in the core CPI or the CPI excluding energy.[16] But over the past 7 years, the core PCE has, on average, risen more than 6 tenths of a percentage point faster (annualized) in the three months ending in March than in the 9 months ending in December. Over the same period the core CPI has, on average, risen only a quarter point faster (annualized) in the first three months than over the last nine.

[15] This section is based on Varvares, "Residual Seasonality in Core Consumer Price Measures," March 5, 2007

[16] Virtually all the residual seasonality in the overall CPI, ands some of the residual seasonality in the overall PCE, owes to the indexes' respective energy components, especially to the motor vehicles components.

So, to the extent that residual seasonality is greater for core PCE compared to the core CPI, the latter may be more useful when looking at higher frequency inflation data.[17]

The bottom line for monitoring inflation and near term policy decisions**:** For monitoring purposes and making near term policy adjustments, the most important message is to use some measure of underlying inflation, not headline inflation. That leaves a lot of choices, including the core CPI, chain-weighted core CPI, core PCE, market based core PCE, and the trimmed mean. Because of my distrust of imputed prices and my preference for using the Fisher ideal weighting, I prefer either the chain-weighted core CPI, market based core PCE, or trimmed mean PCE. There is also some value in keeping the measure as simple as possible, so that would lean me toward the core CPI, preferably the chain-weighted core CPI.

Equally important to focusing on a measure of underlying inflation is to keep in mind the average differential among the measures when trying to glean information from the alternative measures of underlying inflation. Different measures require different ranges for the comfort zone. In particular, the core PCE is typically 0 to ¼ percent lower than the core CPI, and the market based core is typically about ¼ percentage point lower than the core PCE.

Communicating and Selecting a Measure for an Explicit Objective

When it comes to setting an explicit target, one simply has to make a choice and pick one measure to feature. Some of the same considerations, of course, are relevant to picking a

[17] Varvares [14] searched for, but did not uncover, a systematic methodological cause if the residual seasonality in the core PCE. Despite considering a large number of suspects, including the imputed prices component, he was not able to identify a single systemic cause. But it is puzzling that residual seasonality is so much greater for the core PCE than the core CPI, given that the main source of information for PCE prices comes from the CPI and there is little residual seasonality in the core CPI. One possibility, suggested by David Lebow, is that the different degrees of residual seasonality might reflect the differences in seasonal adjustment procedures for the two measures. The CPI is seasonally adjusted at the level of 73 items which are adjusted independently from the more detailed item-strata indexes that actually feed into the PCE.

preferred measure for monitoring purposes. But the presumption in favor of a core measure for monitoring purposes does not guarantee that a core measure is a better choice for an explicit objective. Indeed, I would argue that this is not the case.

First, in my view, the inflation objective should not be set for the next year or two, but, I believe, over some more vaguely defined "medium term"—long enough not to have to dramatically raise the unemployment rate to get back to the target quickly, but short enough that the task remains an important consideration in near-term policy-making. Over the medium term, any initial relative price shocks, and the inflation spurt they bring, will have dissipated and we usually don't expect "unexpected shocks" after that. So there should be no difference between where inflation is expected to settle in the medium term between core and headline measures.

In this case, I believe it is better to set the target for headline inflation that is more understandable to the public and less seemingly manipulated, but most of all, because this is the inflation rate in the objective function.[18] This is also the conclusion that Chairman Bernanke [2] reached in his recent paper on the FOMC's communication strategy.

If we decide on a headline measure, should the explicit target be for the PCE or the CPI? The FOMC has invested eight years in elevating the role of the PCE measure, so continuity would call for using this measure for an explicit objective. But the advocate for single-minded focus on the PCE was Alan Greenspan, and the Board staff and other FOMC members never had the same religious conviction in favor of the PCE. Even with the Fed's recent focus on the PCE measure, the "public" almost certainly has a greater familiarity with the CPI measure. As a result, it would not be a very difficult reach for the FOMC, in the post-Greenspan era, to choose the headline CPI for its measure for an explicit inflation objective, should it choose to set an explicit objective. But the more important message here is to use a headline measure for either the CPI or PCE as the implicit or explicit medium term objective for monetary policy.

[18] This is what I argued in Meyer, "The IT Debate: Best Practice Details," August 31, 2006.

However, even if you buy that logic, it is still appropriate to use a measure of underlying inflation—core or trimmed mean--for monitoring success in achieving the medium term target. This combination is, I believe, best practice central banking—setting the objective in terms of the headline consumer price inflation and monitoring success in the short run with a measure of underlying or core measure of consumer price inflation. The Bank of Canada (and maybe there are others) does it precisely this way.

For a while at least, the issue for the FOMC is how to communicate about its inflation objective in the absence of an agreed upon and explicit objective. It has found a very good intermediate step in its recent decision to extend the forecast horizon for its now four FOMC forecasts to three years. Core and headline PCE inflation in the third year will almost always be identical and provide clarity on the central tendency for the preferred inflation rate among Committee members. Adding headline PCE to the list of variables it forecasts could have increased the confusion as to whether the FOMC responds to core or headline inflation. The Committee members recent forecasts, however, made clear that the Committee believes that headline converges to core rather than vice versa, and the Chairman's discussion of the changes to the FOMC forecasts emphasized that a medium term objective for inflation should be expressed in terms of the headline rate, but that the Committee views the core rate as a better guide in the short-run to the underlying trend in headline inflation.

However, if the FOMC decides in the future to move to an explicit inflait0on objective, that timing would be an app-ropriate point to re-visit the issue of whether to state the objective in termsd of the PCE and the CPI. I would lean toward the chaiorn-weighted CPI.

References

[1] Bernanke, Ben S., “Economic Outlook,” March 2005

[2] Bernanke, Ben S., Federal Reserve Communications, Federal Reserve Board, November 14, 2007

[3] Blinder, Alan S. and Ricardo. Reis, “Understanding the Greenspan Standard,” in The *Greenspan Era: Lessons for the Future*, Symposium sponsored by the Federal Reserve Bank of Kansas City, Wyoming, August 25 – 27.

[4] Bryan, M.F. and Stephen G. Cecchetti, Measuring Core Inflation,” In N. Greg Mankiw, *Monetary Policy Studies in Business Cycles*,” vol. 29, 195 – 215, Chicago and London: University of Chicago Press, 1994.

[5] McNulty, Clinton P., Brian C. Moore, and Kenneth J. Stewart, “A Reconciliation between the Consumer Price Index and the Personal Consumption Expenditures Price Index,” Bureau of Economic Analysis and Bureau of Labor Statistics, September 2007.

[6] Meyer, Laurence H., “The IT Debate: Best Practice Details,” Macroeconomic Advisers, August 31, 2006.

[7] Mishkin, Frederic, “Headline versus Core Inflation in the Conduct of Monetary Policy,” Federal Reserve Board, October 20, 2007.

[8] Nordhaus, William, “Whose Afraid of a Big Bad Oil Shock?” *Brookings Papers .on Economic Activity*, 2002, v2.

[9] Prakken, Joel, “Will Higher Energy Prices Boost Core Inflation?,” Macroeconomic Advisers, October 31, 2006

[10] Rich, Robert and Charles Steindel, "A Comparison of Measures of Core Inflation," Federal Reserve Bank of New York *Economic Policy Review*, December 2007.

[11] Sack, Brian, "Does the Fed Focus on Core or Headline Inflection?," Macroeconomic Advisers, June 30, 2005.

[12] Stevenson, Richard, "The Fed's Evolving Comfort Zone," *New York Times*, August 2002.

[13] *Transcript of the Federal Reserve Open Market Committee*, 1998.

[14] Varvares, Chris P., "Residual Seasonality in Core Consumer Price Measures," Macroeconomic Advisers, March 5, 2007