Timing the Exit

Monetary policy seems to lend itself to automotive analogies. Central banks have been portrayed as "pushing the pedal to the metal", "pressing the accelerator", "tapping the brakes", or "shifting into neutral". Some have described central bank behavior during the current crisis as "pushing the pedal through the floorboard"! But more recently the focus has changed to how, when, and why central banks, or at least the Federal Reserve, will slow down the economobile and hit the exit ramp at the right moment to achieve its preferred destination.

Most readers will probably have done a double take at that last sentence. Surely neither the European, UK , nor US economy needs to be "slowed down" right now. So why the fuss and fret about the exit? Well, part of the problem is that there is not a common understanding of what "exit" means. Another part of the problem is that the monetary policy transmission mechanism is seriously malfunctioning.

Before the employment of the balance sheet—its size, composition, and rate of change, central banks were seen to have essentially one instrument, a short term interest rate. As inflation targeting gained adherents, communication about the time path of the policy instrument began to be seen as an additional instrument available to monetary authorities which, in turn, led to a revolutionary improvement in the quality and quantity of central bank communication. The predictability of the timing of changes in the policy rate has also greatly improved. Back in the day, central bank "watchers" attempted to infer from patterns of short term rates whether the central bank was changing policy. Now, changes in the monetary policy stance are announced at pre-set times, following meetings of policy committees that are established months, if not years, in advance. Policymakers try to keep intra-meeting decisions to a minimum…confined to emergency situations.

The aim of this note is to discuss how central banks, with particular reference to the Federal Reserve, customarily think about both the timing and pace of tightening policy, i.e. when, and how fast, to exit accommodative policies. I then discuss the apparent inconsistency between this thinking and the set of economic and policy target projections provided after the June 19, 2013 FOMC meeting. I conclude by suggesting a resolution to that inconsistency by reference to the relevant implications of Michael Woodford's paper "Methods of Policy Accommodation at the Interest-Rate Lower Bound"[1].

In discussing how tightening episodes were thought about prior to the current crisis, it is important to mention a number of stylized facts or beliefs.

- The first is that *monetary policy works with a lag*. More precisely, the impact of any given increase in interest rates exerts a negative impulse on the ***real*** economy whose cumulative impact is felt approximately 12 to 18 months after the rate increase.
- Following on from this premise, *central banks focus only on what their economic models are saying about the state of the economy 12 to 18 months from now, not on current or past economic conditions*. In terms of the driving analogy, if you are moving along at 150 km per hour

[1] http://www.columbia.edu/~mw2230/JHole2012final.pdf

you ought to be looking forward a significant distance since it is virtually impossible to do anything about what is in your immediate path anyway.

- The third premise is customarily expressed in rather paradoxical language—*the economy has a "full employment level of unemployment" below which wage and inflationary pressures will build*. In other words the economic engine has a capacity to run smoothly and indefinitely at a defined speed, going beyond this is possible for a time but eventually the engine will overheat and be damaged. For illustrative purposes we will assume that rate for the US is 5.5 percent[2].
- The fourth premise is that *inflation outside a narrow corridor centered on 2 percent is undesirable*.
- The fifth premise is that *the expectations theory of the term structure of interest rates* suggests there is a somewhat stable relationship between long term rates (such as those on mortgages) that directly impact real activity and the overnight interest rate (the fed funds effective rate) that the Fed targets. In other words, long term US rates are deemed to be the expected geometric average of future short term rates plus a time-varying risk premium.
- The last premise is that *there exists a "neutral" short term interest rate that provides neither a positive nor negative impulse to the real economy*. The neutral rate can be thought of as the sum of the target rate of inflation (2 percent) plus the real long run equilibrium overnight risk free interest rate. Rather than delve into the theoretical debate about what determines an economy's long run real interest rate, let us assume here it is 3 percent for the United States. Similarly, let us assume an average risk premium of 1 percent. That provides us with a nominal neutral fed funds rate of 4 percent[3].

Combining these premises with the June 19, 2013 FOMC central tendency projection that the US unemployment rate will hit 5.5 percent approximately at the end of 2016—and that inflation will be at the FOMC preferred rate of 2 percent—we might surmise that the target fed funds rate 12-18 months prior should be 4 percent. In other words, the target rate ought to reach 4 percent by, say, the end of the third calendar quarter (Q3) of 2015. However, *this logic is very inconsistent with the estimates of the FOMC members regarding where they expect the target rate to be at the end of 2015*.

Although 18 out of 19 FOMC members envision the fed fund target rate to be above where it is now, the median forecast for the rate at end-2015 is only 1 percent. This is well below the median "longer run" estimate of 4 percent (provided by the same FOMC), and clearly portends a later attainment of the neutral rate than is derived in the preceding paragraph. Assuming that FOMC members envision raising the rate in increments of 25 bps per FOMC meeting (approximately every six weeks), the fed funds rate target would begin to be increased in the middle of 2015 and reach 4 percent only by Q2 2017, two quarters *after* the unemployment rate is projected to reach full employment.

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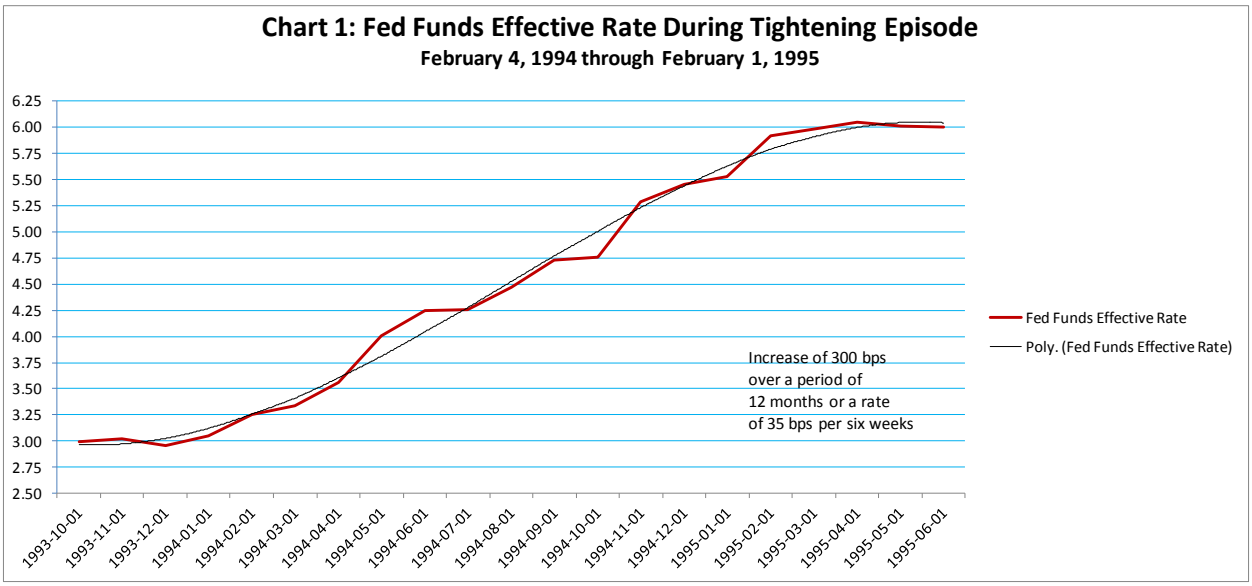
[2] In the FOMC press release of June 19, 2013, the projection for the "longer run" unemployment rate appears to be slightly higher than 5.5 percent: http://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20130619.pdf

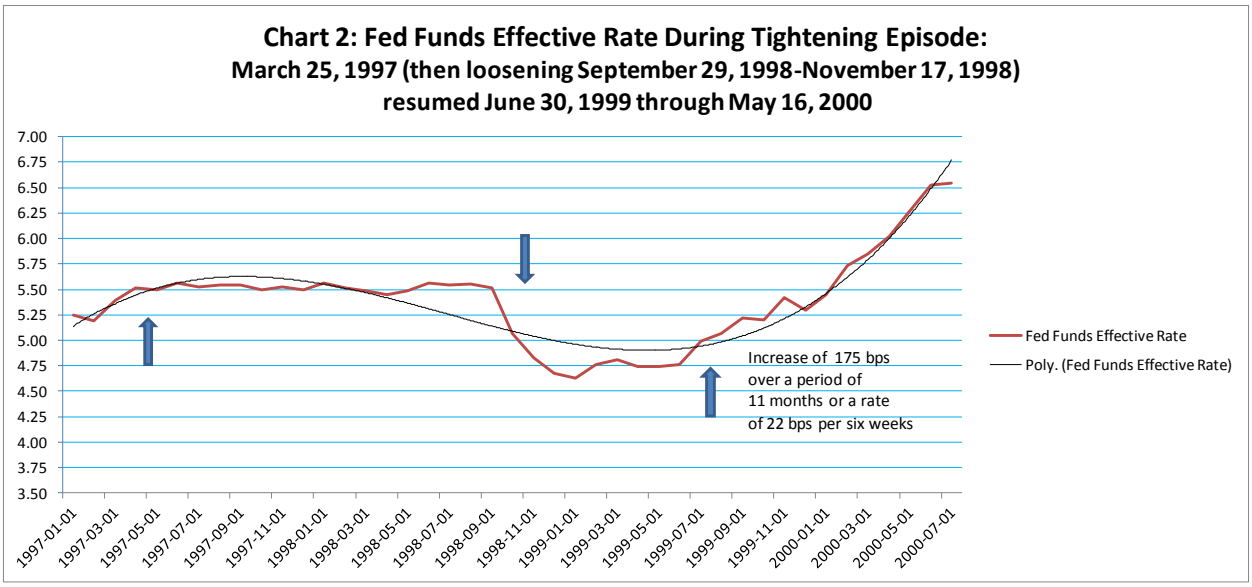
[3] In the FOMC press release of June 19, 2013, 9 out of 19 FOMC members provided 4 percent as their estimate of the "longer run" target fed funds effective rate. Of the 10 other members, 9 had a target rate within 50 basis points of 4 percent.

Before we try to resolve this puzzle, let us take a look at the last three tightening episodes in Federal Reserve history. This time frame also dovetails with the introduction of the first announced tightening, by the FOMC chaired by Alan Greenspan, in February 1994.

That first episode—for which the Federal Reserve was roundly criticized for allegedly taking the market by surprise leading to a rout in the fixed income market—is shown in Chart 1.

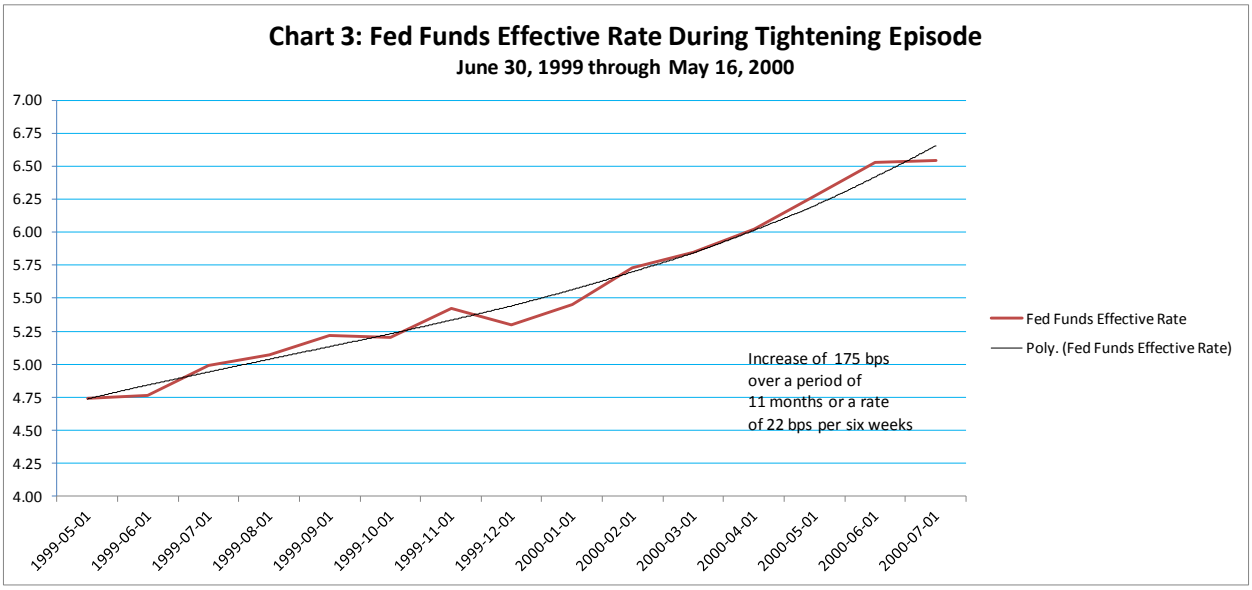


In that episode, the target fed funds rate was raised by 300 bps over the course of 12 months, the fastest rate of increase of the three episodes[4]. The second tightening episode is shown in Chart 2.

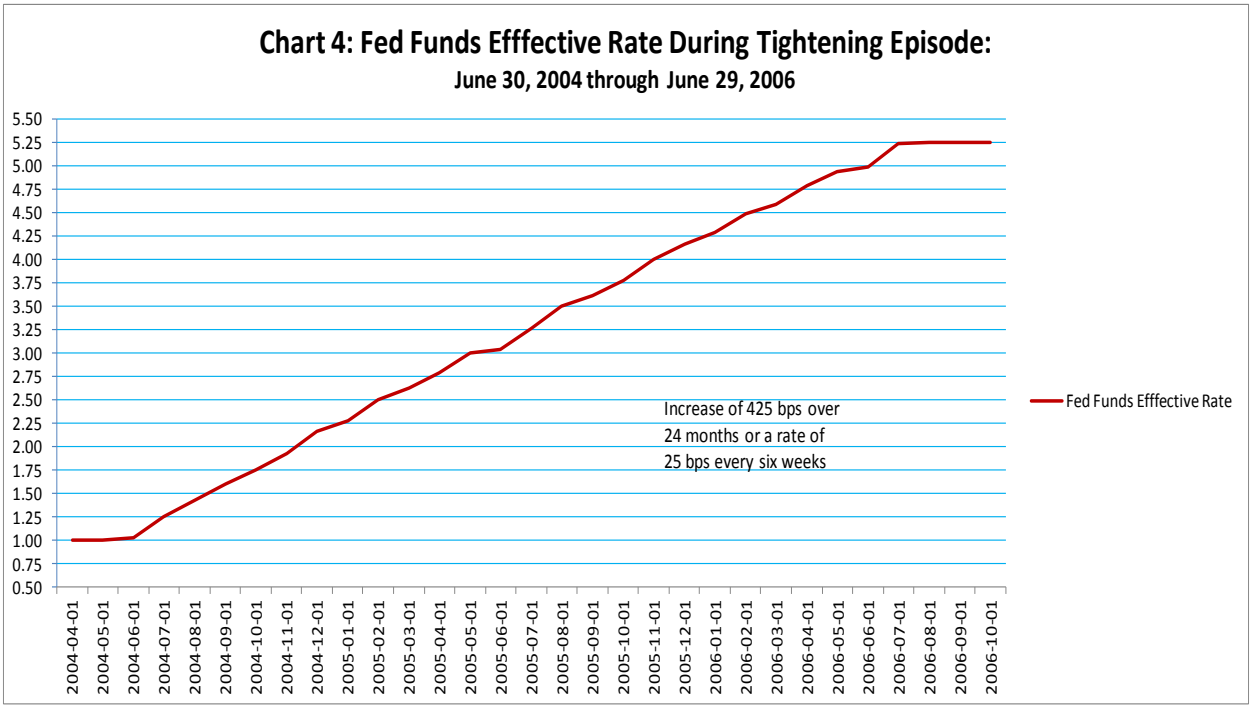


[4] Note that all charts show the *actual* fed funds effective rate rather than the target. They are highly correlated.

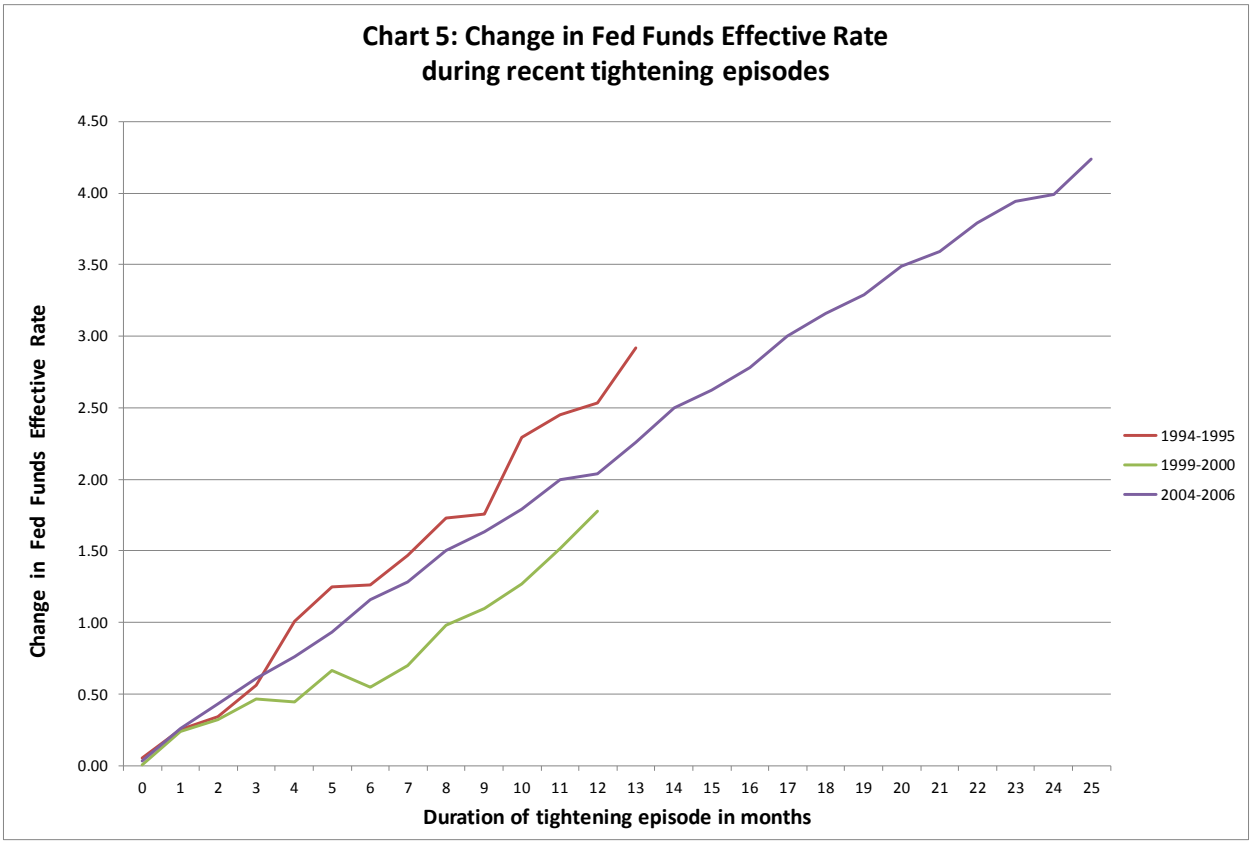
The tentative tightening in 1997, an increase in the target by 25 bps on March 25, 1997, was reversed with 25 bps rate cuts on September 29, October 25, and November 17, 1998. There then followed a steady increase of 175 bps over a period of 11 months commencing on June 30, 1999. Chart 3 focuses on the decisive tightening period.



The most recent tightening episode, and the only one to overlap with Ben Bernanke's presence at the Federal Reserve Board, began in June 2004. It is shown in Chart 4 and reflects 17 consecutive 25 bps increases in the fed funds rate target.

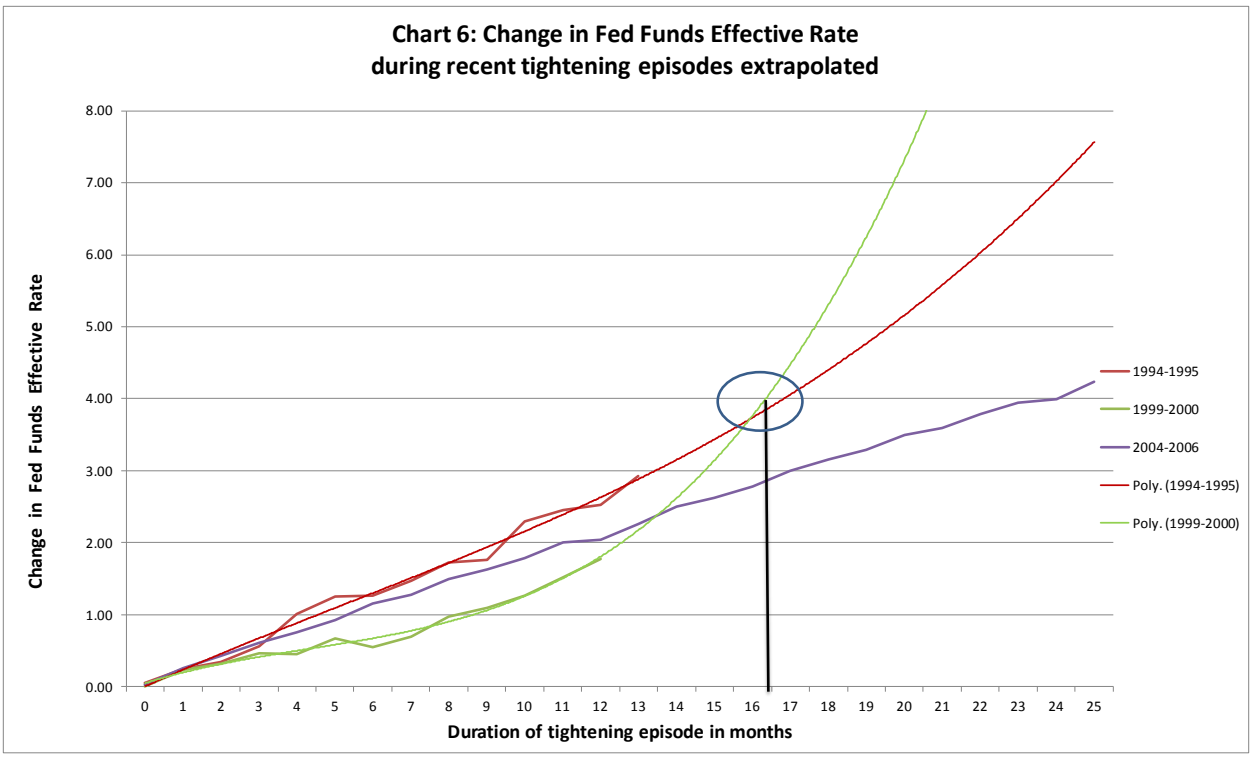


For ease of comparison, Chart 5 superimposes the three episodes with a normalization of the fed funds rate at the start of the tightening episode. So the y-axis represents the cumulative change in the fed funds rate rate starting with time zero set as the month prior to the first rate increase.



Clearly the "Greenspan surprise" episode represents the fastest rate of increase. The subsequent tightening episode—after a tentative tightening, and then a modest easing—was quite cautious at the beginning but then picked up at a more rapid pace. The 2004-2005 episode was both within the two extremes and also clearly the most predictable. Furthermore, for our purposes, the most recent tightening is very relevant as it is the only episode that involves a cumulative rate hike of 400+ bps.

In order to have an idea of how the first two tightening episodes might have played out were they extended to encompass a cumulative rise in the target of 400 bps, I have extrapolated the trend using a simple polynomial fit for the two earlier episodes. The results are shown in Chart 6.



Although the curvature for the two extrapolated episodes is somewhat different, they both cross the 400 bps cumulative increase line at roughly the same point in time, 16 ½ months, approximately 8 months before the 2004-2006 tightening episode.

What takeaways might we have from this admittedly small sample size? Studying the graphs above in the context of then Governor Bernanke's May 2004 speech "Gradualism"[5] and considering the way in which the current FOMC has signaled that it sees the costs associated with potentially higher than target unemployment as significantly outweighing the costs associated with above target inflation for a few quarters, it seems highly unlikely that the pace of rate increases during the next tightening will be faster than the last. On the other hand, to move any slower than that episode would require an occasional FOMC meeting with a pause in rate increases or rate increases of less than 25 bps on average[6]. This might create much more of a communications problem than it would be worth. So we seem compelled to adopt a "baseline" scenario, perhaps one day to be dubbed the "Bernanke stride", consisting of a series of consecutive 25 bps target increases, one per meeting. Thus starting in mid 2015 we would end up at 400 bps by mid 2017. Again, two full quarters after unemployment had reached the "full employment" level rather than the theoretical optimum outlined above of 4 to 6 quarters *before* unemployment is projected to reach the full employment level.

[5] http://www.federalreserve.gov/boarddocs/speeches/2004/200405202/

[6] A senior (non-US) central banker who is an expert in communications was once asked why move only in increments of 25 bps. His answer was that they had found that 25 basis points was the smallest increase that could get central bank policy action onto the front page of the newspaper. It has also been said that certain central banks tend to move in increments of 8 bps or in numbers that end in 8 as that number is viewed favorably by financial market participants. I have not researched the veracity of the latter claim.

Summarizing the puzzle, how do we reconcile a clear intention to start rate increases in mid-June 2015, the lagged impact of monetary policy, a forward-looking FOMC, the Bernanke stride, and expectations that the full employment unemployment rate will be attained by end 2016? In other words, why does it seem the FOMC aims to attain a 4 percent fed funds rate 6 to 8 quarters later than would seemingly be necessary to glide gracefully into equilibrium at potential output at the start of 2017?

Let us consider several possible resolutions of this puzzle.

1. Perhaps the FOMC believes the reduction in the unemployment rate beyond 2015 will be extremely slow. The current FOMC projections do not extend explicitly into 2016. I obtained the end 2016 5.5 percent unemployment rate by extending the central tendency forecast one year with a ruler and pencil.[7] Perhaps the last 0.5 decline in the level of unemployment will take much longer than 1 year. If full employment were expected to be attained only in mid 2018, the Bernanke stride indicated fed funds rate would be "optimal" in 2017. Certainly there are reasons to believe that the US unemployment rate will decline more slowly than usual given the possibility that labor force participation rates will rebound but the FOMC is well aware of that and it is not obvious why the impact of that factor would be so important only in 2017-18.

2. Perhaps FOMC members individually chose the most attractive among several alternative equilibrium paths. In other words, if someone started out believing the economy would reach full employment at end 2016 and then worked backward through the Bernanke stride to an initiation of increases in the fed funds rate starting in Q4 2014 it might be apparent that this is not a consistent set of assumptions. In other words, a 2014 initiation of a reduction in policy accommodation through target rate increases might not be consistent with a robust economy in 2015-2016—meaning full employment would not be achieved by 2016. This, in turn, suggests that a later tightening would be the only path consistent with full employment by end 2016 even though it might be inconsistent with price stability in later years.

3. The FOMC might be (implicitly) envisioning breaking from the Bernanke stride into a sprint during 2016 with a sharp acceleration in rate hikes. While implausible a priori, it might happen if by end 2015 long term rates have already fully incorporated the forecast policy tightening path once "liftoff" occurs in mid 2015. Therefore a more aggressive lessening of policy accommodation in 2016 may be merely an ex post validation of the "work" already done by the market to tighten monetary conditions.

4. The most intriguing and in my view most consistent explanation of the puzzle is that the FOMC may be attempting to follow the guidance of the author of the keynote paper presented at the last annual Federal Reserve Bank of Kansas City Jackson Hole Symposium, Michael Woodford[8]. The paper

[7] FRB Minneapolis President Kocherlakota was quoted by Bloomberg News on June 24, 2013 as saying that he expects that it will take two years for the unemployment rate to fall from 6.5 to 5.5 percent. Using this to extrapolate from the FOMC central tendency forecast provides the same timing as the ruler and pencil "model".

[8] Professor Woodford did not find his invitation in the wrapper of a Willy Wonka chocolate bar. He is a past colleague of Ben Bernanke, Lars Svensson and Alan Blinder at Princeton and has been writing path breaking papers on monetary policy for more than a decade. His work with former graduate student at Princeton (now at the Federal Reserve Bank of NY) Gauti Eggertsson is highly topical.

presented, "Methods of Policy Accommodation at the Interest-Rate Lower Bound"[9], concludes that the Federal Reserve would be better off following a policy rule that involves making up for past accumulated shortfalls in nominal output growth. That means, to return to the automotive analogy, that the central bank would compensate for a period when the economic engine was running at less than full capacity with a period of running the engine at greater than full capacity so as to "catch up" for lost time. In theoretical terms, the critical element of Woodford's proposal is that optimal current policy should *not* only be forward-looking but incorporate, in an essential way, the past behavior of the economy. This then contradicts the second "belief or fact" I posited on page 1 above, namely, that central bank policy should only be forward-looking.

"We [Eggertsson and Woodford (2003)] argue for the desirability of a commitment to conduct policy in a different way than a discretionary central bank would wish to, ex post, and that…the optimal commitment involves keeping the policy rate at zero for some time after the point at which a forward-looking inflation-targeting bank (or a bank following a forward-looking 'Taylor Rule") would begin to raise interest rates."[10]

The practical problem Woodford encounters is how the central bank can commit to doing something that, while optimal "now" (promise to delay the exit), will appear to be suboptimal when the time comes to actually delay the exit (and thereby depart from forward looking orthodoxy). Since talk is cheap the market would presumably require more than just a projected or promised policy path. Hence Woodford's proposal that the Federal Reserve target something akin to a path for nominal GDP. Such a target would imply, in the current circumstances, a commitment to make up for lost time and delay the initiation of an increase in the policy target beyond what would otherwise seem appropriate.

While easy enough said for a central bank free to define its own objective, the actual Federal Reserve clearly would have a task explaining how such an explicit policy target is consistent with its statutory requirement to aim at "maximum employment, stable prices, and moderate long-term interest rates". Certainly, interpreting the statutory objectives as pertaining to a hypothetical long-run average might enable the adoption of such a target without a change in law but, as we have seen in the last few days, it might take quite some time for the FOMC to fully explain its underlying thinking without running too fast in front of a skeptical market as well as its own Congressional overseers.

Peter Stella

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"I can't believe that!" said Alice.
"Can't you?" the Queen said in a pitying tone. "Try again: draw a long breath, and shut your eyes."
Alice laughed. "There's no use trying," she said: "one can't believe impossible things."
"I daresay you haven't had much practice," said the Queen. "When I was your age, I always did it for half-an-hour a day. Why, sometimes I've believed as many as six impossible things before breakfast."

Lewis Carroll(1871) *Through the Looking-Glass, and what Alice Found There*

[9] http://www.columbia.edu/~mw2230/JHole2012final.pdf
[10] Woodford (2012) op cit, page 38.