

The Inflation Outlook
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I am very pleased to be with you today to discuss my views on the economic outlook, with particular emphasis on the outlook for inflation.¹ In its most recent statements, the Federal Open Market Committee has identified “the risk that inflation will fail to moderate as expected” as its “predominant policy concern.” This places current inflation and the inflation outlook squarely at center stage in thinking about the economy and monetary policy. So in my remarks today, I will take a closer look at inflation’s recent behavior and the prospects for its future behavior. In doing so, I’ll discuss the interplay between real activity and inflation expectations. As always, these remarks should be taken as my own personal views, and not necessarily those of any of my colleagues in the Federal Reserve.

Recent Inflation

To put the current situation in context, recall that under Chairman Paul Volcker the FOMC brought inflation down to below 4 percent in the mid-1980s. (Throughout my remarks today, unless otherwise noted, I will be referring to inflation measured by the 12-month growth rate in the price index for core personal consumption expenditures.) Under Chairman Alan Greenspan, core inflation fluctuated between 3½ percent and 5 percent until 1992, but fell to near 2 percent in 1994, and below 2 percent in March 1996. Inflation then remained between 1 percent and 2 percent more or less continuously until April 2004. The exception was several months during the second half of 2001 as the economy slipped into a recession.² For those years, core PCE inflation averaged 1.6 percent, and was between 1 percent and 2 percent for more than 90 percent of the time.

In early 2003 inflation fell, and for some months inflation was reported to be below 1 percent at an annual rate.³ This led to concern about the possibility of excessive disinflation, and in response the FOMC statement at the May meeting cited the risk of “an unwelcome substantial fall in inflation.” At the June 2003 meeting, the FOMC reduced the target federal funds rate to 1 percent. While the Committee had not then, and has not since, established an explicit numerical target range for inflation, the May 2003 statement was taken to many observers as establishing an implicit lower bound on the range of inflation rates the Committee would find acceptable.⁴

Core inflation has increased since 2003. It rose to more than 2 percent in April 2004, and has fluctuated between 2 percent and 2.4 percent ever since. Monthly readings have exhibited wider swings recently, and 12-month inflation has fluctuated accordingly, falling to 2.1 percent in November but then rising 2.4 percent again for February. The most recent reading, for April, came in at 2.0 percent. But given the repeated swings we've seen, it is difficult to pick out a definite trend, and in fact, no statistically significant moderating trend has emerged yet, an issue I will say more about later in my talk. About all one can say with confidence is that year-over-year core inflation is now fluctuating around 2¼ percent.

Chairman Ben Bernanke, in his March 28 testimony to the Joint Economic Committee, said about core inflation that “recent readings have been somewhat elevated and the level of core inflation remains uncomfortably high.” In addition, I and several other FOMC participants have expressed dissatisfaction with the current level of inflation. Even though, as I noted earlier, the Committee has not established an explicit numerical objective or range for inflation, some observers have taken recent comments as indicating an upper bound on the range of desired inflation rates, analogous to the way the Committee's May 2003 statement was taken as marking a lower bound on the Committee's desired inflation rate.

The central question, then, regarding the outlook for inflation is whether core inflation will “moderate” to an acceptable rate in coming quarters? Some forecasters are expecting inflation to decline this year and next, and many of them link this decline to the expectation that real growth has been weak and is expected to remain below trend over the next few quarters. So let me review some important components of final demand.

Real Activity

Housing construction is the component of aggregate output that has understandably attracted the most attention lately. The recent weakness followed a decade-long period of sustained growth in housing activity, which was driven by favorable fundamental factors such as: improving prospects for real income growth, unusually low inflation-adjusted mortgage interest rates, increasing population, and the favorable tax treatment of owner-occupied housing. By the end of 2005, though, demand appeared to have been largely satiated in most local markets. Since then, although some markets continue to show steady growth, many markets have seen sharp reductions in construction and homes sales and a slowdown in housing price appreciation. Indeed, in some locations prices have begun to decline. The fact that housing data are typically somewhat noisier in winter months is making it difficult to gauge whether housing demand has reached bottom as yet. Even if it has, however, the need to work off an overhang of new homes inventories is likely to depress new construction spending for several months to come.

One prominent feature of the expansion of housing activity was a dramatic advance in lending to subprime borrowers, and the recent increase in delinquencies and defaults in this sector has raised concerns. This is not the time for a thorough review of the subprime mortgage market – that would be a separate speech.⁵ If you're interested, Chairman Bernanke just gave an excellent one. All things considered, macroeconomic effects of recent developments in the subprime market are likely to be relatively limited, and I do not expect any significant spillovers to the rest of the economy.

Business investment spending has been an impressive source of strength over much of this expansion. Real spending on equipment and software increased at a healthy 8.7 percent annual rate from the first quarter of 2003 to the first quarter of 2006. Spending on structures picked up at the end of 2005, increasing 14 percent in the four quarters ending in Q3. Business investment faltered late last year though, with weaker sales of autos and construction materials apparently playing important roles. Most of the fundamentals for business investment are still quite positive, however; profitability is high, the cost of capital is fairly low, and funds for new investment are readily available on favorable terms. Thus I expect investment to re-gain momentum this year. Indeed, we are already seeing some encouraging signs that this is taking place.

Growth in consumer spending has been another source of strength in this economic expansion. That growth has been underpinned by solid real income growth during the recovery and favorable prospects for future income growth. Many observers hypothesized that the drag from weakening housing markets would spill over and dampen consumer spending. That hasn't happened. Last year real consumer spending rose 3.6 percent, and in the first quarter it increased at a 3.8 percent annual rate.

Some observers have questioned the outlook for consumer spending, often citing statistics that lead them to believe that consumer debt is too high or consumer saving is too low. I won't argue with the data – by the usual measures saving is quite low, with the widely cited personal saving rate clocking in at negative 1 percent for the first quarter. But keep in mind that the personal saving rate has been on a downward trend from about 10 percent in the early 1980s to about minus 1 percent now. A number of forces could potentially be at play here, including, for example, the significant credit market innovations that have taken place over that period.⁶ I understand how historical averages can exert a gravitational pull on the forecasts of variables like the saving rate, and I don't believe the downward trend is likely to persist indefinitely. But having said that, it's not obvious to me why we should expect that long-term trend to reverse itself beginning precisely next quarter.

An alternative perspective on savings and consumption is that the strong recent growth in household spending indicates optimism about future income prospects, rather than any fundamental recklessness. And there are good reasons for

households to be relatively optimistic. The labor market is reasonably tight, with the unemployment rate at 4.5 percent. Average earnings are growing at about a 4 percent rate. Employment growth has slowed a bit from the above average pace of the last several years, but still continues to be rapid enough to absorb the ongoing growth we expect in the labor force. Prospects for real income growth, then, look pretty solid. Moreover, household net worth is up to 5¾ percent years of disposable personal income, and has been rising during this recovery, which suggests that savings, properly measured, might not be so low after all. As always, real wage growth will tend to track gains in labor productivity, and while productivity growth was fairly strong for the first several years of this decade, the recent slowdown is a negative risk for consumer spending. On balance, though, I expect consumer spending to remain reasonably healthy.

Putting this all together, I expect overall growth to come in below trend in the first half of this year, but to return to trend by the end of the year, based on my expectation that the housing market is likely to find a bottom some time this year and no longer be a drag on top line growth, business investment will pick up, and consumer spending will remain healthy.

The Phillips Curve

As I mentioned earlier, many commentators base their belief that inflation will moderate on their belief that output growth will be below trend for the next few quarters. This connection is based on a popular – though I will argue incomplete and potentially misleading – understanding of the relationship between inflation and real economic activity. This relationship is usually described by the “Phillips curve,” which typically shows an inverse relationship between inflation and unemployment or the “output gap.”⁷ One way of thinking about the Phillips curve is to see it as describing a set of options facing policymakers – as if to say, “You can have less inflation with more unemployment or less unemployment with more inflation.”

Modern monetary economics now understands the relationship between inflation and real activity differently. In the new version of the Phillips curve, current inflation is related to expected future inflation as well an indicator of current economic activity, such as unemployment or the “output gap.” But to state it this way – as an equation with inflation on the left hand side depending on a real variable plus inflation expectations on the right hand side – is entirely arbitrary. One could just as well write the relationship the other way and say that unemployment, for example, depends on inflation and expected inflation.

In fact, what we know is that inflation and real economic activity are the joint outcome of decentralized decisions, made by participants in the economy, regarding demand, supply, prices and wages. So it is just as correct (or rather incorrect) to say below-trend growth will drive inflation down, as it is to say that falling inflation will keep growth below trend. Because inflation ultimately

depends on the actions of the central bank, those decentralized decisions will depend on past, present and expected future central bank policy choices. Thus it is central banks, not the labor market, that drive inflation down.

The behavior of inflation expectations is vitally important to a central bank that is attempting to reduce inflation. If inflation expectations are low and consistent with the reduction in inflation that the central bank wishes to bring about, it will be important to assure that they do not drift higher during the disinflation process. If inflation expectations have become elevated, a sustained reduction in inflation will require bringing inflation expectations down as well.

Inflation expectations embody assumptions –either explicit or implicit –about how the central bank is going to conduct monetary policy in the future. Public understanding of the central bank’s long-run goals and of how the central bank would respond to various potential economic disturbances helps anchor inflation expectations.

Inflation Expectations

If inflation expectations are a key determinant of the inflation outlook, then what do we know about the recent behavior of inflation expectations? There are a variety of indicators and as you might expect, none of them is perfect. Survey measures have the longest track record. The Philadelphia Fed compiles and publishes the Survey of Professional Forecasters every quarter. Their most recent compilation, published just last week, reports a mean expectation for core PCE inflation of 2.1 percent through the end of 2009. You may also have heard of the Blue Chip forecasters survey. Their average forecast for core CPI inflation (not PCE inflation) is 2.4 percent in 2007, and 2.3 percent in 2008, The CPI and the PCE inflation indexes are based on slightly different methodologies, and they tend to differ by about four-tenths on average. So the Blue Chip forecast of 2.4 percent and 2.3 percent for CPI translates into 2.0 percent and 1.9 percent respectively for the core PCE, a bit lower than the Philadelphia survey. Consumer surveys, in contrast, yield much higher figures. Among respondents to the Reuters - University of Michigan survey, the median expected inflation over the next year is 3.2 percent and the median expected inflation over the next ten years is 3.1.percent. Economists typically discount data from such consumer surveys in which respondents have little or no economic incentive to forecast well. Professional forecasters presumably perceive a pecuniary benefit to having a documented record of accuracy. So I would favor the figures obtained from professional forecasters. Better yet would be readings on inflation expectations derived from traded market instruments. Fortunately, such measures can be derived from the spreads between indexed and non-indexed U.S. Treasury securities –the so-called TIPS spread. The implied expectation of CPI inflation over the next five years was around 1½ percent in early 2003, rose to near 2½ percent in 2004, and has been trading around 2.3 percent in recent weeks. Taking

off four-tenths for the average PCE-CPI spread, this translates to around 1.9 percent.

Another place to look for evidence on inflation trends is the growth in labor compensation. Hourly compensation in the nonfarm business sector accelerated from below 4 percent in 2005 to 5 percent in 2006. This is consistent with the broad acceleration in average hourly earnings shown in the Employment Report, and the upswing in the Employment Cost Index. Inflation-adjusted compensation gains should (and generally do) track labor productivity gains fairly closely. This is algebraically equivalent to saying that the markup over unit labor costs should be fairly constant. If so, the growth in unit labor costs should provide a gauge of expected inflation trends, the idea being that workers and firms set current wages based on their near-term expectations for real productivity gains and inflation. Productivity growth was relatively high early in this decade, but has decelerated recently and averaged 1.6 percent last year. As a result, unit labor costs have accelerated and have averaged 2.4 percent over the last two years. The markup has been relatively steady at an elevated level over those two years, which with rising unit labor costs is consistent with the rise in inflation we've seen.

If unit labor costs continue to advance at recent rates, either inflation will keep pace with unit labor costs, or the increase in labor costs will be absorbed by firms lowering their markups. It is true that the aggregate markup implied by the productivity and unit labor cost numbers has been high by historical standards, which accords well with the recent strength in business profits, but our understanding of aggregate movements in the markup is limited. The markup has tended to revert to its mean, but it can deviate for long stretches of time. So while it is possible that the markup might fall to offset a rise in unit labor costs, if we don't know why the markup is elevated now, it's hard to have much confidence in a forecast that it is going to come to our rescue just in the nick of time. If the markup remains relatively high, and unit labor costs continue to advance at or above 2 percent, then we are likely to see inflation continue at about 2 percent.

Corroborating evidence on inflation expectations is provided by recent work by James Stock and Mark Watson.⁸ They estimate a model of postwar US inflation that allows them to decompose inflation into "trend" and "transitory" components, each with their own time-varying volatility. The time-varying volatility feature allows for changes over time in the portion of the variability in inflation that is due to long-lasting swings in trend inflation, as we saw in the Great Inflation of the 1970s, as opposed to short-run transitory movements in inflation. They find that the variability in the trend component of inflation has fallen dramatically since the 1970s, consistent with other research that has documented a fall in the "persistence" of inflation since then.⁹

Stock and Watson's methodology implies that the best forecast for future inflation is the current estimated value of the trend component, which their method puts at 2.1 percent (for core PCE inflation) as of the first quarter of 2007. This measure

of trend inflation has been above 2 since the fourth quarter of 2004, and peaked at 2.2 percent in the second quarter of 2006. Interestingly, their measure of trend was between 1.3 percent and 1.8 percent for over eight straight years from 1996 to 2003.

The Stock and Watson framework provides a natural way to assess whether any moderation in core inflation is evident yet. Their measure of trend inflation fell by 6 basis points from the peak (2.17 percent) in the second quarter of last year to the first quarter of 2007 (2.11 percent). Given the shape of the probability distribution around their estimates, this decline does not appear to be statistically significant.

Inflation Outlook

A variety of expectations measures then, point to expectations for core PCE inflation of about 2 percent right now. What does this imply about the outlook for actual inflation? The current level of inflation expectations is likely to exert a gravitational pull on actual inflation, provided that monetary policy actions are not inconsistent with those expectations and no concerted effort is made to shift expectations. Policy actions at variance with those expectations –for example, significant easing at a time of elevated or rising inflation –would likely call those expectations into question and lead to a change in assessments regarding future inflation. But as long as policy actions appear to be plausibly consistent with movement toward 2 percent inflation and nothing else acts to alter inflation expectations, that’s likely to be the best forecast for where inflation is headed.

Could inflation fall below 2 percent, say to 1½ percent? That depends. Without a prompt fall in inflation expectations, a reduction in inflation below 2 percent is likely to be temporary and hard to sustain. With expectations left alone, that is, if nothing is done to try to shift expectations, the remaining mechanism for bringing down inflation is the old-fashioned Phillips curve mechanism, that is, an increase in real interest rates that slows aggregate demand and reduces both inflation and real activity. This could be costly in terms of foregone real growth.

The prospects for bringing inflation down below 2 percent thus hinge on the extent to which a reduction in inflation expectations can be brought about. How difficult would that be? Using changes in the target interest rate alone, the process is likely to be difficult and time-consuming.

One natural approach to bringing inflation expectations down more expeditiously, should that be the desire, would be a strategy of clear communications about policymakers’ intentions. Just how responsive would inflation expectations be to such communications? General conclusions are unlikely, because the results will depend on the nature of communications, the nature of the accompanying actions, and the context in which they are received. There are many historical examples of significant shifts in monetary policy expectations; examples include the fiscal reforms accompanying the ends of hyperinflations, the governance changes

accompanying the adoption of explicit inflation objectives in other countries, and the operational regime shift adopted by the Volcker FOMC in 1979.

These examples involved fairly dramatic and sizable shifts in the conduct of monetary policy, however. Shifting inflation expectations from 2 percent down to 1.5 percent or 1 percent represents a far smaller change in policy, and thus ought to be less difficult. In fact, exactly the opposite transition was made 3 years ago. As I noted earlier, core inflation was between 1 and 2 percent from 1996 through early 2004, and then since early 2004 core inflation has been between 2 and 2½ percent. Inflation expectations seem to have shifted up accordingly; for example the TIPS spread was around 1½ percent in 2003. The fact that core inflation so recently spent eight years between 1 and 2 percent suggests that convincing the public that we were returning to such a period would not be that difficult, especially in light of the fact that the Committee did not, during that earlier period, announce an intention to keep core inflation within that band.

In many recent instances, FOMC actions or statements appear to have induced simultaneous short-run movements in market participants' expectations regarding the path of the federal funds rate and inflation. For example, following the heavy hurricane season of 2005, and during the spring of 2006 in response to energy price increases, inflation expectations rose, but were subsequently tamped down by Committee member communications. In both cases, the movement in inflation expectations was relatively contained, but these short run spikes suggest a pliability of inflation expectations in the current environment.

The outlook for inflation, then, is to an important extent contingent on the extent to which it appears worthwhile to engineer a reduction in inflation expectations, to return them to a level more closely consistent with our price stability mandate. In any event, there is little disagreement about the central importance of inflation expectations for the conduct of monetary policy and the outlook for inflation.

Thank you.

¹ This speech is an abridged version of a speech given on May 22, 2007. I am grateful to John Weinberg and Roy Webb for assistance with these remarks.

² The insurance payments associated with the September 11, 2001 attacks were treated as an offset to net premiums paid for insurance in the National Income and Product Accounts, resulting in a sharp decline in measured inflation for that month, and a corresponding increase in 12-month measured inflation for September 2002, when core PCE inflation was 2.4 percent on a twelve-month basis. "Business Situation," *Survey of Current Business*, November, 2001, pp. 1-7.

³ PCE inflation for the second quarter of 2003 was originally reported as 0.7 percent.

⁴ Daniel Thornton, "The Lower and Upper Bounds of the Federal Open Market Committee's Long-Run Inflation Objective," *Federal Reserve Bank of St. Louis Review*, May/June, pp. 183-193.

⁵ Bernanke, Ben S., "The Subprime Mortgage Market," Federal Reserve Bank of Chicago's 43rd Annual Conference on Bank Structure and Competition, Chicago, Illinois, May 17, 2007, and Lacker, Jeffrey M., "The Evolution of Consumer Finance," Conference of State Bank Supervisors, Norfolk, Virginia, May 18, 2006.

⁶ John Weinberg, “Borrowing by U.S. Households,” Federal Reserve Bank of Richmond 2005 Annual Report.

⁷ Lacker, Jeffrey M., “Inflation and Unemployment,” Charlotte Economics Club, Charlotte, N.C., April 11, 2007, and “Inflation and Unemployment: a Layperson’s Guide to the Phillips Curve,” Federal Reserve Bank of Richmond 2006 Annual Report, forthcoming.

⁸ Stock and Watson “Why has Inflation Become Harder to Forecast?” *Journal of Money, Credit and Banking*, forthcoming. See also Steven Cecchetti, Peter Hooper, Bruce Kazman, Kermit Schoenholtz, and Mark Watson, “Understanding the Evolving Inflation Process,” U.S. Monetary Policy Forum 2007, the Initiative on Global Financial Markets. I am grateful to Mark Watson for providing us with the computer code to estimate the decomposition.

⁹ John Williams, “Inflation Persistence in an Era of Well Anchored Inflation Expectations,” Federal Reserve Bank of San Francisco Economic Letters, October 13, 2006.