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# Making Monetary Policy at the Fed

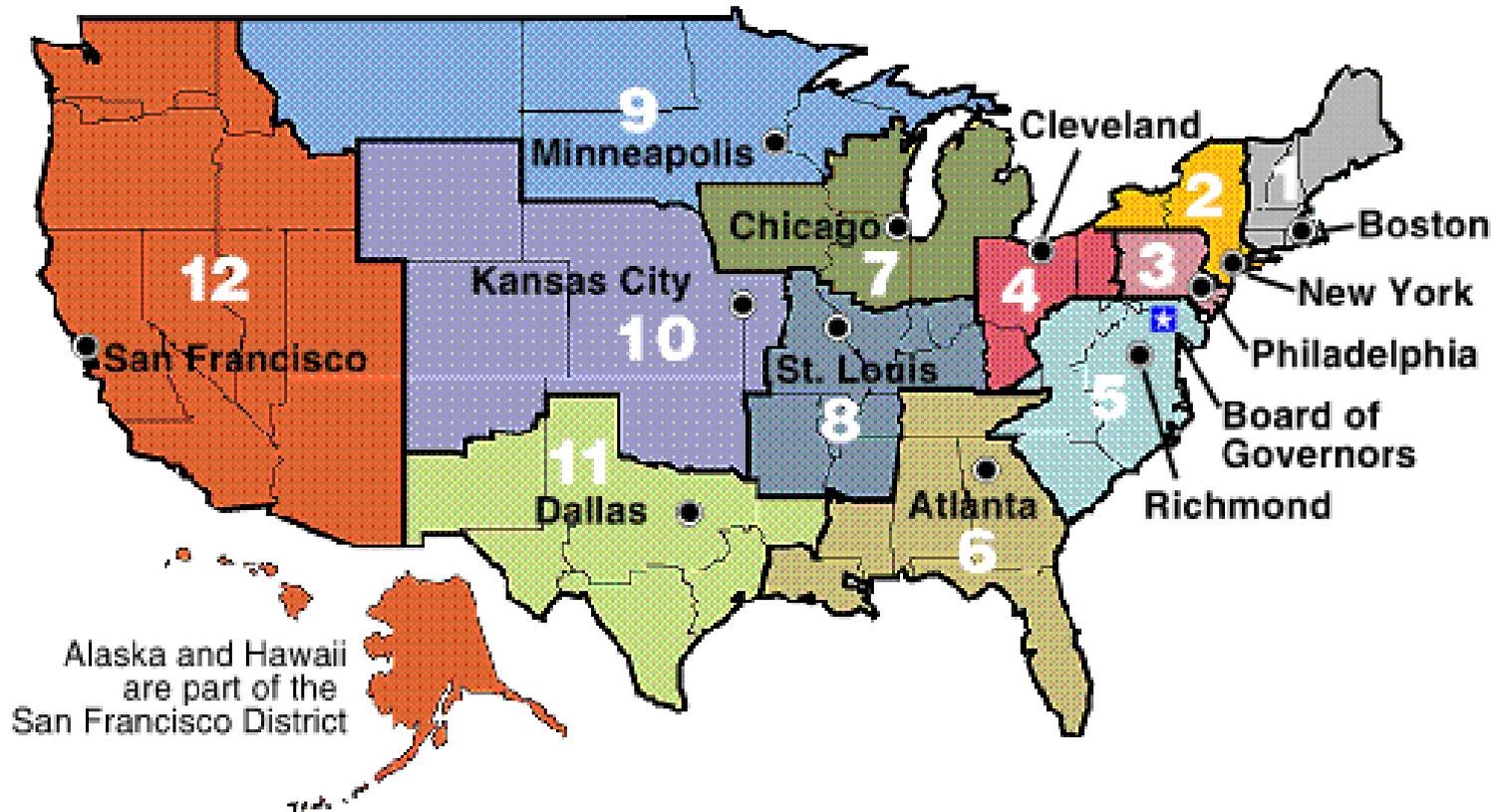
*American Economic Association Summer Program  
Federal Reserve Bank of Chicago  
July 1, 2016*

*Spencer Krane*  
Senior Vice President, Economic Research  
Federal Reserve Bank of Chicago

*The views I express here are my own and do not necessarily reflect the views of the Federal Reserve Bank of Chicago, my colleagues on the Federal Open Market Committee (FOMC) or within the Federal Reserve System.*

# Federal Reserve Districts

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# Nice Marble

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Board of Governors



Chicago Fed





# The Federal Reserve Board of Governors\*

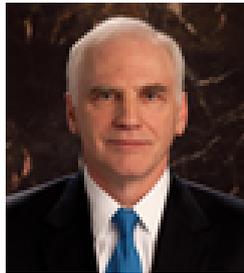
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*Janet L. Yellen*



*Stanley Fischer*



*Daniel K. Tarullo*



*Lael Brainard*



*Jerome H. Powell*

*\* Two seats currently vacant*

# Presidents of the District Reserve Banks

\* 2016 voting FOMC member



*Eric S. Rosengren\**  
*First District - Boston*



*William C. Dudley\**  
*Second District - New York*



*Patrick T. Harker*  
*Third District - Philadelphia*



*Loretta J. Mester\**  
*Fourth District - Cleveland*



*Jeffrey M. Lacker*  
*Fifth District - Richmond*



*Dennis P. Lockhart*  
*Sixth District - Atlanta*



*Charles L. Evans*  
*Seventh District - Chicago*



*James B. Bullard\**  
*Eighth District - St. Louis*



*Neel Kashkari*  
*Ninth District - Minneapolis*



*Esther L. George\**  
*Tenth District - Kansas City*



*Robert S. Kaplan*  
*Eleventh District - Dallas*



*John C. Williams*  
*Twelfth District - San Francisco*

# FOMC Meetings

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# Objectives of Monetary Policy

# Monetary Policy: The Fed's Dual Mandate

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- **Federal Reserve Act: Section 2a. Monetary Policy Objectives**
- ... the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates **commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates.**

# Long Run Goals and Policy Strategy Principles

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## ■ Price stability

- Goal: 2% inflation in price index for total personal consumption expenditures (PCE)
- Target is symmetric: an average over medium term, not a ceiling

## ■ Full employment

- Employment goal may change over time for non-monetary reasons
- Most FOMC participants see 4.7-5.0% unemployment as consistent with mandate (current forecast of long-run “normal” unemployment)
- Seek an economy operating at its level of potential output

## ■ Balanced approach

- Balanced approach to achieving both goals if they are in conflict
- Takes account of lags and other limits in effects of monetary policy

# Monetary Policy Goals: Output and Employment

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- **We would like to see fully utilized productive resources**
  - Help close gaps between actual and “potential” output and employment
  - Okun’s Law:  $y = y^* \Leftrightarrow u = u^*$

- **But if over-stimulate the economy eventually results in inefficiencies and increasing inflation**

$$\pi = E\pi + \frac{1}{\alpha}(y - y^*) + v$$

- **In the long run:**
  - Potential output is the best can do on a sustainable basis
  - In the long run, the Fed can’t make the economy grow faster than its potential (classical dichotomy)

# Monetary Policy Goals: Price Stability

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- **Price stability provides the environment necessary to meet all the other goals of monetary policy**
- **An environment of price stability makes planning easier**
  - Price stability improves the workings of the price system – high and variable inflation jam signals sent by relative prices
  - Price stability may also lower long-term interest rates by reducing uncertainty
- **Usually discussed in terms of cost of inflation being too high or too low**

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# Execution of Monetary Policy

# Monetary Policy In Usual Times

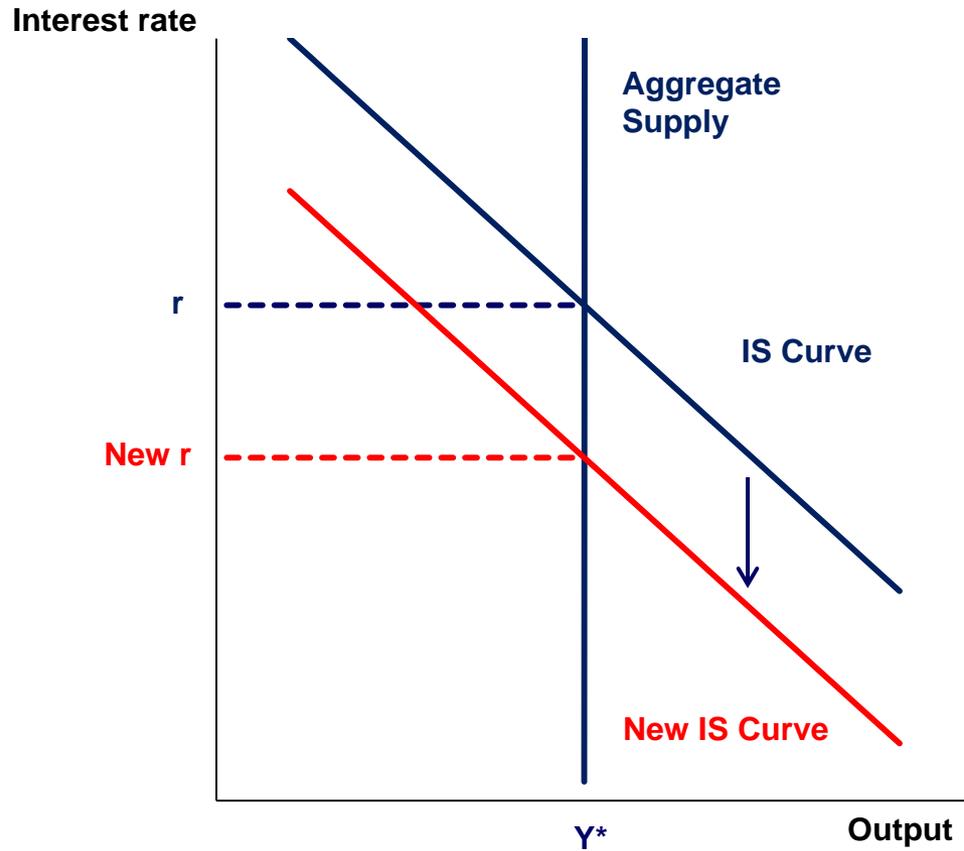
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- **Target the federal funds rate**
- **Changes in fed funds rate move other short-term interest rates**
- **Changes in short-term interest rates influence:**
  - Longer-term interest rates
  - Exchange rates
  - Asset values
- **These then affect saving and investment decisions, which in turn influence employment and output**
- **Inflation influenced by these and other factors**

# Response to Aggregate Demand Decline

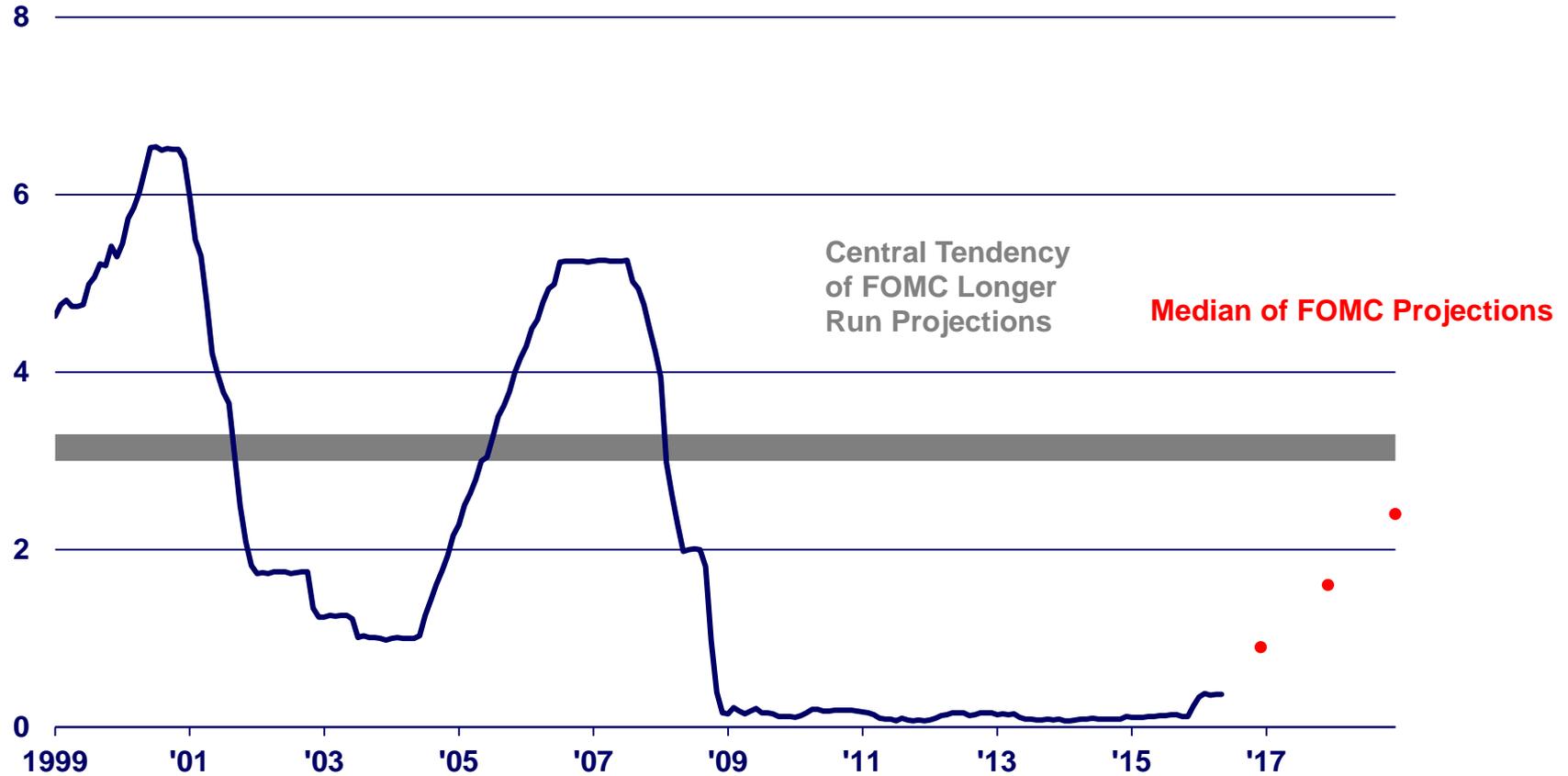
Assume  $\pi = 0$

## Normal Adjustment



# Policy Rate Constrained By Zero Lower Bound

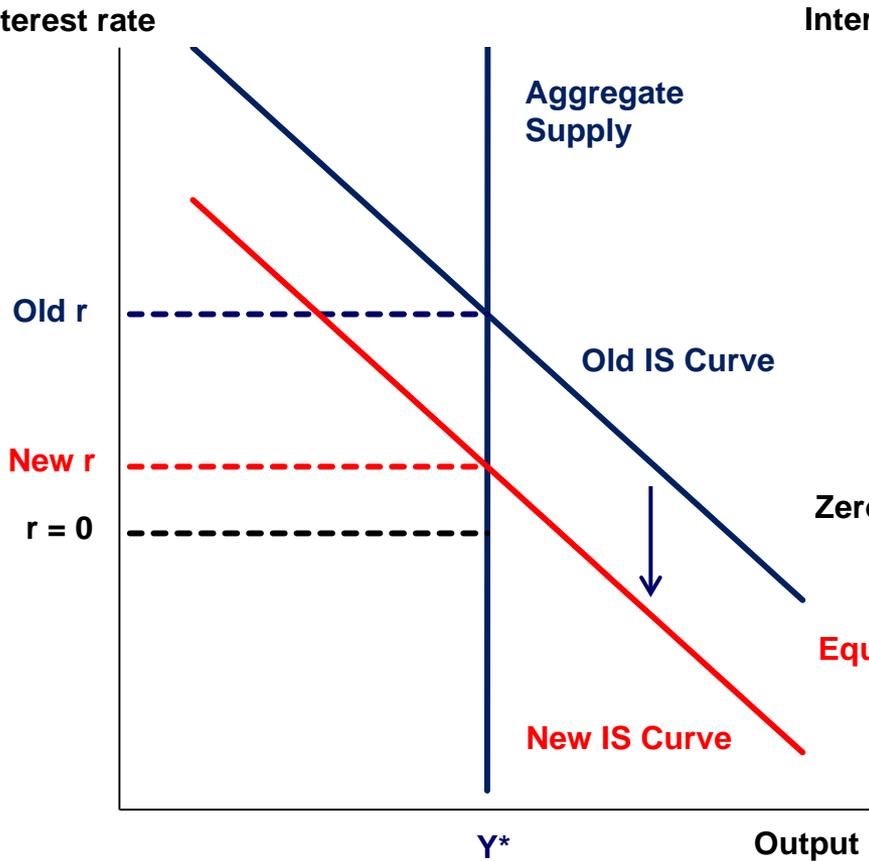
**Federal Funds Rate**  
(percent)



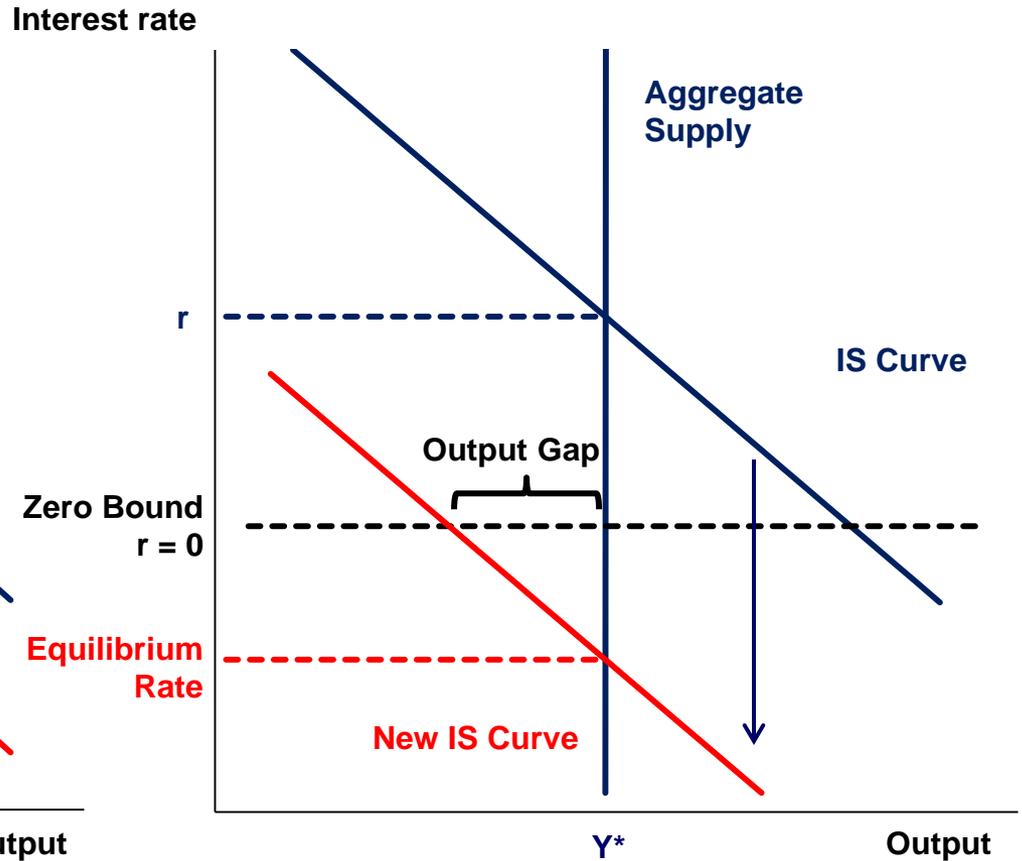
# Aggregate Demand Decline and the ZLB

Assume  $\pi = 0$

## Normal Adjustment

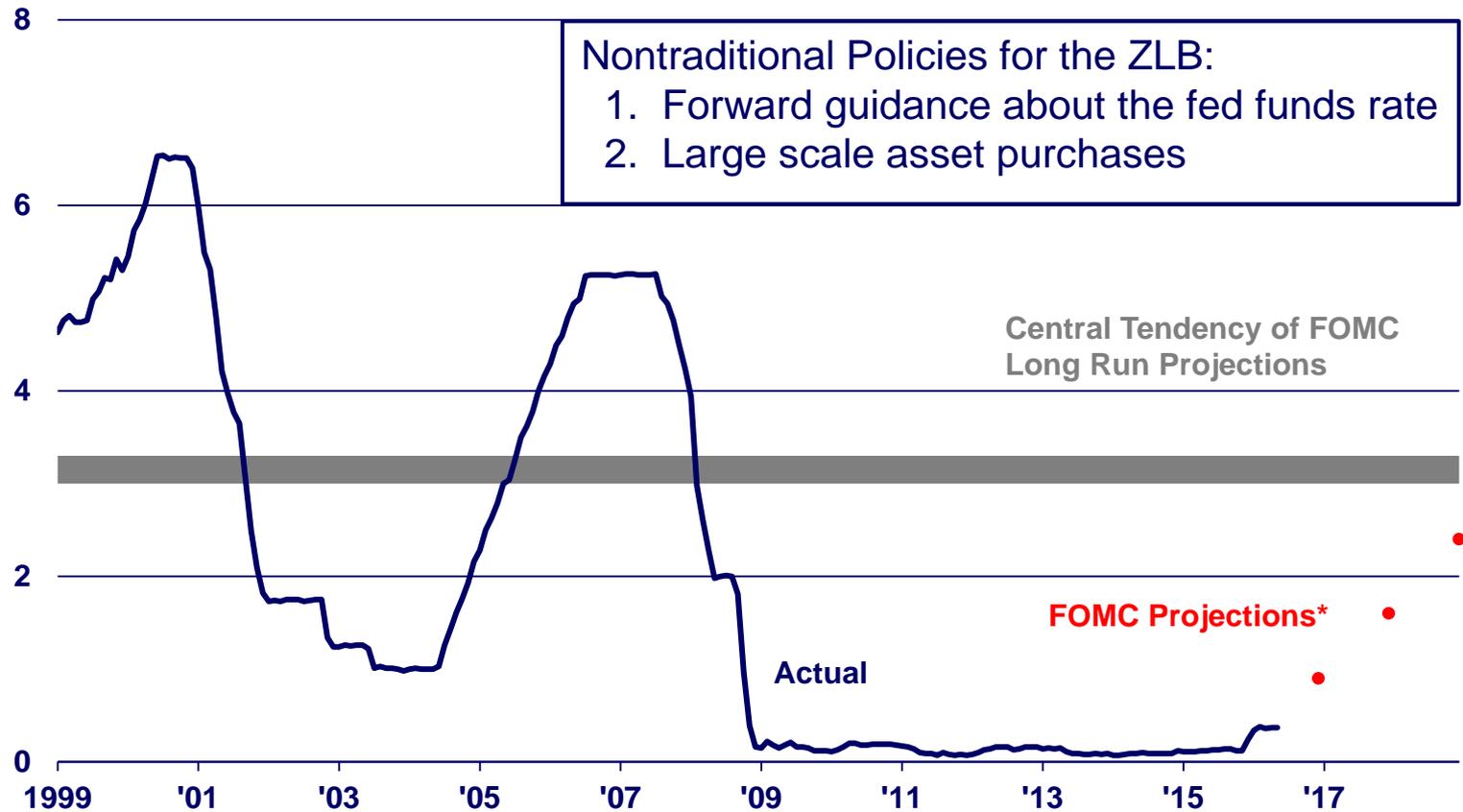


## Zero Lower Bound



# Policy Rate Constrained By Zero Lower Bound

## Federal Funds Rate (percent)



\* FOMC projections are the median values from the June 2016 Summary of Economic Projections.

# Monetary Policy At The Zero Lower Bound

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- Longer-term interest rates roughly equal expected average future short-term rates plus a term premia (tp)

$$r_t^{10} \approx \frac{1}{10} E_t \left[ r_t^1 + r_{t+1}^1 + r_{t+2}^1 \dots + r_{t+10}^1 \right] + tp_t^{10}$$

- Option 1: Lower expectations of average future short-term rates through “forward guidance” on future policy rates
- Option 2: Buy long-term bonds to:
  - Buying bond raises its price and so lowers its interest rate
    - ◆ Reduce term premium
    - ◆ Reinforce option 1

# Option 1: Forward Guidance on Funds Rate

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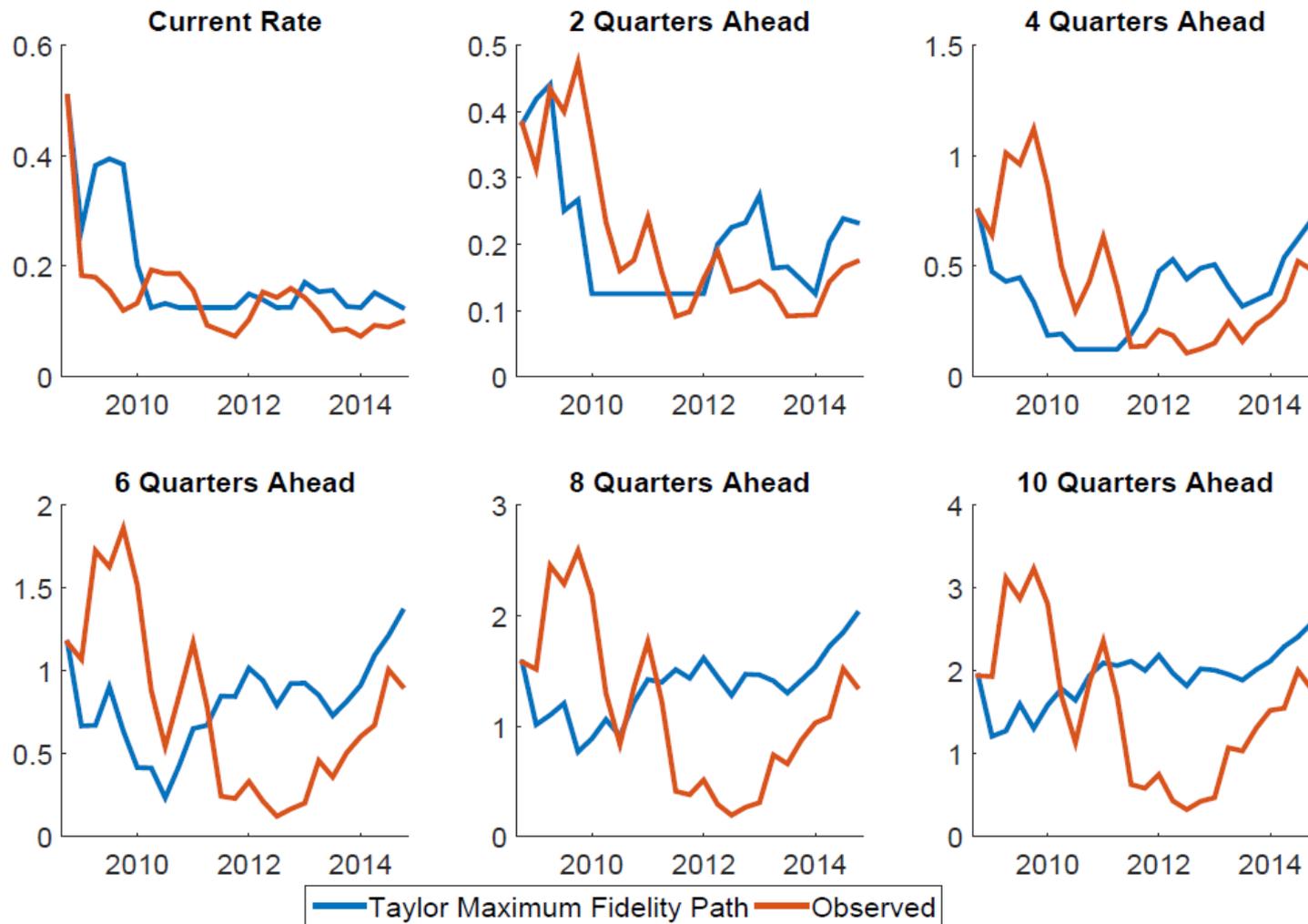
- **Economic conditions likely to warrant exceptionally low level of the funds rate:**
  - **December 2008: “for some time”**
  - **March 2009: “for an extended period”**
  - **August 2011: “at least through mid 2013”**
  - **January 2012: “at least through late 2014”**

# Forward Guidance on Funds Rate cont.

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- **September 2012:** “...expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the economic recovery strengthens....at least through mid-2015.”
- **December 2012:** “... conditions likely to warrant exceptionally low level of the funds rate at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than a half of a percentage point above the Committee’s 2 percent long-run goal, and longer-term inflation expectations continue to be well-anchored.”

# Forward Guidance



Campbell, Fisher, Justiniano, Melosi, forthcoming NBER Macroannual

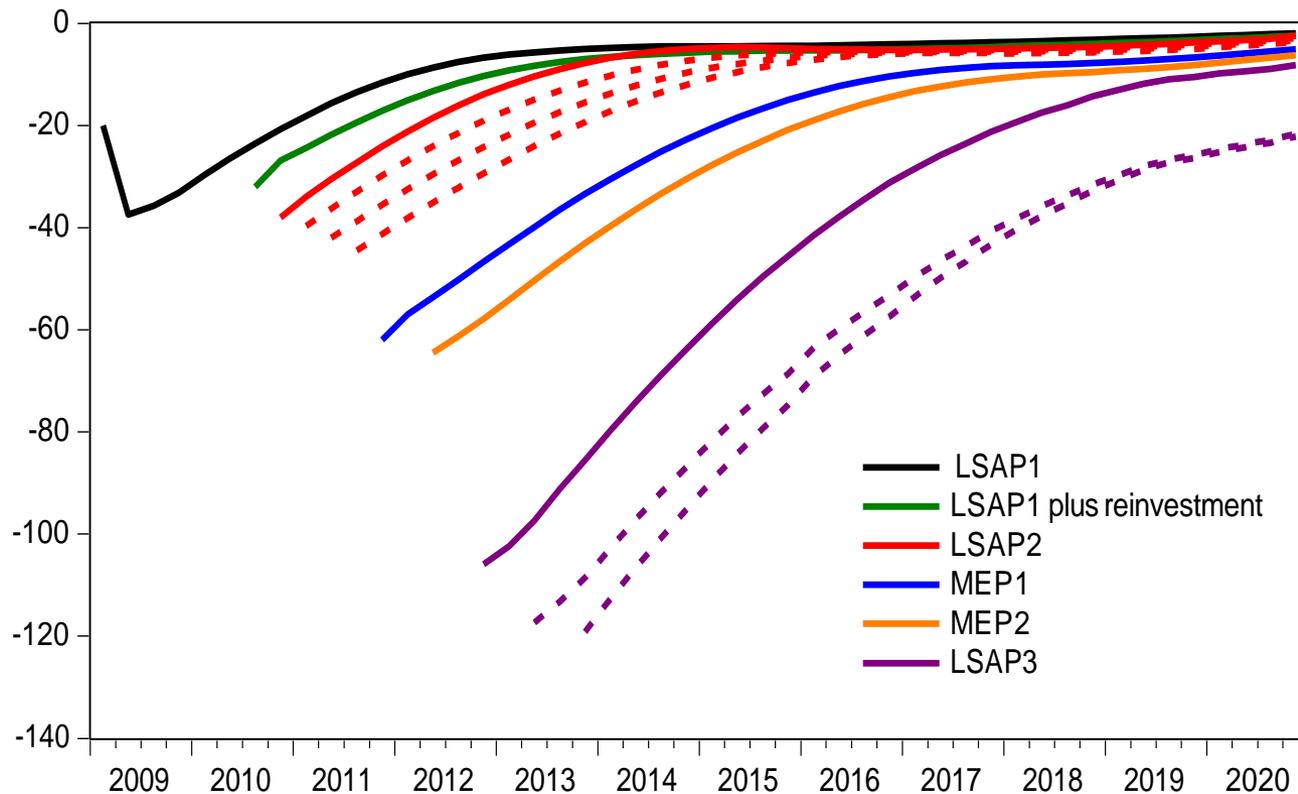
# Option 2: Large Scale Asset Purchases (LSAP)

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- **LSAP I (11/08): \$600 bill agency debt/MBS**
- **LSAP Ia (3/09): \$850 bill agency debt/MBS; \$300 bill Treas.**
- **LSAP II (11/10): \$600 bill Treas.**
- **MEP (9/11): Exchange \$400 bill short-term for \$400 bill long-term Treas.**
- **MEP extension (6/12): Extend MEP through end of 2012**
- **LSAP III (9/12): \$40 bill per month MBS, no fixed end date -- “until labor market outlook improved substantially”**
- **LSAP IIIa (12/12): \$40 bill per month MBS and \$45 bill per month long-term Treas; no fixed end date**

# Estimates of Term Premia Effects: Ihrig et al.

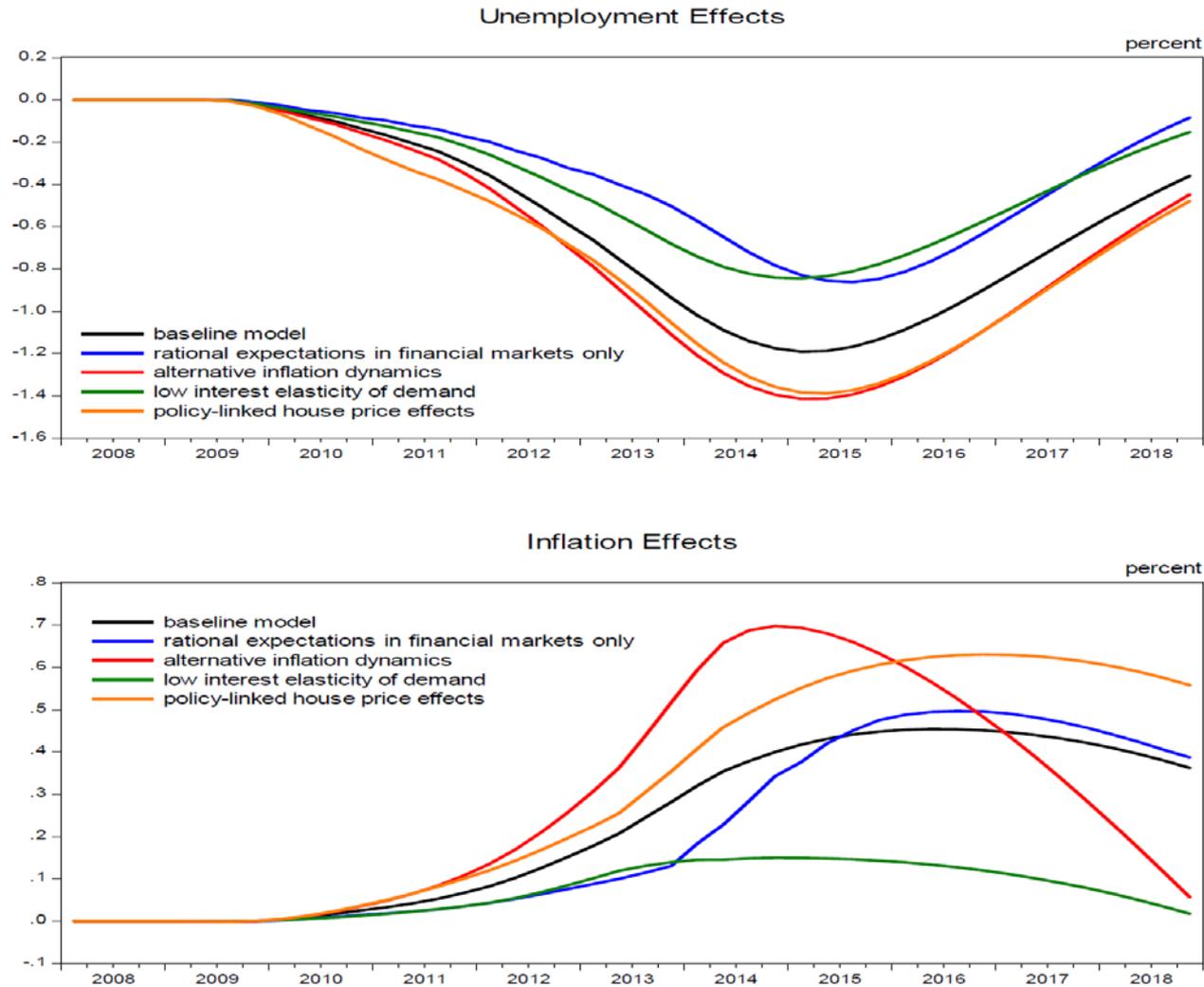
Figure 3  
Estimated Term Premium Effects of the FOMC's Asset Purchases



Source: Ihrig et al. (2012). Effects of LSAP3 program computed by the authors; see text for details.

# Alternative Estimates of Unconventional Policy

Figure 10. Estimated Effects of of Unconventional Policy  
in Diferent Specifications of the FRB/US Model

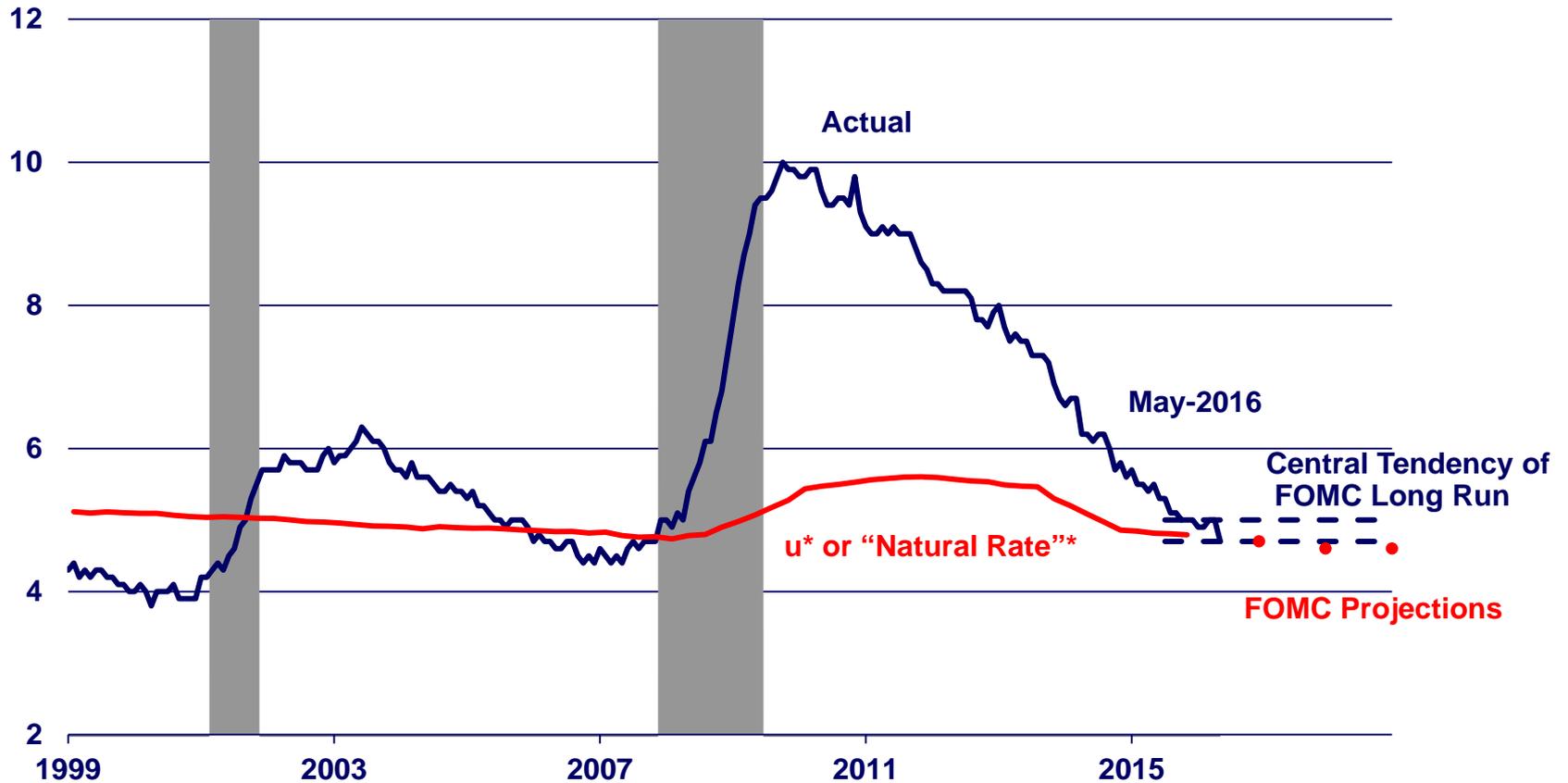


Note. Results expressed as differences from history and the October 2013 Blue Chip forecasts.

The Macroeconomic Effects of the Federal Reserve's Unconventional Monetary Policies;  
Eric M. Engen, Thomas Laubach, and David Reifschneider. FEDS WP 2015-005

# Unemployment Rate

## Unemployment Rate (percent)



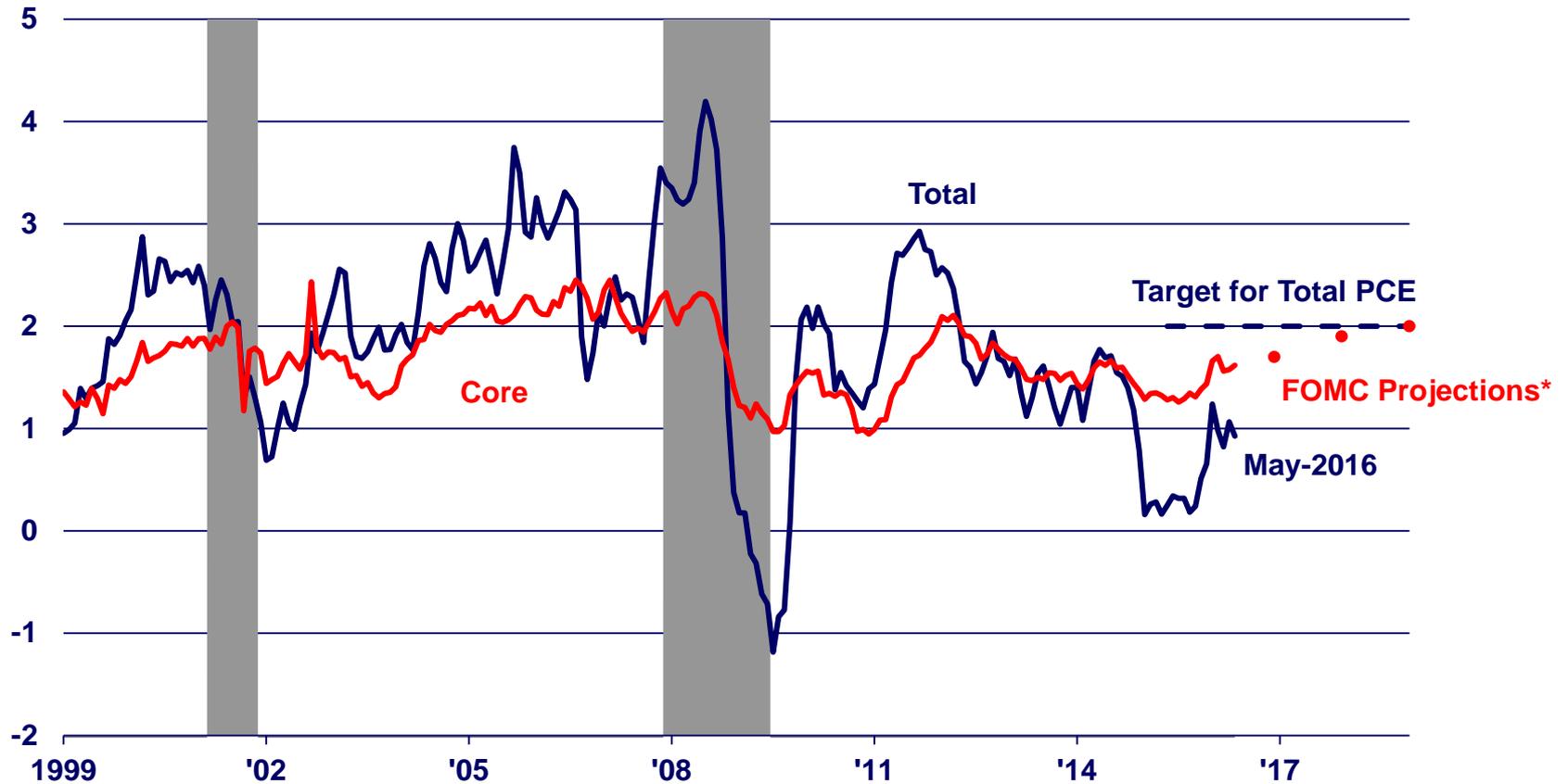
\*FRBCHI staff estimate

Projections are the median values from the June 15, 2016 FOMC Summary of Economic Projections.

# Inflation

## PCE Price Index

(12-month percent change in the price index for personal consumption expenditures)



*Projections are the median values from the June 15, 2016 FOMC Summary of Economic Projections.*

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# What Happens When the FOMC Meets?

# What Happens Before the FOMC Meeting?

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- **Board staff prepare and distribute to entire FOMC:**
  - Economic forecast (Tealbook Part A)
  - Monetary policy alternatives (Tealbook Part B)
  - Other analyses
  
- **Regional bank staffs prepare their bank presidents:**
  - Internal forecasts and analyses
  - Study Board staff documents
  - Help bank president prepare commentary on:
    - ◆ Board staff materials
    - ◆ Personal economic outlook and policy views

# What Happens at an FOMC Meeting?

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- **Preliminaries**
  - Administrative matters
  - Often presentation on special topic
- **Report from the “Desk”**
  - NY Fed Markets Group: What’s up in financial markets
- **Tealbook Part A presentation**
  - The economic outlook
- **Financial stability report (quarterly)**
- **“First Go-Around”**: Participants present views on regional and national outlook
  - Supposed to avoid talking about policy; people cheat a little

# What Happens at an FOMC Meeting?

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- **Tealbook Part B presentation: The policy options**
- **“Second Go-Around”:** Policy discussion
  - Participants give views of appropriate policy
- **The Vote: The Chair gives sense of the consensus**
  - Sometimes “word-smith” the FOMC statement
  - Only members vote
- **Post-decision activities**
  - Lunch
  - Sometimes presentation of a special topic
  - The Chair’s press conference (quarterly)

# Communicating Policy Rationale to the Public

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- **Immediately following the FOMC meeting**
  - Statement
  - Press conference and forecasts (quarterly)
- **Soon after meeting**
  - Minutes (3 weeks after meeting)
  - Speeches and testimony
- **Biannually -- Monetary policy report**
- **With a longer lag, meeting documents become public**
  - 5-years: Tealbook
  - 10-years: Transcripts

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# The Current Policy Environment

**Economic projections of Federal Reserve Board members and Federal Reserve Bank presidents under their individual assessments of projected appropriate monetary policy, June 2016**

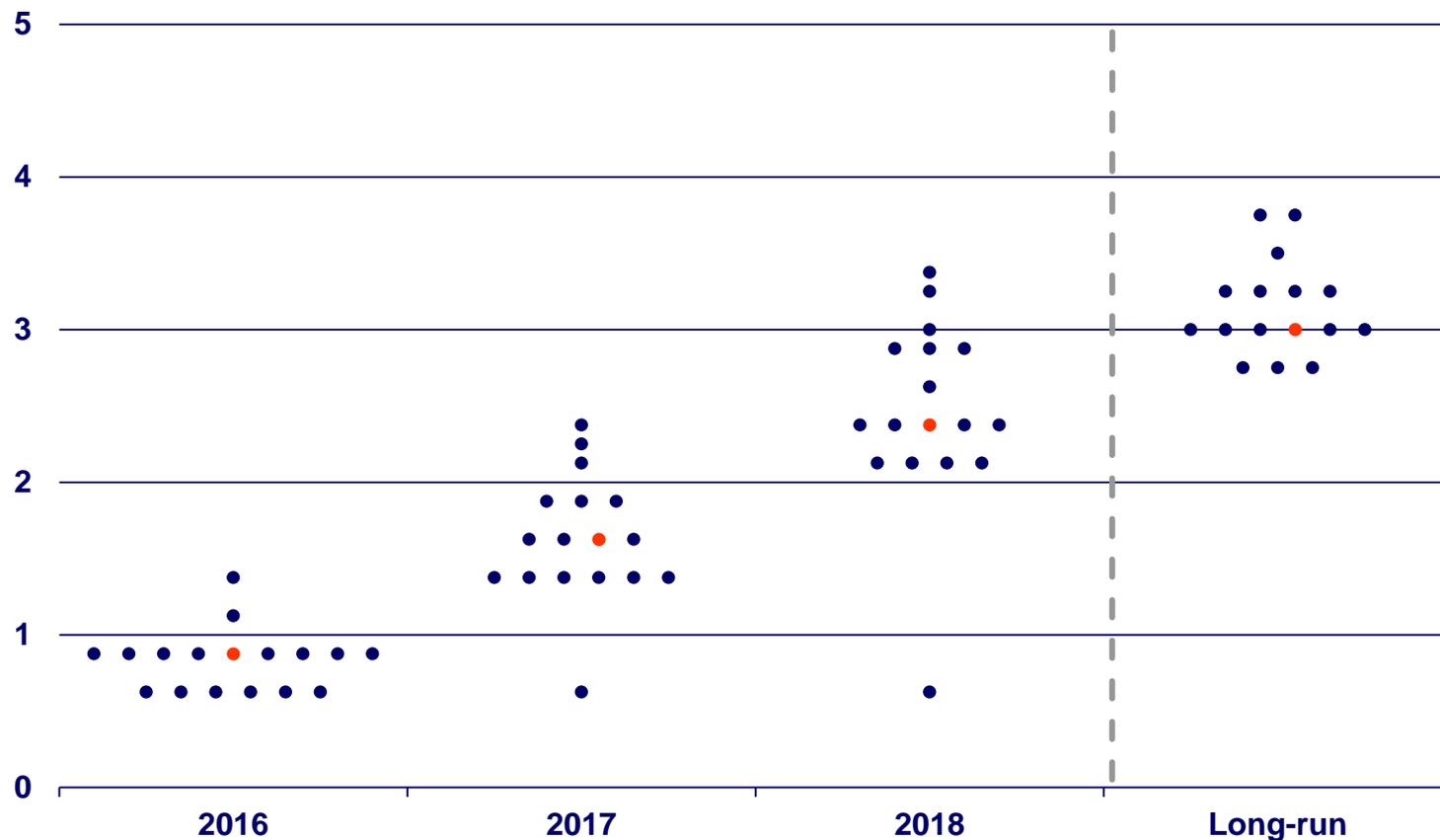
Advance release of table 1 of the Summary of Economic Projections to be released with the FOMC minutes

Percent

Variable	Median <sup>1</sup>				Central tendency <sup>2</sup>				Range <sup>3</sup>			
	2016	2017	2018	Longer run	2016	2017	2018	Longer run	2016	2017	2018	Longer run
Change in real GDP	2.0	2.0	2.0	2.0	1.9–2.0	1.9–2.2	1.8–2.1	1.8–2.0	1.8–2.2	1.6–2.4	1.5–2.2	1.6–2.4
March projection	2.2	2.1	2.0	2.0	2.1–2.3	2.0–2.3	1.8–2.1	1.8–2.1	1.9–2.5	1.7–2.3	1.8–2.3	1.8–2.4
Unemployment rate	4.7	4.6	4.6	4.8	4.6–4.8	4.5–4.7	4.4–4.8	4.7–5.0	4.5–4.9	4.3–4.8	4.3–5.0	4.6–5.0
March projection	4.7	4.6	4.5	4.8	4.6–4.8	4.5–4.7	4.5–5.0	4.7–5.0	4.5–4.9	4.3–4.9	4.3–5.0	4.7–5.8
PCE inflation	1.4	1.9	2.0	2.0	1.3–1.7	1.7–2.0	1.9–2.0	2.0	1.3–2.0	1.6–2.0	1.8–2.1	2.0
March projection	1.2	1.9	2.0	2.0	1.0–1.6	1.7–2.0	1.9–2.0	2.0	1.0–1.6	1.6–2.0	1.8–2.0	2.0
Core PCE inflation <sup>4</sup>	1.7	1.9	2.0		1.6–1.8	1.7–2.0	1.9–2.0		1.3–2.0	1.6–2.0	1.8–2.1	
March projection	1.6	1.8	2.0		1.4–1.7	1.7–2.0	1.9–2.0		1.4–2.1	1.6–2.0	1.8–2.0	
Memo: Projected appropriate policy path												
Federal funds rate	0.9	1.6	2.4	3.0	0.6–0.9	1.4–1.9	2.1–2.9	3.0–3.3	0.6–1.4	0.6–2.4	0.6–3.4	2.8–3.8
March projection	0.9	1.9	3.0	3.3	0.9–1.4	1.6–2.4	2.5–3.3	3.0–3.5	0.6–1.4	1.6–2.8	2.1–3.9	3.0–4.0

# Appropriate Pace of Policy Firming

## Federal Funds Rate at Year-End (percent)



Source: Interest rate projections are from the June 15, 2016 FOMC Summary of Economic Projections.  
Red dots indicate the median projection.

# FOMC Communications: Data Dependence

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- **The actual path of the federal funds rate will depend on the economic outlook as informed by incoming data**
- **Realized and expected conditions relative to maximum employment and 2 percent inflation**
- **Take account a wide range of information**
  - Labor market conditions, inflation pressures and inflation expectations, and financial and international developments
  - Risks to the outlook

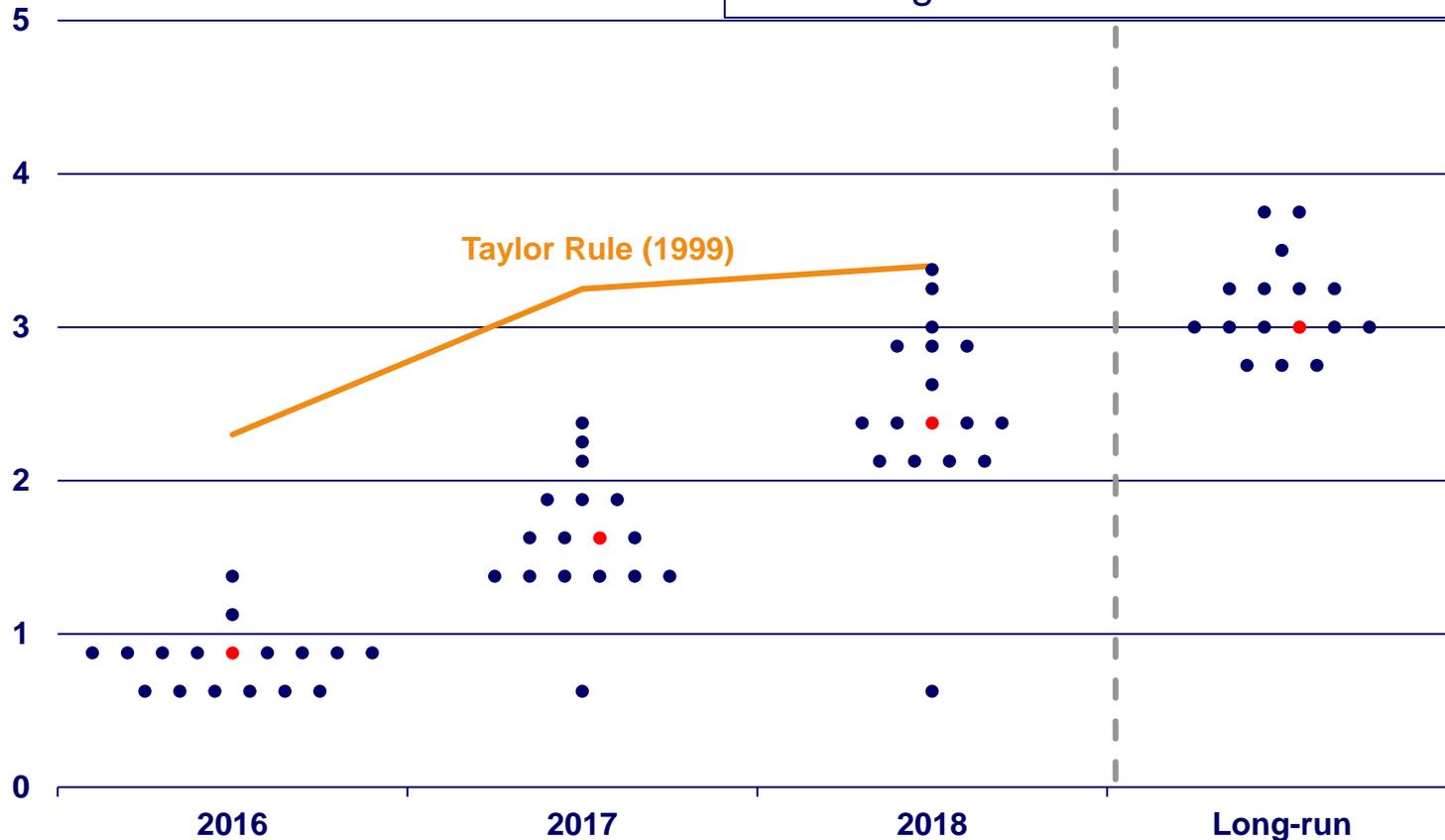
# Appropriate Pace of Policy Firming

Federal Funds Rate at Year-End  
(percent)

**Taylor Rule (1999)**

$$ffr = r^* + \pi + 0.5 (\pi - \pi^*) + 1.0 (y - y^*)$$

SEP Long-run:  $r^* = 1$     $\pi^* = 2$     $u^* = 4.8$



Source: Interest rate projections are from the June 15, 2016 FOMC Summary of Economic Projections.  
Red dots indicate the median projection.

# FOMC Communications: Path Likely Gradual

- **The Committee expects:**
  - **That economic conditions will evolve in a manner that will warrant only gradual increases in the federal funds rate;**
  - **The federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run**

# Why Below the Taylor Rule?

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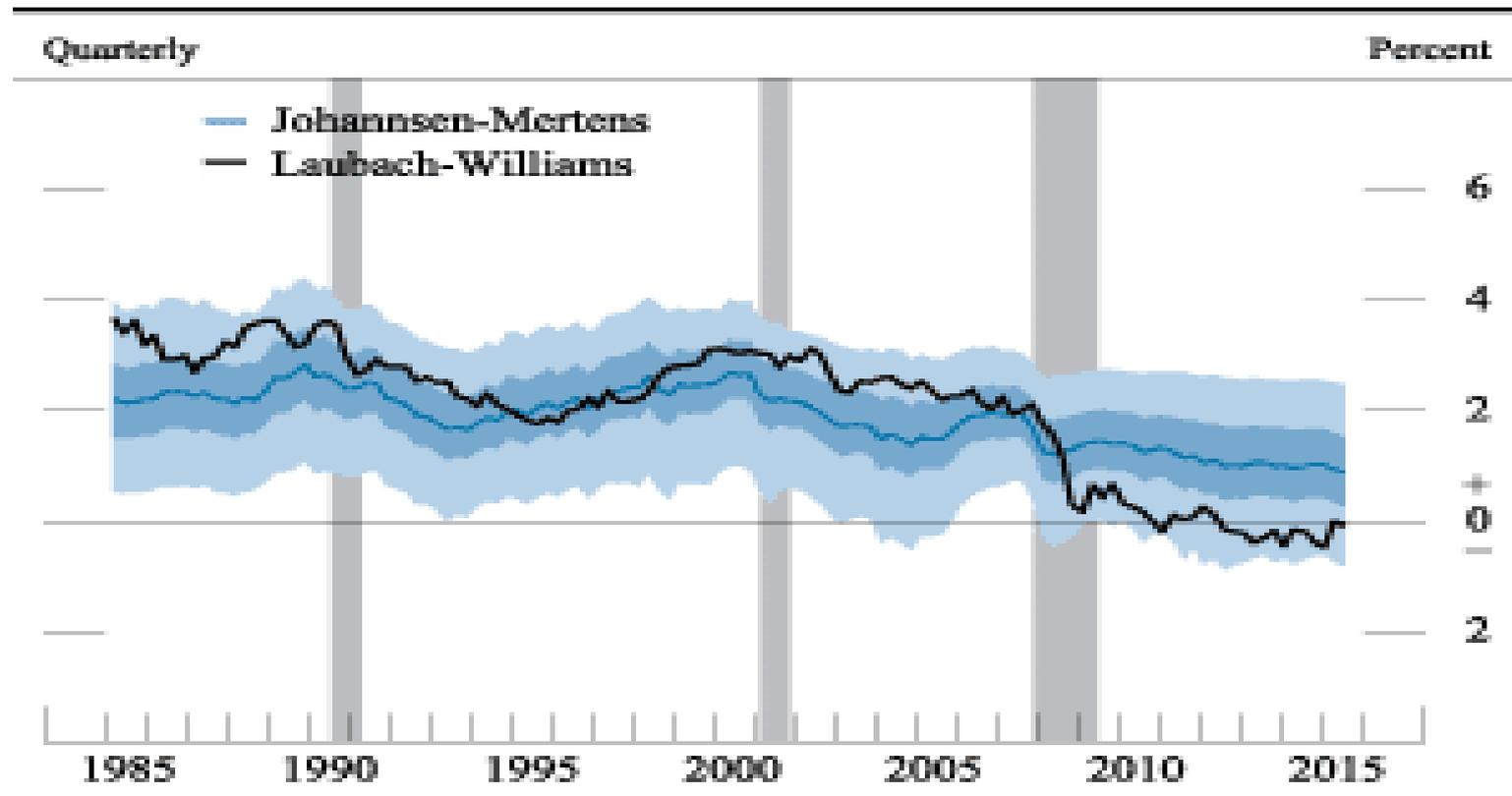
- **$r^*$  below its long-run level**

- Headwinds reducing aggregate demand
- Slow international growth, dollar, residual fallout from financial crisis, uncertainty and precautionary behavior

- **Risk management**

# Model Estimates of $r^*$

## A. Estimates of the neutral real rate in the longer run



Note: The data extend through 2015:Q3. For the Johanssen-Mertens model, at each date, the parameters of the model and the longer-run equilibrium real rate are jointly estimated using data up to that date. For the Laubach-Williams model, the parameters are estimated on the entire data sample, but estimates of the longer-run equilibrium real rate use data only up to the date of interest. Shaded regions are 50 and 90 percent uncertainty bands from the Johanssen-Mertens model. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic

# Risk Management

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- **Some participants think forecast risks weighted to downside for both growth and inflation**
- **Policy options asymmetric as well**
  - Little room to loosen conventional policy to counter downside shocks
  - Ample room to tighten policy if inflationary pressures rise too much
- **Risk management thus prescribes accommodative policy**
  - Provide a buffer against possible future downside shocks that might otherwise drive us back to the effective lower bound

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# Appendix

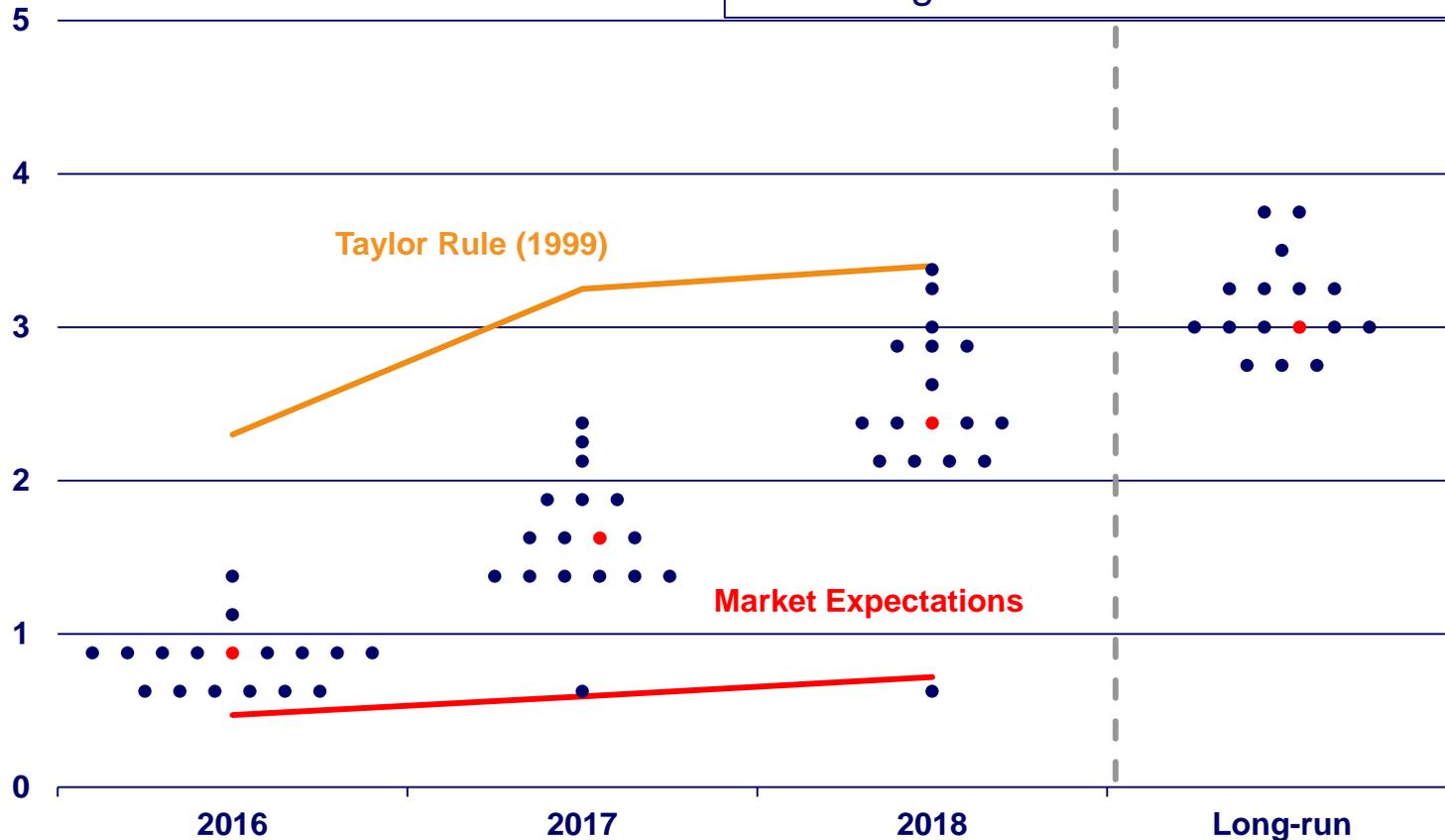
# Appropriate Pace of Policy Firming

Federal Funds Rate at Year-End  
(percent)

**Taylor Rule (1999)**

$$\text{ffr} = r^* + \pi + 0.5 (\pi - \pi^*) + 1.0 (y - y^*)$$

SEP Long-run:  $r^* = 1$     $\pi^* = 2$     $u^* = 4.8$



Source: Interest rate projections are from the June 15, 2016 FOMC Summary of Economic Projections. Red dots indicate the median projection. Market expectations are from OIS futures as of June 17, 2016.

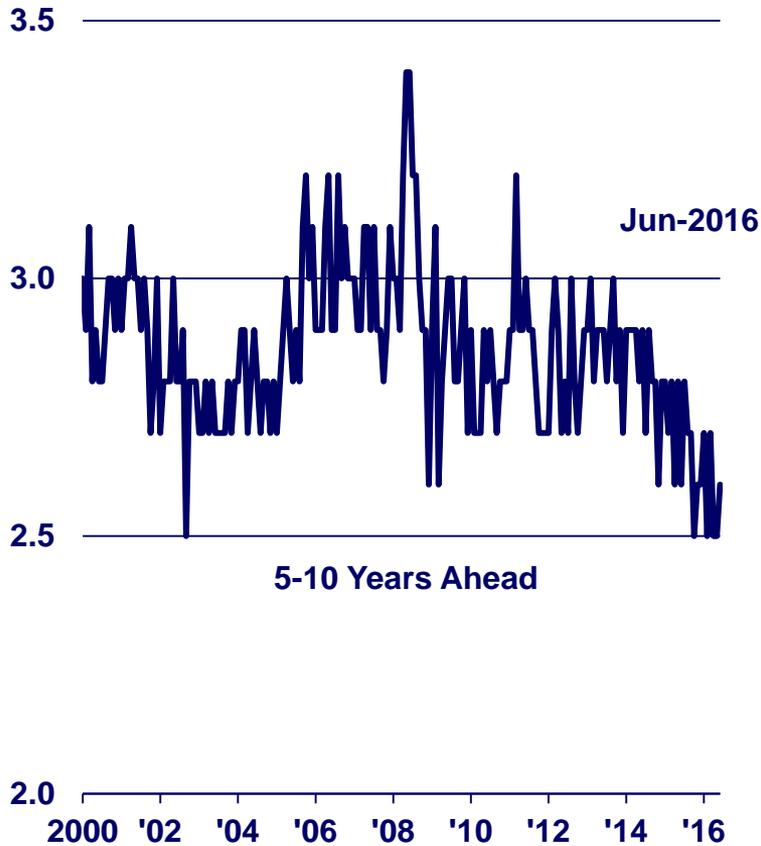
# Inflation Outlook Still Quite Uncertain

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- **Energy price and dollar stabilization should raise inflation**
  - But only to roughly 1¾ percent
- **Tightening labor market should support higher inflation**
  - Strength and timing very uncertain
- **However, soft inflation expectations raise concerns about full recovery to target**
  - Michigan household survey 5 to 10 year expectations and Professional Forecasters 10 year forecast are low
  - Financial market measures of inflation compensation are quite low
- **Moreover, low global inflation creates headwinds in the U.S.**
  - Inflation is below target in all major advanced economies

# Survey-Based Inflation Expectations Are Low

**University of Michigan Median Inflation**  
(percent)



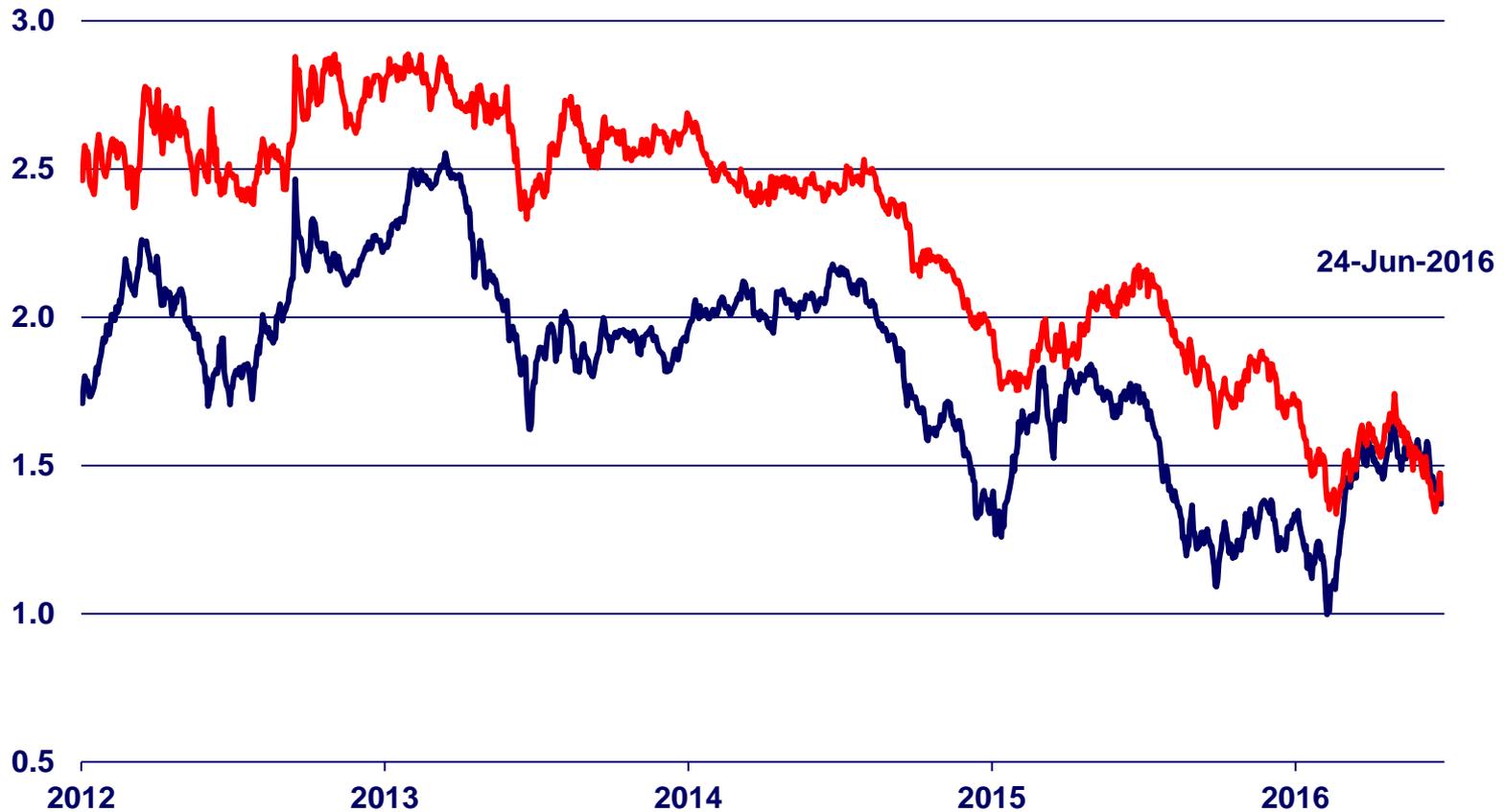
**Survey of Professional Forecasters**  
(percent)



# TIPS Inflation Compensation Is Very Low

## Implicit Inflation Compensation Embedded in TIPS

(percent)



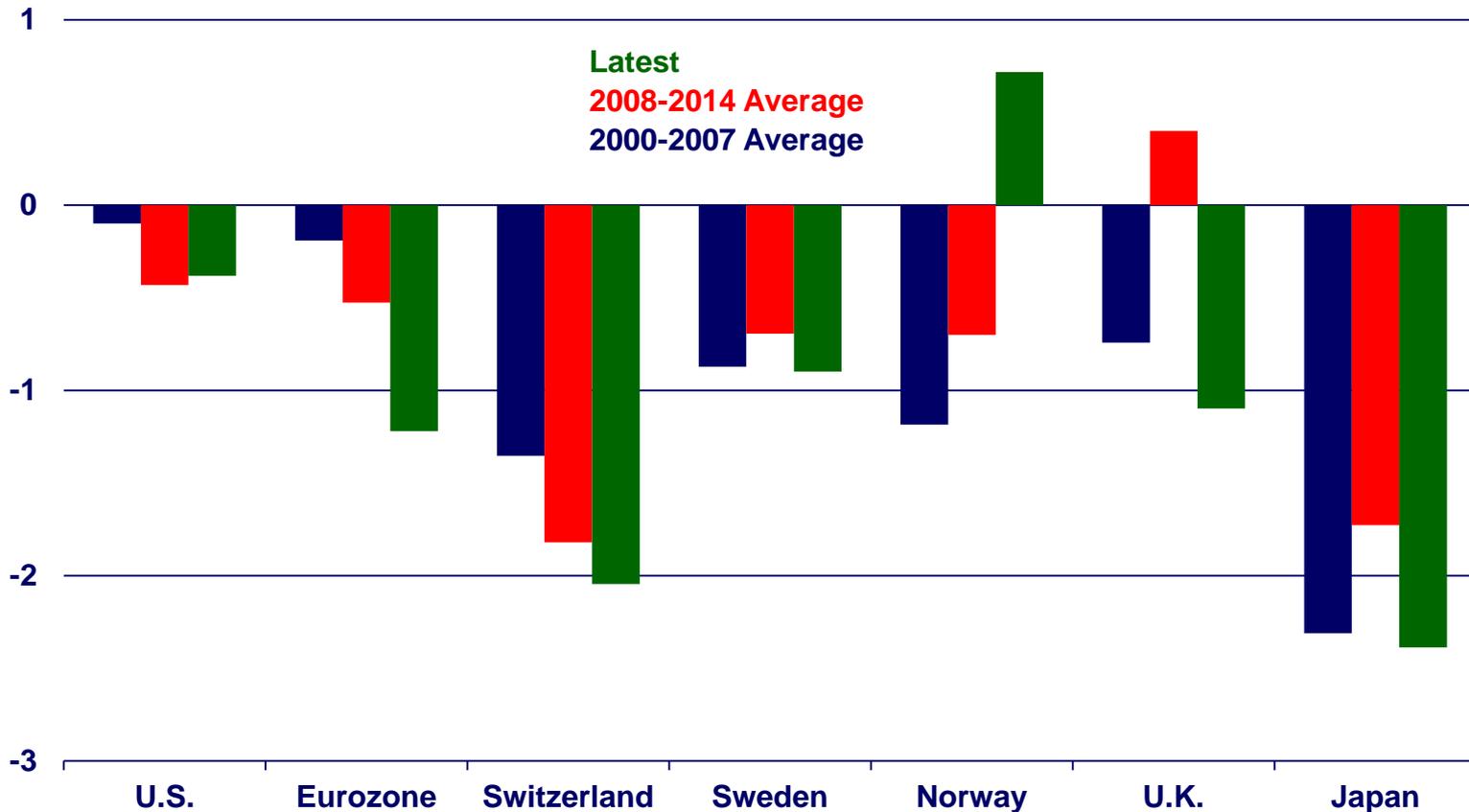
*Quoted data as of 24-Jun-16.*

■ 5 YR: 1.37%  
■ 5-10 YR AHEAD: 1.39%

# Inflation is Too Low Globally

## Consumer Inflation

(year-over-year percent change, deviation from target)



*Consumer inflation in the U.S. is as measured by the core price index for Personal Consumption Expenditures; in other countries, it is measured by the core Consumer Price Index. Latest data are year-over-year changes in the most recently published monthly price index.*

# Lower Potential Output Growth

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- **Expect growth to be a little above potential in the near term**
- **FOMC participants' projections of longer run trend growth (long-run potential) have been declining**
- **Many reasons for lower potential output growth**
  - Weak capital investment
  - Slowing population growth
  - Plateauing labor quality
  - Slowing pace of technological improvement
- **Real equilibrium interest rates are lower in an economy with lower potential output growth**