# The Federal Reserve's Current Framework for Monetary Policy: A Review and Assessment

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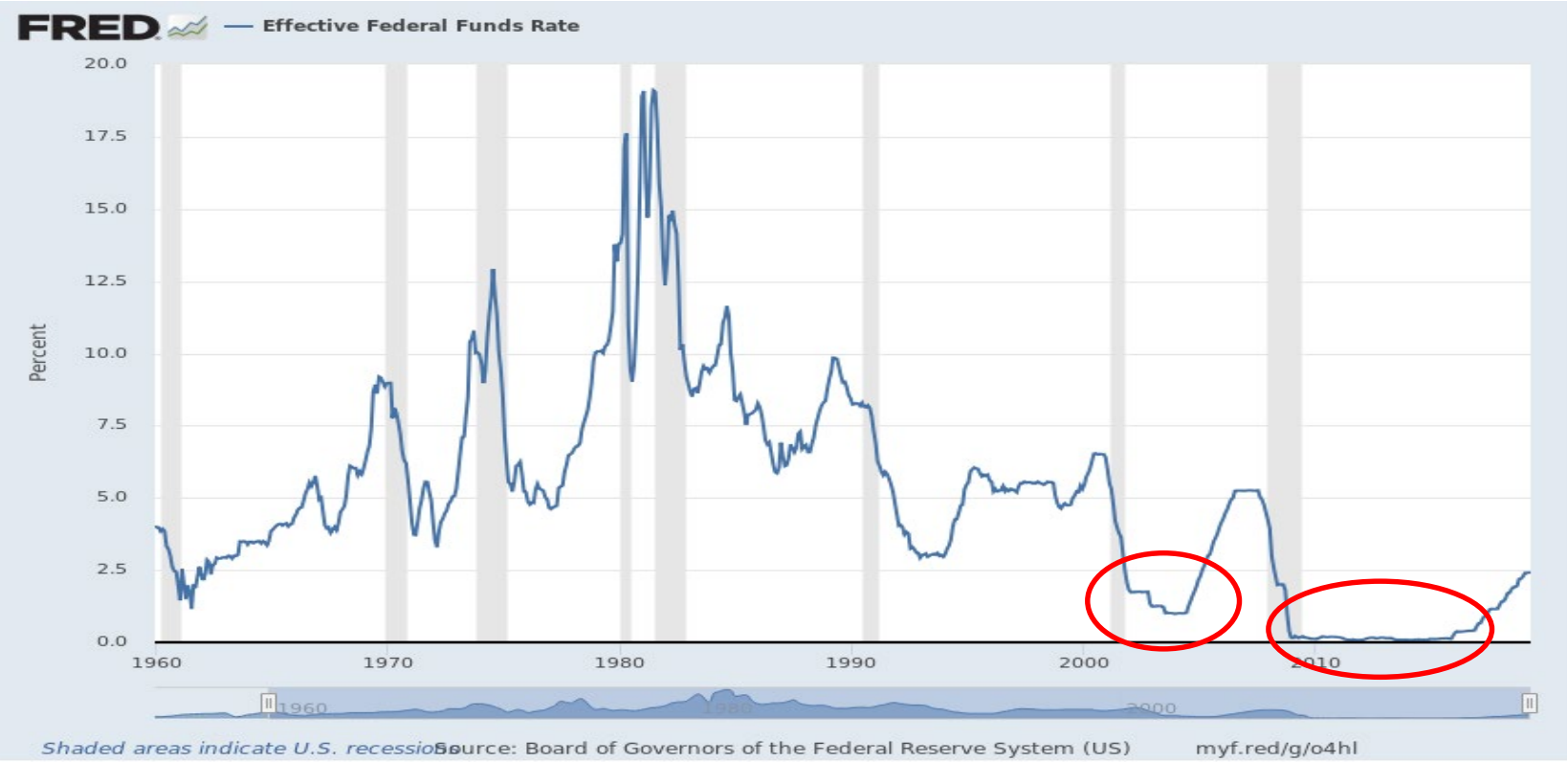
# Fed Framework Review

## Humphrey-Hawkins dual mandate

## 2012 Statement of Principles

- Symmetric 2% inflation target
- Commitment to maximum employment




## Tools to achieve these goals

- Level of **Fed funds rate**
- **Forward guidance** about future Fed policy
- Large scale asset purchases (**LSAPs**)
- Communications and transparency

## Fed Framework Review

- Furher, Olivei, Rosengren, & Tootell (*BPEA* Sept. 2018)
- Internal process (Chung et al 2019, etc.)
- Public process

# Outline

1. Background and introduction
2. The current long-run framework for monetary policy
3. Macro environment, 2010-2018
4. Empirical framework, methods, and data
5. Performance under counterfactuals
6. Caveats and Conclusions

# The current long-run framework for monetary policy

- January 2012: Consensus Statement
  "The Committee judges that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate."
- January 2016: Inflation goal referred to as "symmetric" inflation goal
- Commitment to "maximum employment" which is interpreted as NAIRU, but not numerically specified (NAIRU can change)

Levels policy

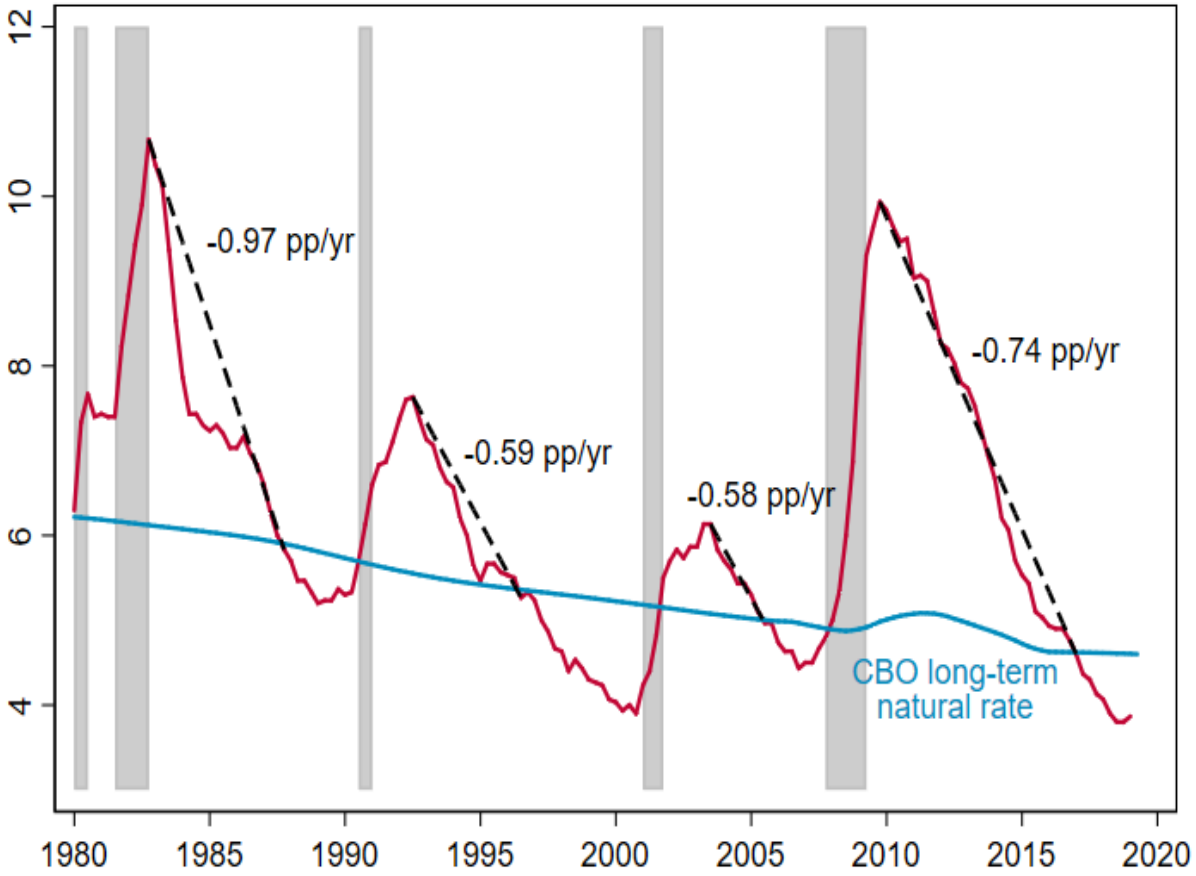
- Federal funds rate raised gradually since December 2015

Slope policy

- Forward guidance: press conferences, speeches, Summary of Economic Projections (SEP – dot plots)
- Large Scale Asset Purchases (LSAPs) (Treasuries and MBS)

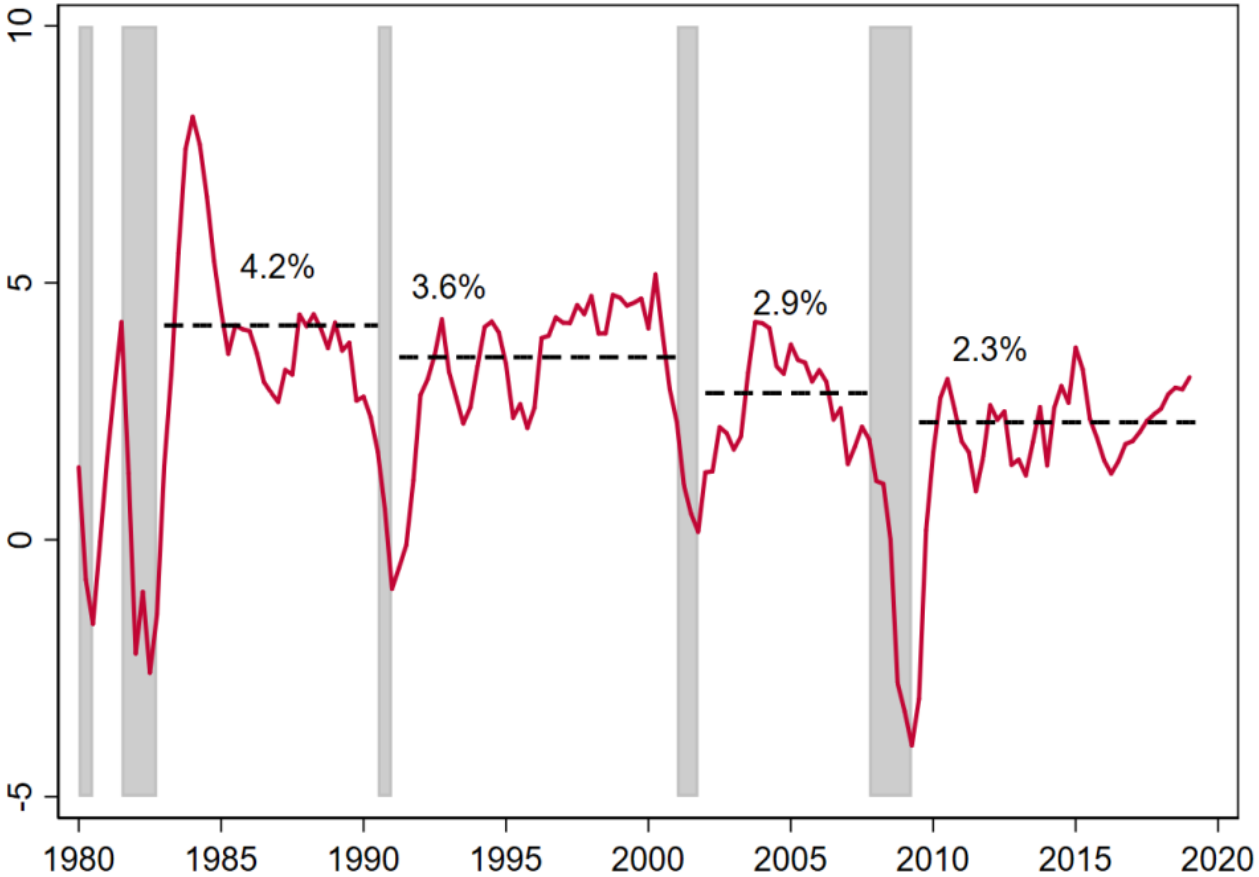
# Backdrop: The Slow Recovery

## Unemployment rate, 1980-2019




Dashed line is trend from peak unemployment rate to CBO NAIRU. Shading denotes NBER-dated recessions.

## 4-quarter GDP growth, 1980-2019



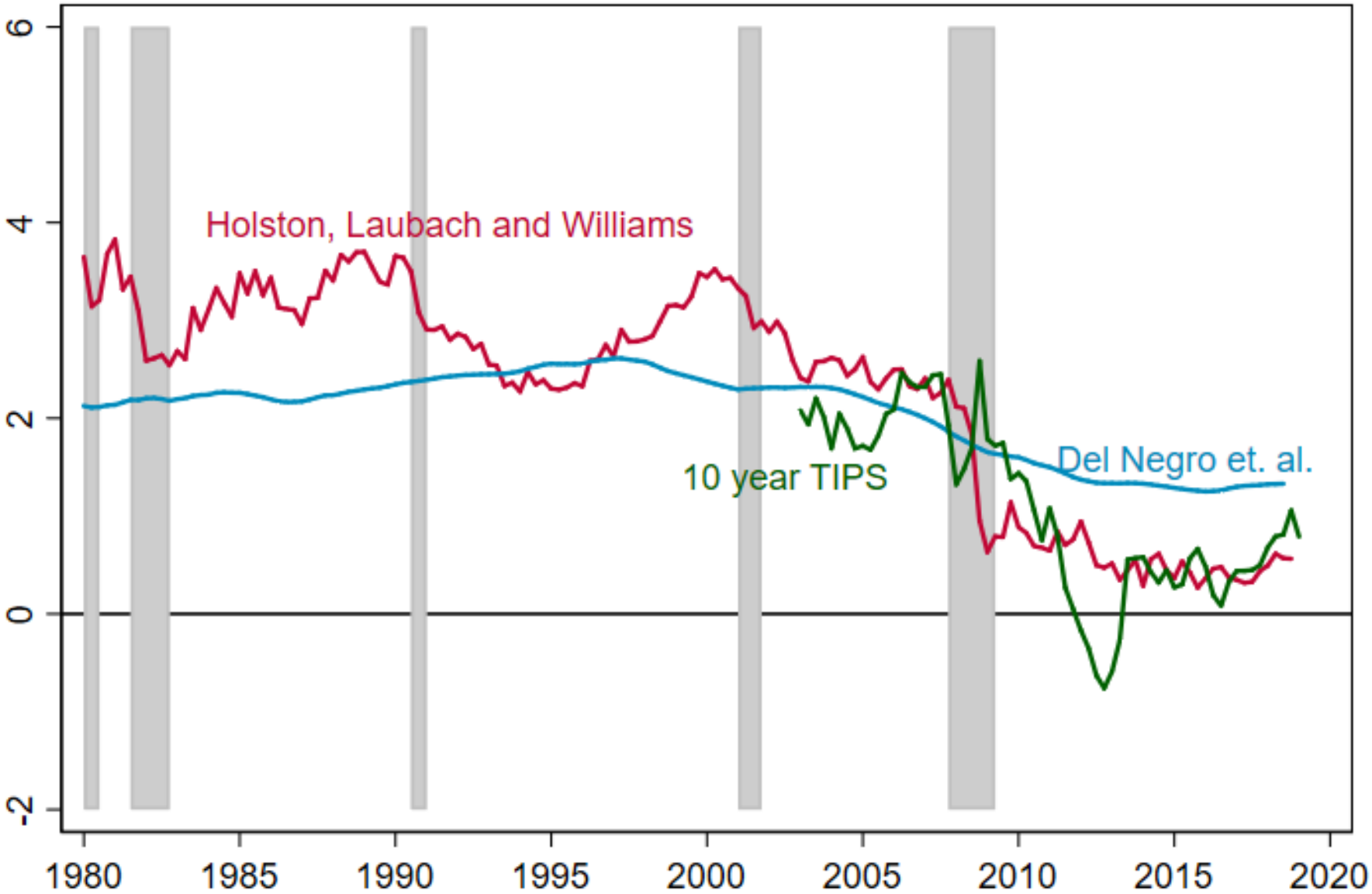

Dashed line is mean growth rate over expansion. Shading denotes NBER-dated recessions.

## Headwinds to GDP growth:

- Baby boom retirement (demographic LFPR decline)
- Productivity slowdown (TFP)
- Fiscal headwinds, until 2018

# The Decline in R*

**Two estimates of the long-term equilibrium real rate of interest (R*) & the yield on 10-year TIPS**




Sources: Holston, Laubach, and Williams (2017), updated, and Del Negro et. al (2017), updated; TIPS: FRED. Shading denotes NBER-dated recessions.

# Empirical Model

## Two monetary policy interventions (shocks)

- Level shock: Change level of Fed funds rate
- Slope shock: Change slope of Treasury yield curve (10 year-FF spread)

## Key elements of model

- SVAR-IV estimate of response of unemployment gap to policy change in (a) Fed funds rate and (b) slope of yield curve
  - Instruments: announcement-window changes in interest rates (Kuttner (2001)) (Gertler-Karadi (2015), extended to two policy
- Estimate response of inflation to the unemployment rate using a hybrid New Keynesian Phillips Curve
  - Instruments: announcement-window changes in interest rates (Kuttner (2001))

## Other complementary approaches:

- DSGE model (Chen et al. (2012), Del Negro et al. (2017))
- FRBUS (see Durdu et al. (2013), Engen et al. (2015) Chung et al. (2019))

## IRF of unemployment gap to level, slope shock via SVAR-IV

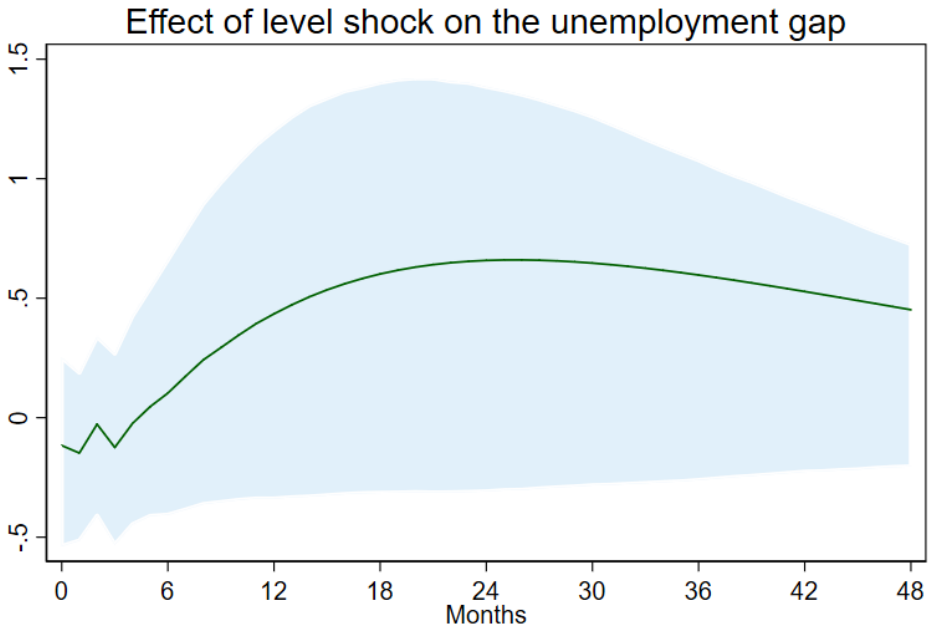
- References: Stock (2008), Stock & Watson (2012, 2018), Mertens & Ravn (2013); Gerlter & Karadi (2015)
- VAR variables: Ugap, FF, 10yr Tbond-FF, Gilchrist- Zakrajšek EBP (updated), reduced-form VAR estimated 1994m2-2019m2
- Instruments:
- Levels shock IV: “Kuttner shock” = FF announcement window change (= target decision – futures-implied expectation), estimated 1994m2-2007m12
- Slope shock IV: residual from regression of announcement-window change in 10-year Treasury yield onto Kuttner shock, estimated 2008m1-2019m2

# Empirical Model: Impulse Response Functions

## Response of the unemployment gap to unit level and slope shocks

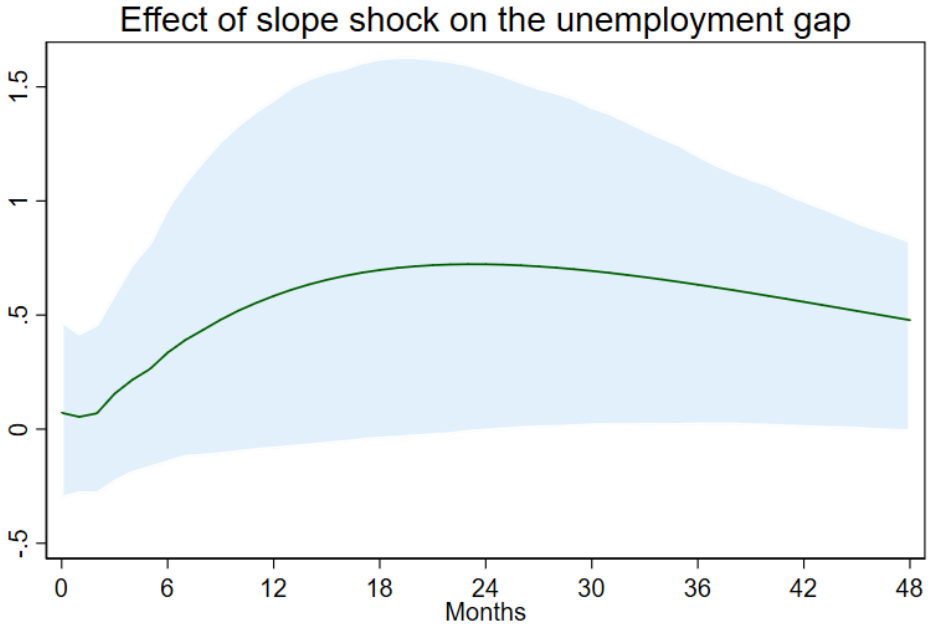
- Level shock increases Fed Funds rate by 1 pp, slope shock increases 10 year-Fed funds spread by 1 pp.

### Level shock
### First stage *F* = 17.0




Estimation is by SVAR-IV, SEs are by parametric bootstrap, shaded area is +/- one standard error.

### Slope shock
### First stage *F* = 5.8

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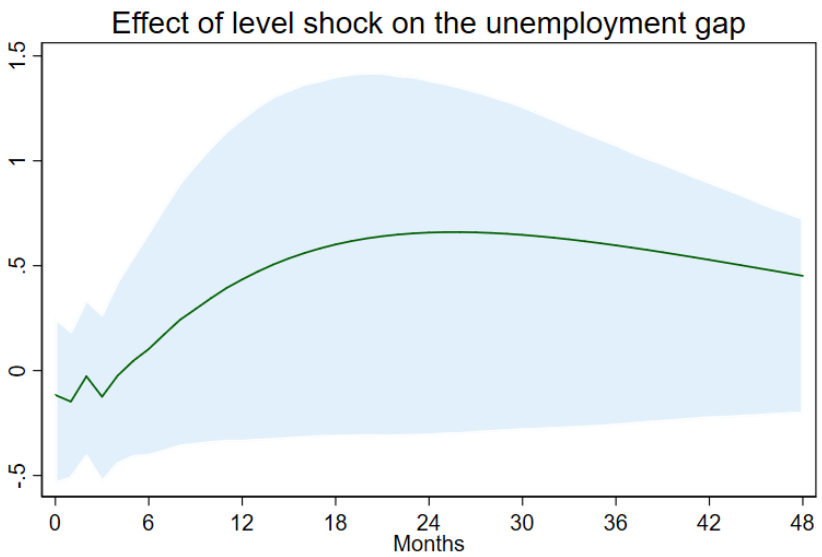
# Empirical Model: Impulse Response Functions

## Level shock

## Slope shock

**SVAR-IV**

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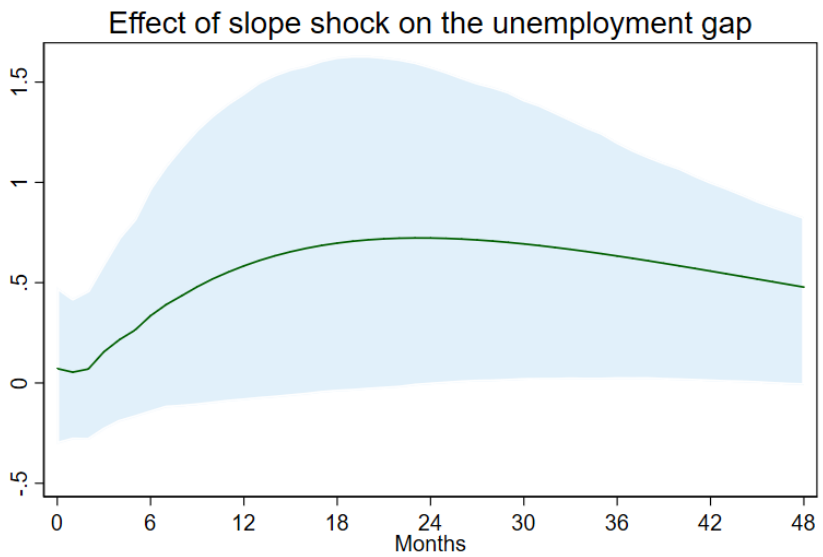


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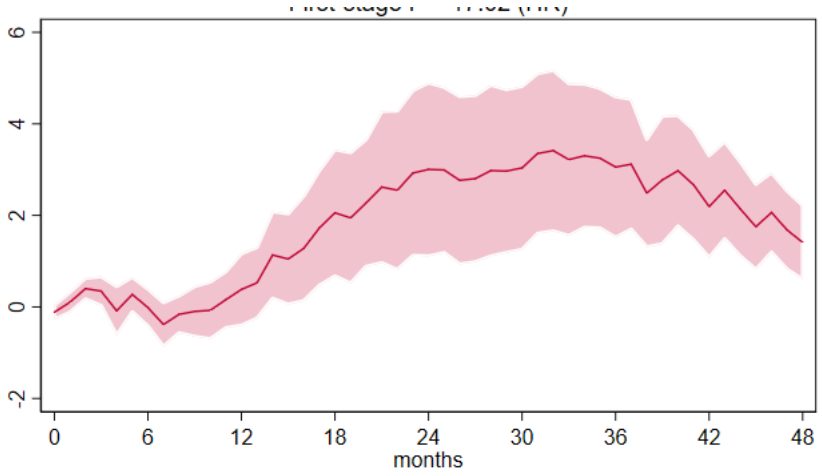
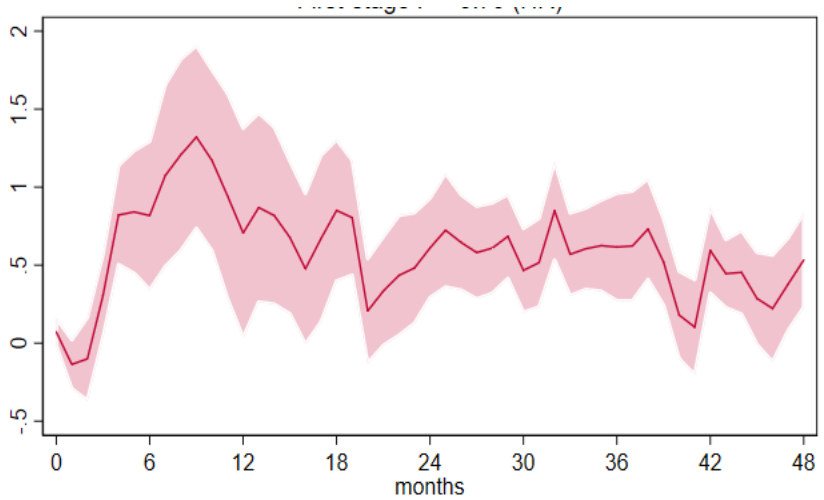
**LP-IV**



## Phillips curve

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f \pi_{t+1}^e + \kappa Ugap_t + e_t$$

- Core PCE inflation
- Michigan survey expectations

- Instruments: modification of Barnichon and Mesters (2019)
  - First three principals components of panel of announcement window changes, 20 different rates (different maturities)
  - These shocks would enter with lags – too many coefficients (many weak instruments). So reduce the number of instruments by (a) 2 EWMA's (0.9, 0.7) and Almon lags (3/maxlag = 12) => two sets of Ivs with (a) 6 IVs and (b) 9 IVs.

# Empirical Model

**Phillips curve**

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f \pi^e_{t+1} + \kappa Ugap_t + e_t$$

| Instrument set (# IVs) | $Ugap_t$ | $\pi_{t+1}$ | $\pi^e_{t+1}$ | $\frac{\kappa}{1-\gamma_b-\gamma_f}$ | First-stage F-effective | J-statistic (p-value) |
|---|---|---|---|---|---|---|
| **A (6)** | -0.094 (0.024) | 0.099 (0.049) | 0.400 (0.092) | -0.187 (0.054) | 43.65 | 4.89 (0.43) |
| **B (9)** | -0.122 (0.024) | 0.055 (0.044) | 0.354 (0.066) | -0.206 (0.043) | 6.94 | 5.18 (0.74) |

**Combined model:** *Ugap* IRF + Phillips curve => joint IRF for *Ugap*, inflation

# Empirical Model

## Simulation structure

- Posit an historical policy hypothetical
- Compute implied monetary policy shocks (level & slope)
  - *See footnote 30 in paper*
- Compute effects on rates of unemployment and inflation

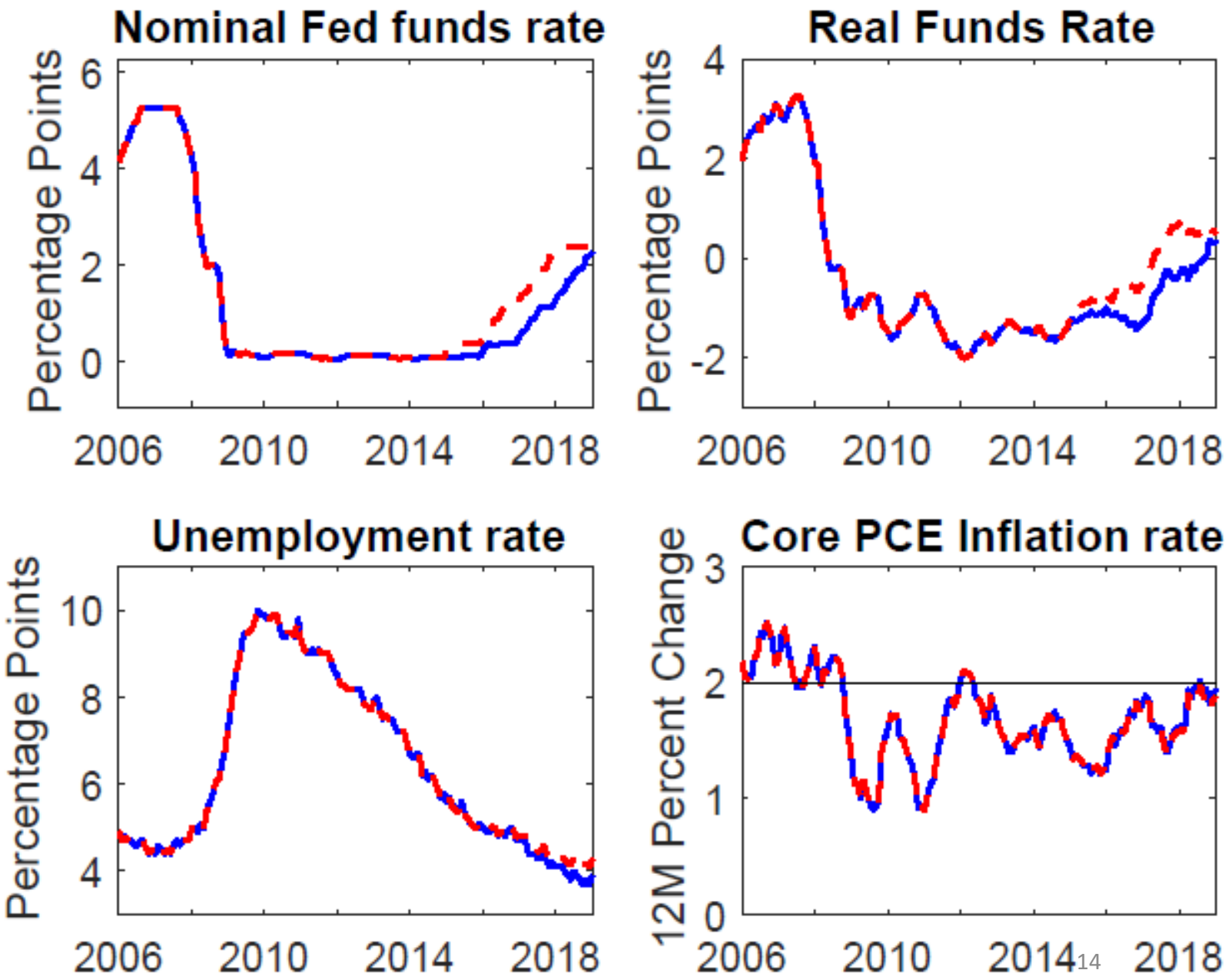
## Policy simulations

A. Earlier or later liftoff
B. No ZLB
C. Alternative LSAPs/forward guidance policies
D. Inherit higher inflation rates, interest rates, and inflation target
E. Temporary price level target
F. Lower for Longer

# Counterfactuals

## Early liftoff

- Fed funds rate lifts off one year earlier (Dec. 2014 instead of Dec. 2015)
- No change in slope policy (LSAPs or forward guidance)




- - - - - - - counterfactual

———— actual

# Counterfactuals

A. Earlier or later liftoff

**B. No ZLB**

C. Alternative LSAP/forward guidance policies

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# Performance Under Counterfactuals

**"Balanced rule" (Taylor (1999) rule), with no ZLB and no LSAPs**

- Calibrate slope policy to undo the effects of actual LSAPs

$$FF_t = 2 + \pi_{t-1}^{(12)} + 0.5\left(\pi_{t-1}^{(12)} - 2\right) - 2 * Ugap_{t-1}$$

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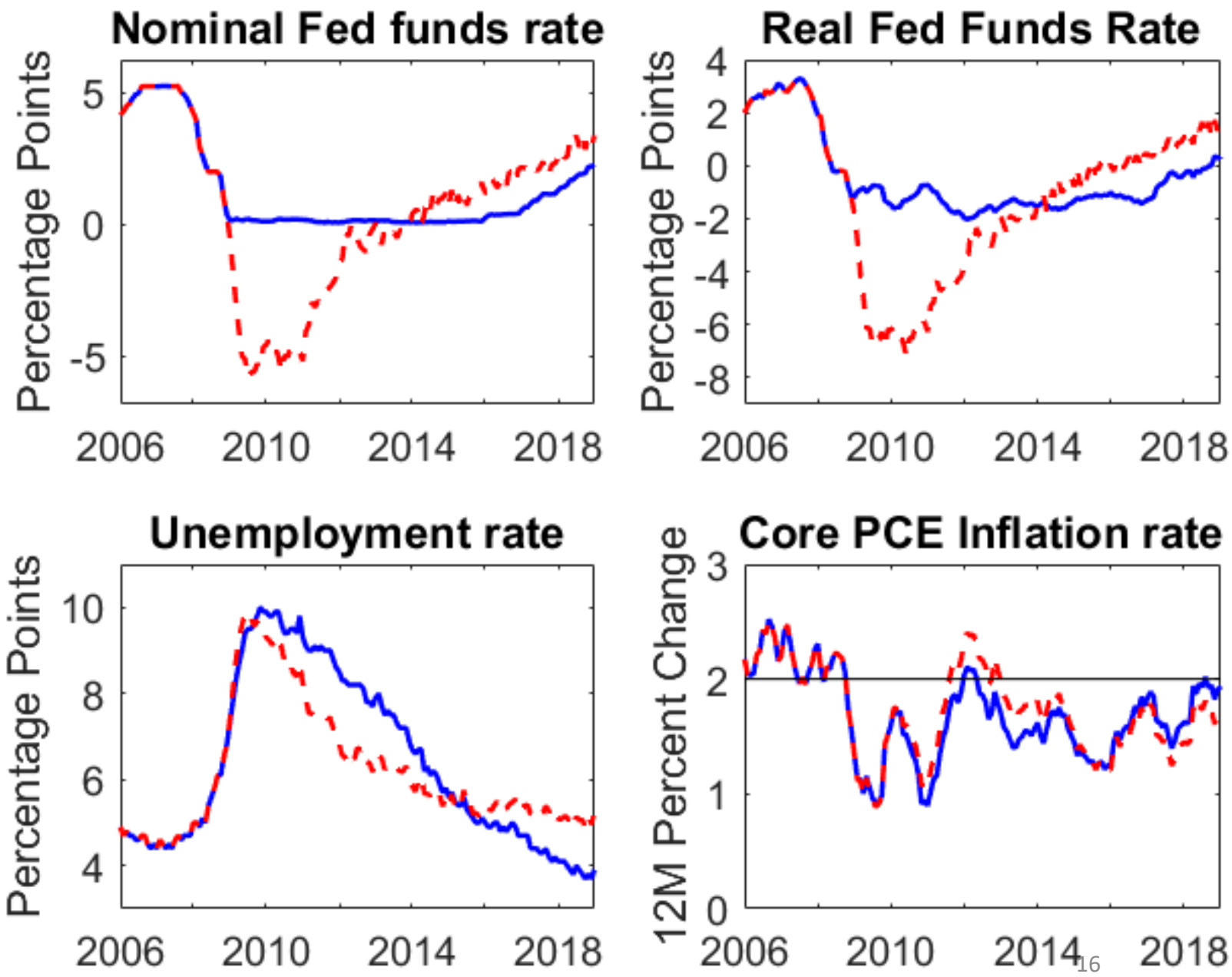

# Counterfactuals

A. Earlier or later liftoff

B. No ZLB

**C. Alternative LSAP/forward guidance policies**

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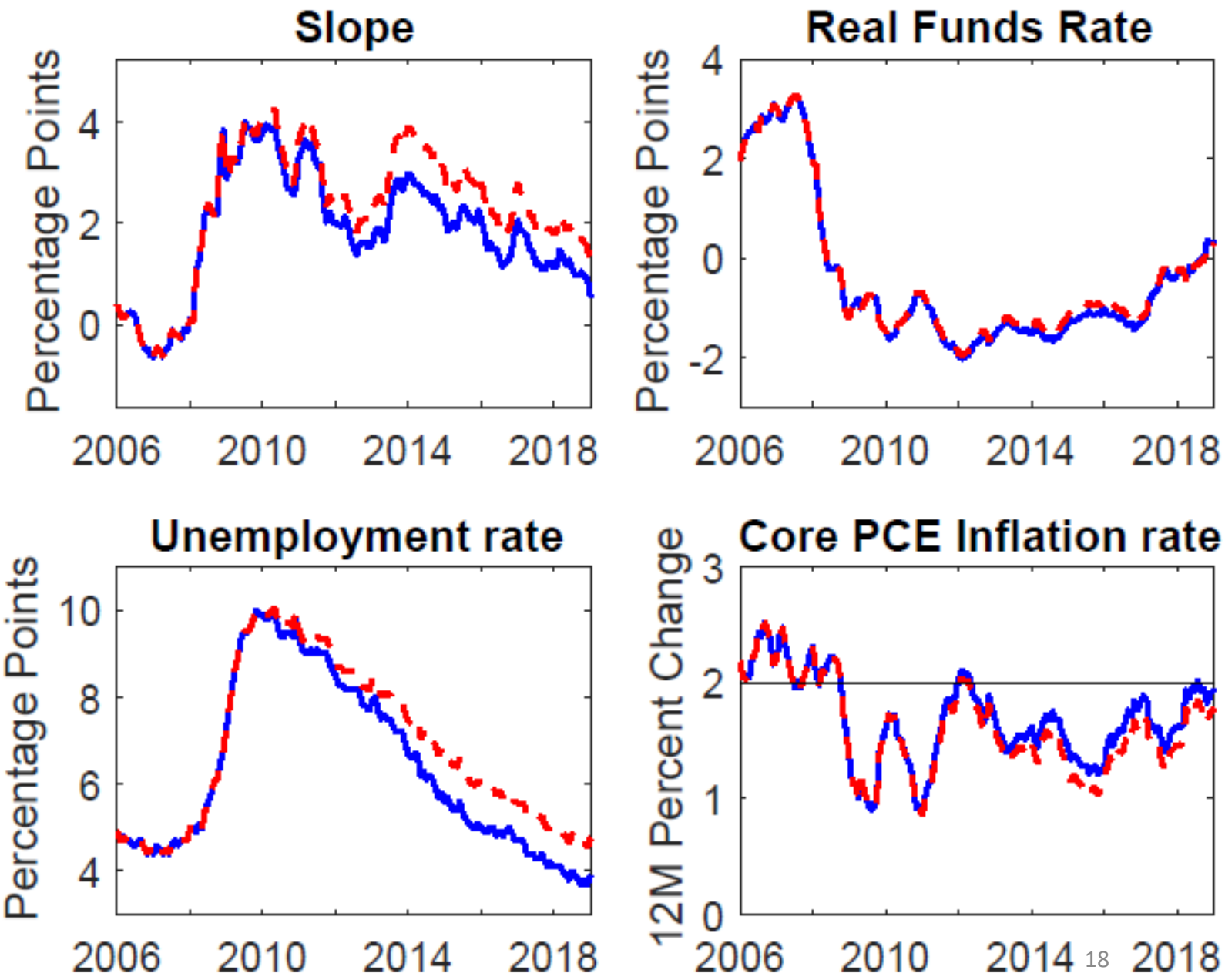
# Performance Under Counterfactuals

## No LSAPs

- Historical Fed funds path

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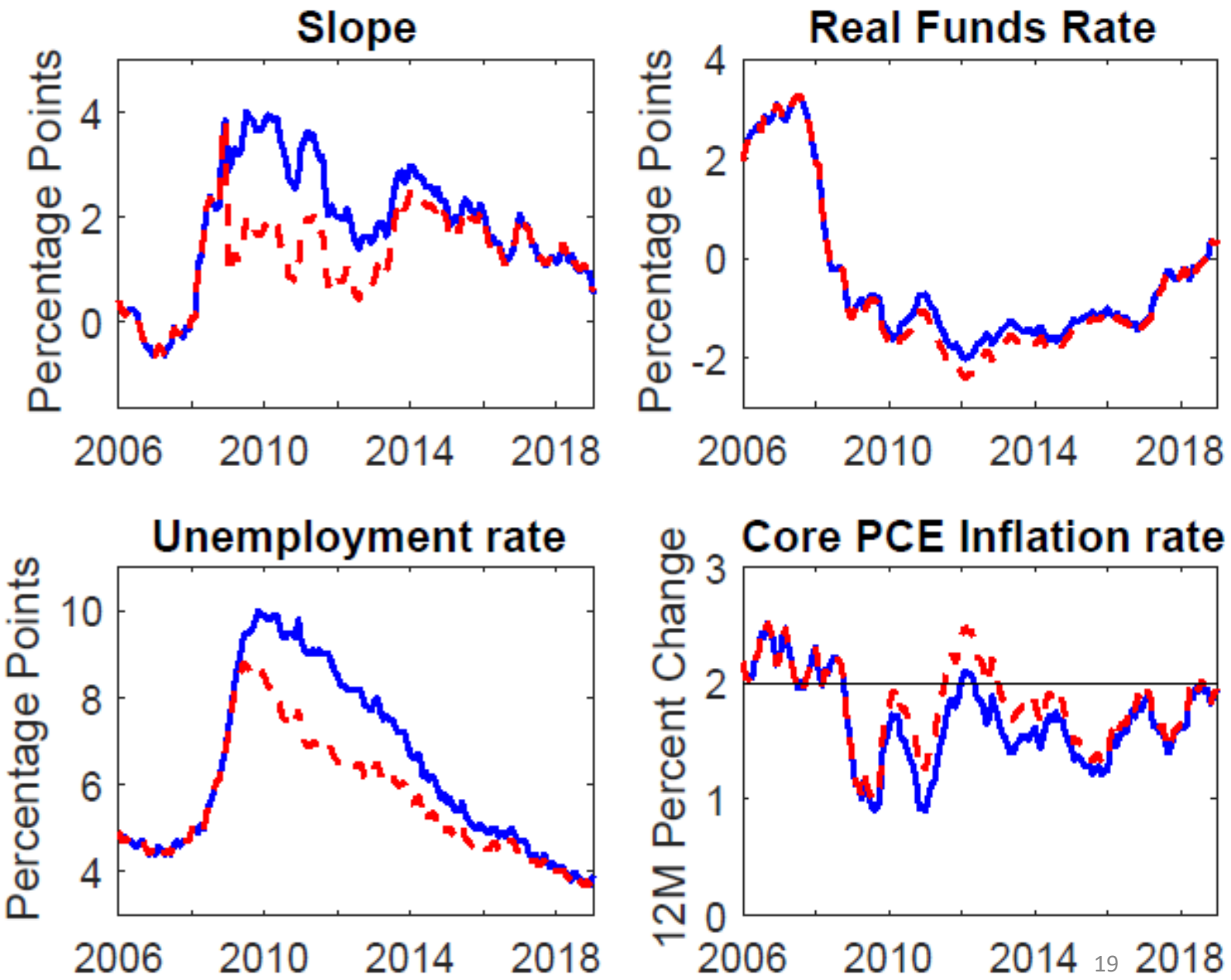
# Performance Under Counterfactuals

**"Stronger sooner:" flatten yield curve by additional 2pp for 18 months, starting December 2008**

- Historical Fed funds path




- - - - - - - counterfactual

———— actual

# Counterfactuals

A. Earlier or later liftoff

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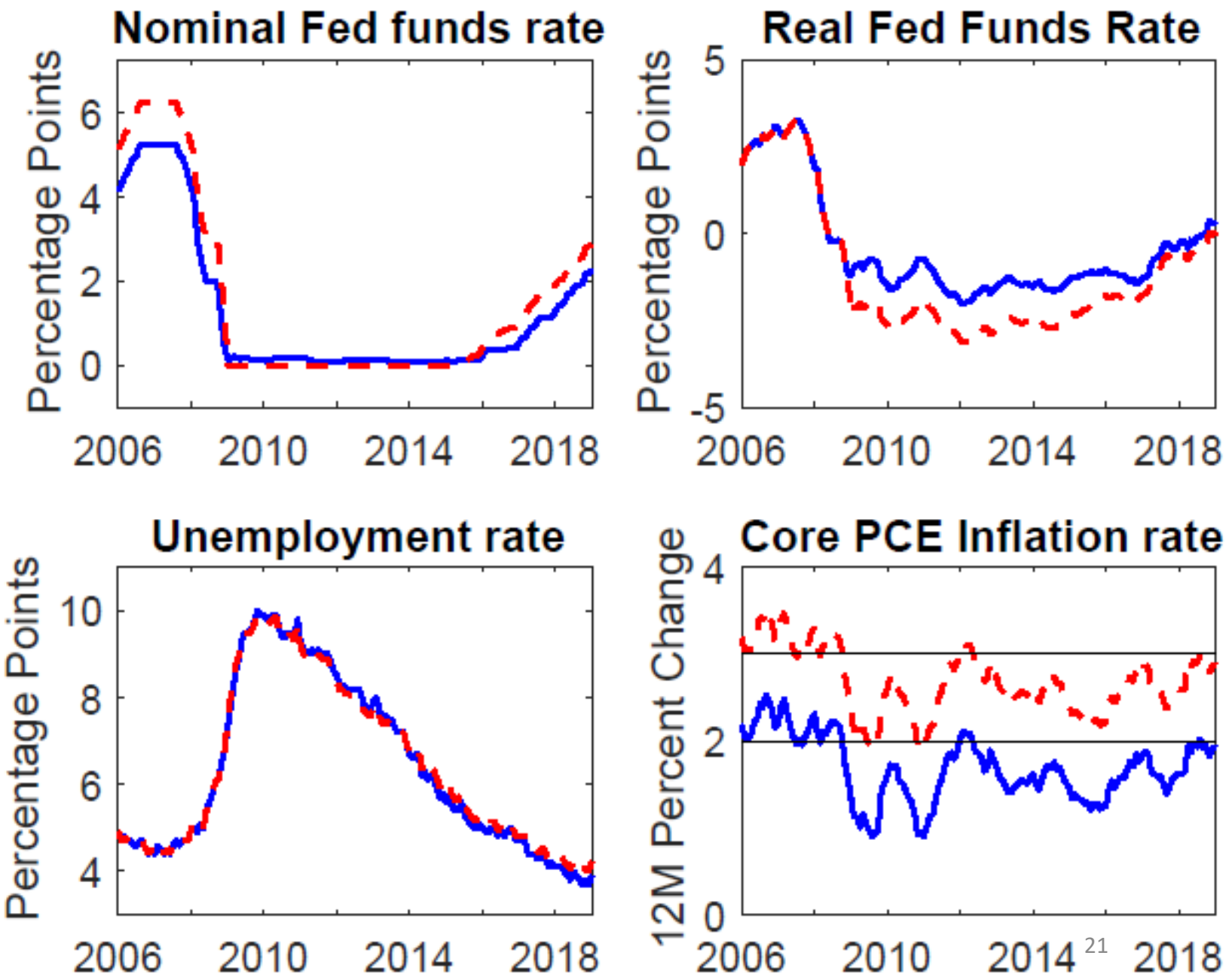
# Performance Under Counterfactuals

**Inherit all nominal rates & inflation target one pp higher ($\pi^* = 3\%$)**
**+ No LSAPs**

- Funds rate liftoff when either:
  - *Ugap* ≤ 1pp, or
  - $\pi \geq \pi^* + 0.5$




- - - - - - - counterfactual
——— actual

# Performance Under Counterfactuals

**Inherit all nominal rates & inflation target one pp higher ($\pi^* = 3\%$)**
**+ Historical slope policy**

- Same LSAPs, forward guidance policy as actual
- Funds rate liftoff when either:
  - *Ugap* ≤ 1pp, or
  - $\pi \geq \pi^* + 0.5$

- Ugap closes 7 quarters earlier (2015q3 instead of 2017q2)

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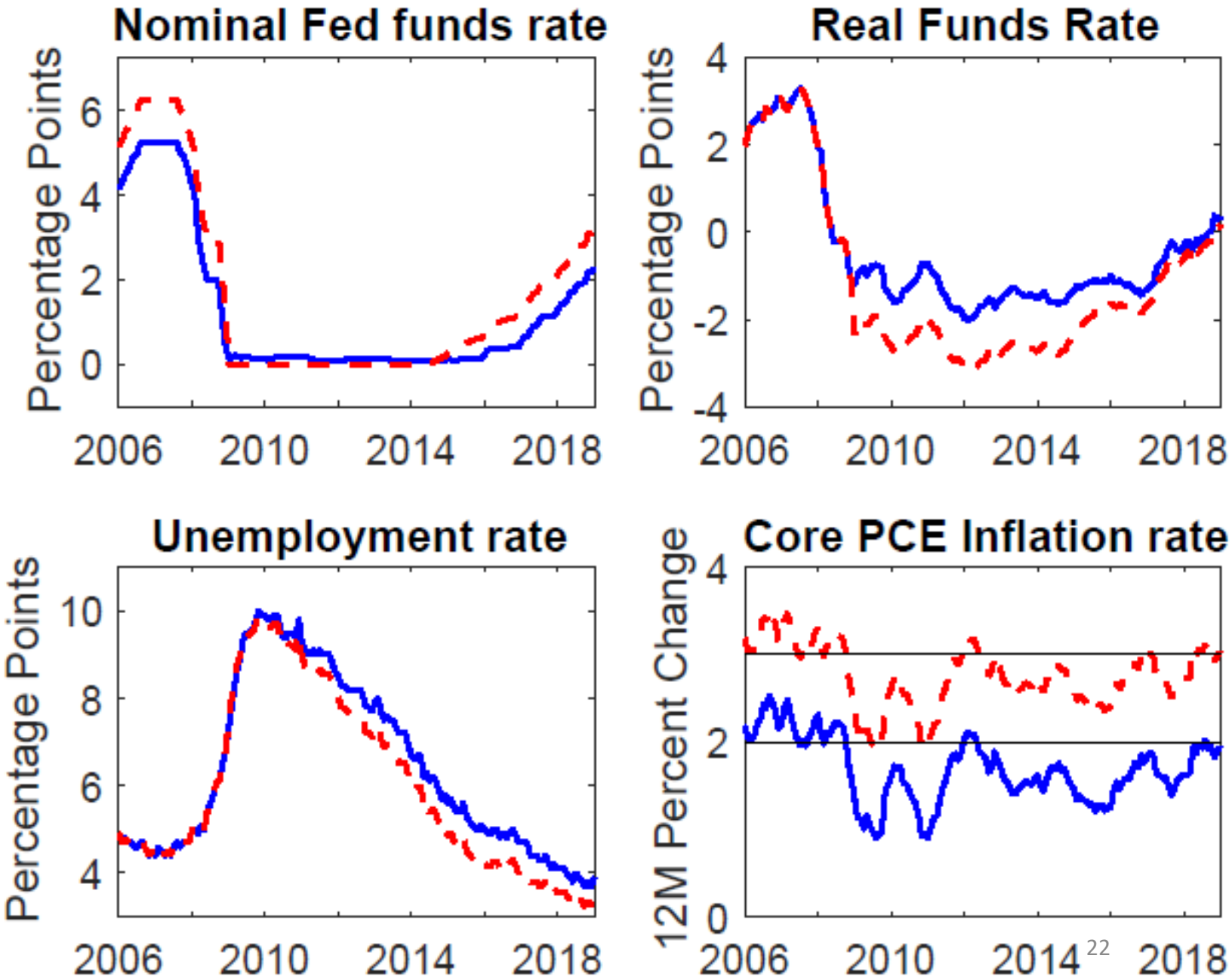
——————— actual



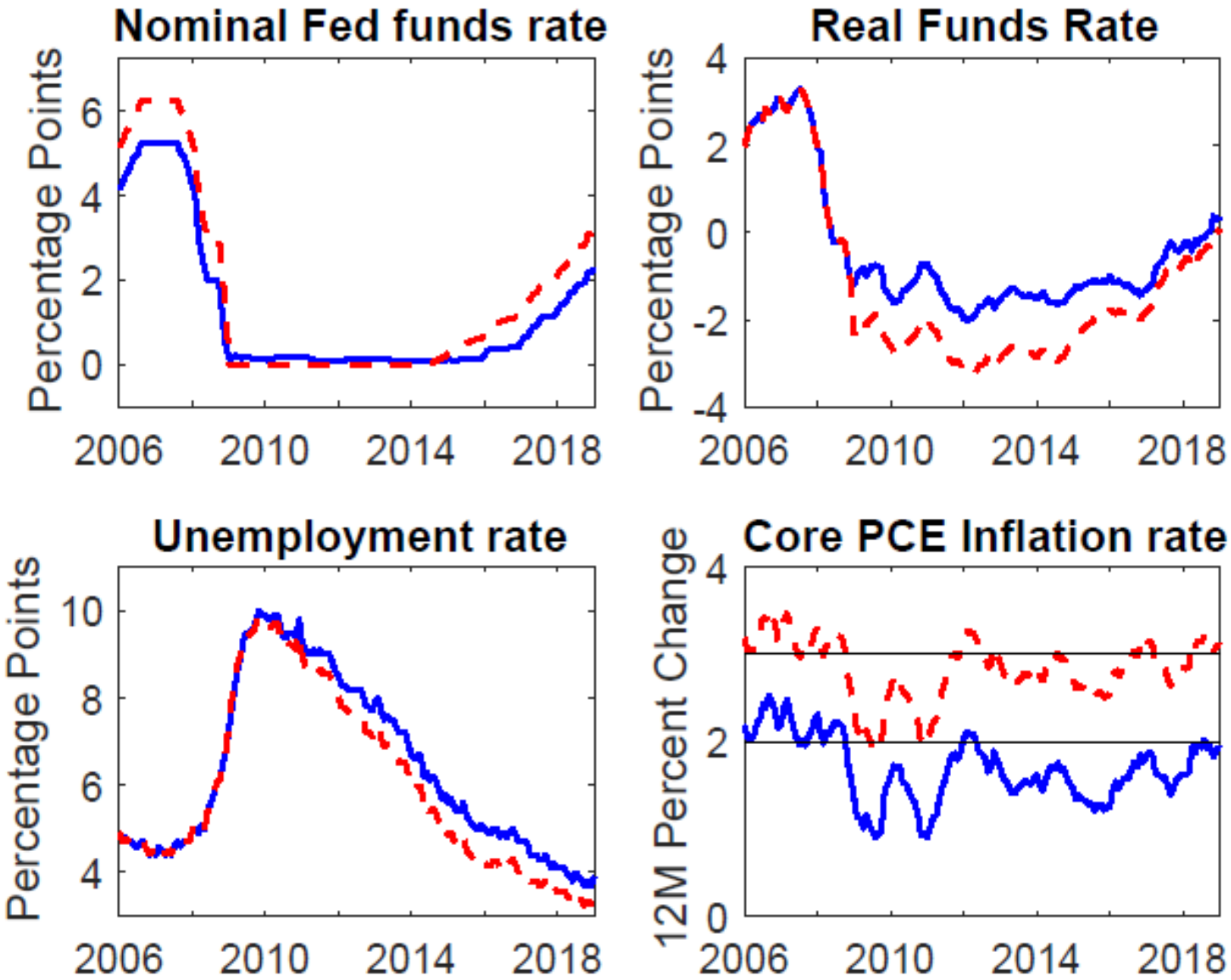
# Performance Under Counterfactuals

**Inherit all nominal rates & inflation target one pp higher ($\pi^* = 3\%$)**
**+ Historical slope policy**

- Steeper Phillips curve (Mcleay & Tenreyro (2019), similar to Barnichon-Mesters (2019), Hopper, Mishkin, Sufi (2018)): long-run slope = -0.37

- Ugap closes 7 quarters earlier (2015q3 instead of 2017q2)

- - - - - - - counterfactual
——— actual



# Performance Under Counterfactuals

**Inherit all nominal rates & inflation target two pp higher ($\pi^* = 4\%$)**

**+ Historical slope policy**

- Same LSAPs, forward guidance policy as actual
- Funds rate liftoff when either:
  - *Ugap* ≤ 1pp, or
  - $\pi \geq \pi^* + 0.5$

- Ugap closes 11 quarters earlier (2014q3 instead of 2017q2)
- Inflation hits target

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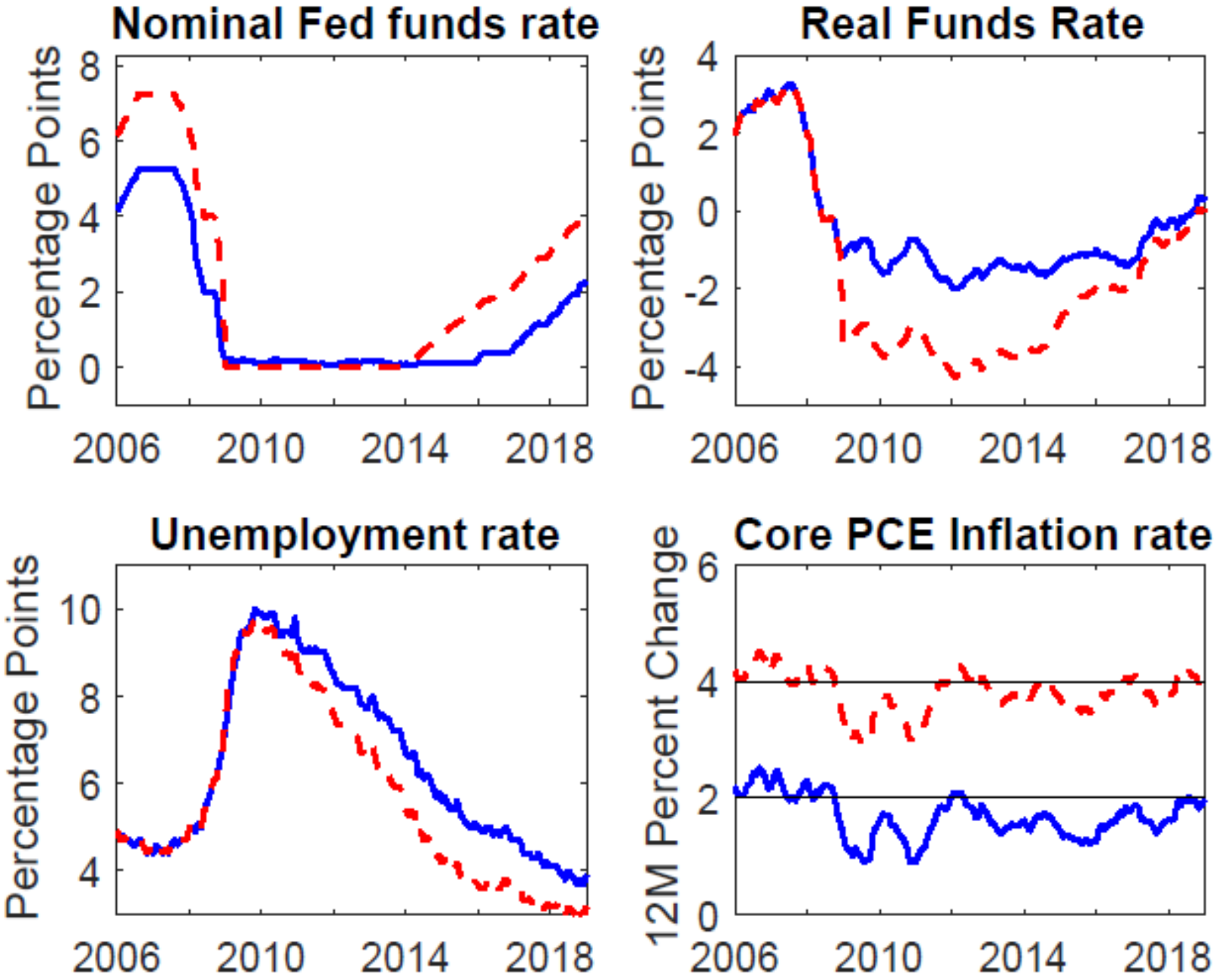
———— actual



# Counterfactuals

A. Earlier or later liftoff

B. No ZLB

C. Alternative LSAP/forward guidance policies

D. Inherit higher inflation rates, interest rates, and inflation target

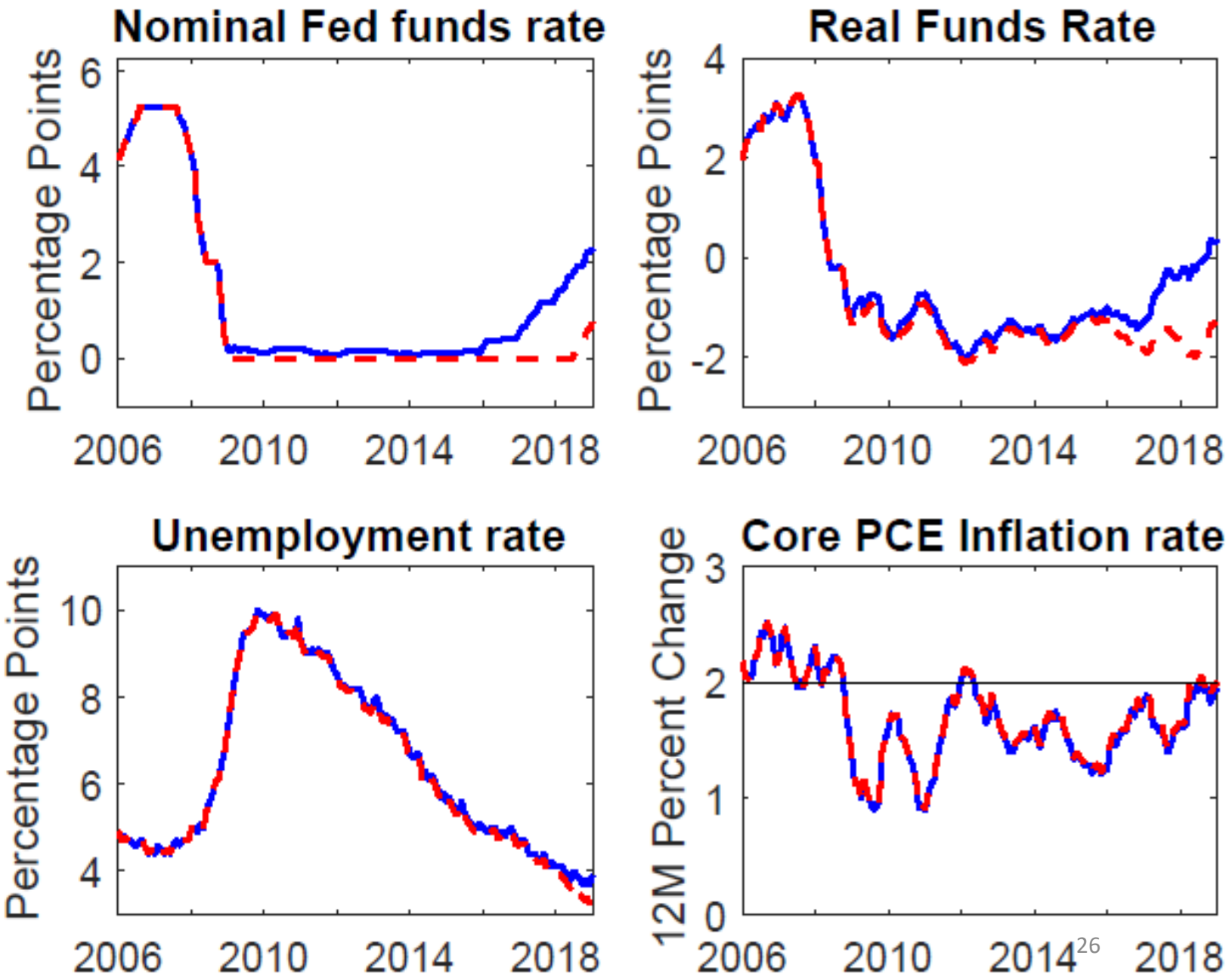
**E. Temporary price level target**

F. Lower for Longer

# Performance Under Counterfactuals

**TPLT with 12 month lookback, implemented by Fed funds + Historical slope policy**

- Funds rate at ZLB until price level target hit
- Same LSAPs, forward guidance policy as actual

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———— actual

# Counterfactuals

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D. Inherit higher inflation rates, interest rates, and inflation target

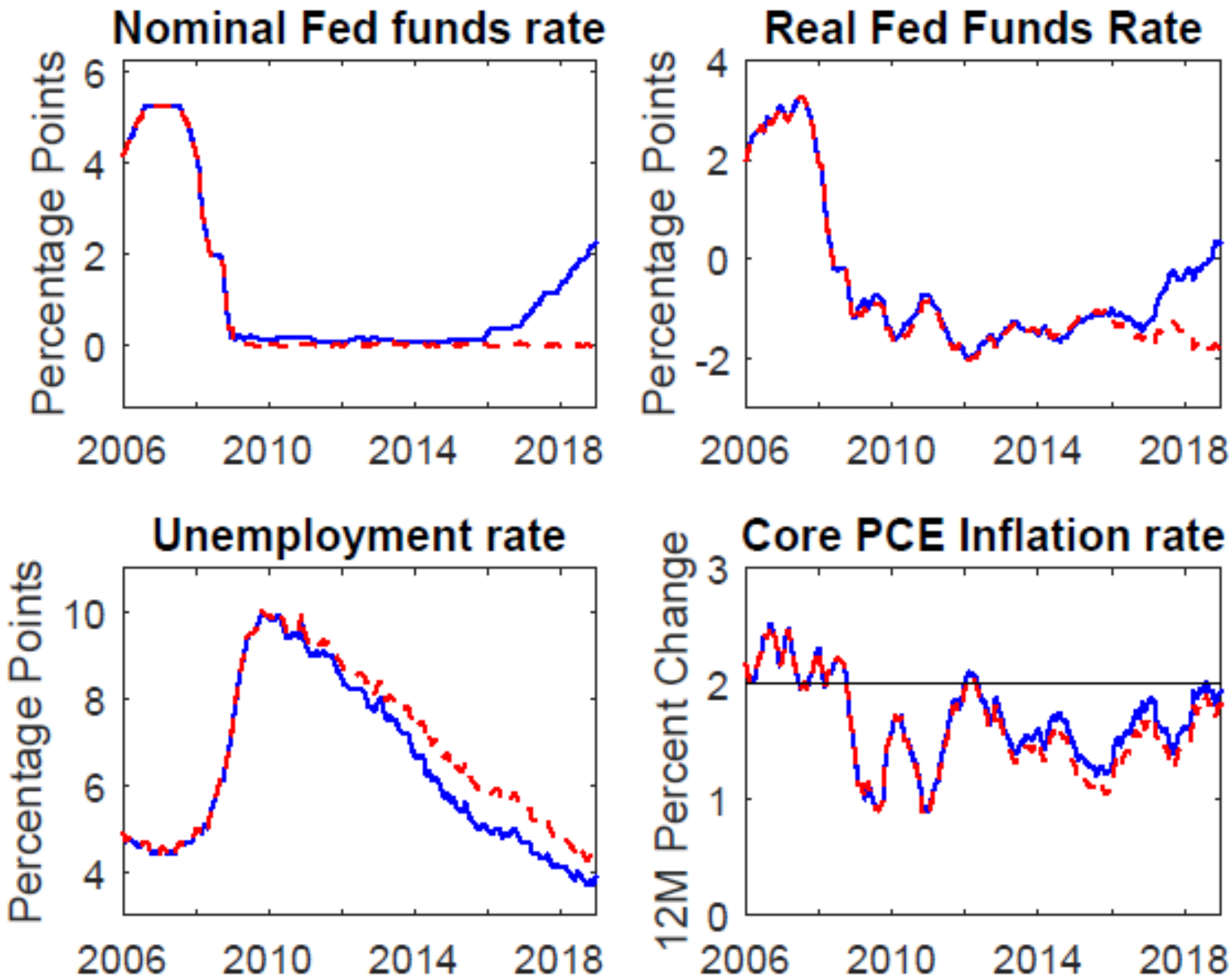
E. Temporary price level target

**F. Lower for Longer**

# Performance Under Counterfactuals

## Taylor (1993) rule with makeup + No LSAPs

- Time-varying *R** (Holston, Laubach, and Williams (2017))
- Funds rate stays at zero until it makes up "below-zero gap"
  - *This is the third rule in Feb. 2019 Monetary Policy Report, p. 37*




- - - - - - - counterfactual

———— actual

# Performance Under Counterfactuals

- Findings qualitatively consistent with Chung et al. (2019) FRB-US simulations:
  - Additional $85B/month accumulating $4 trillion in a future downturn
  - Expands balance sheet to $8 trillion
  - Lowers ten-year yield by more than 1 percentage point
  - Lowers unemployment rate by less than 1 percentage point
  - Raises inflation about 0.5 percentage points
- Similar to other FRB-US simulations (e.g. Durdu (2013))
- Also similar to Chen et al. (2012) DSGE computations:
  - Considers $600 billion of Treasury purchases (QE2)
  - Lowers ten-year yield by 10 basis points
  - Raises growth 0.2 percentage points
  - Raises inflation 5 basis points

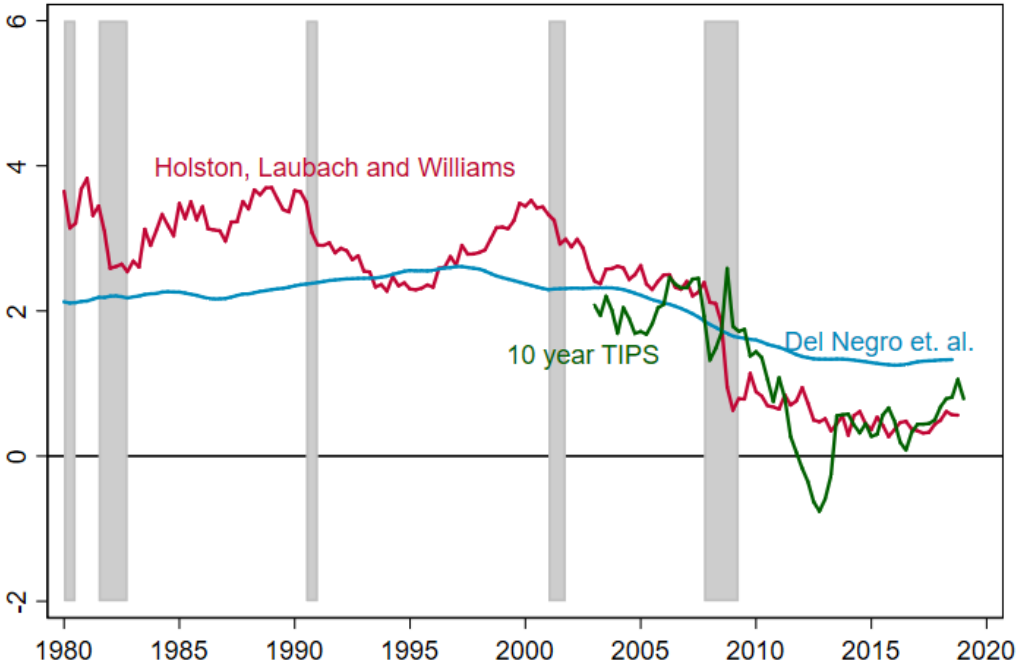
# Summary

## Lots of caveats

- Unfair assessment in hindsight!
- For analytical & identification reasons, we combine unconventional policies into a single "slope" policy – potentially losing nuances (FG, SEPs, etc)
- Flat PC yields sluggish inflation. With steeper PC coefficient, inflation effects would have been larger. Lots of debate about the PC!
- Can't evaluate channels such as resetting expectations with overshooting regime (Yellen proposal), although we can evaluate under existing expectations formation mechanism.

# Summary

- Large costs of ZLB
- LSAPs were worth ~ 1pp on FF rate
- Inherited inflation of 3% + actual LSAPs would have closed output gap 7 quarters earlier
- Stronger-sooner policies can be effective – but likely would require very large asset purchases




Sources: Holston, Laubach, and Williams (2017), updated, and Del Negro et. al (2017), updated; TIPS: FRED. Shading denotes NBER-dated recessions.

# Additional Slides

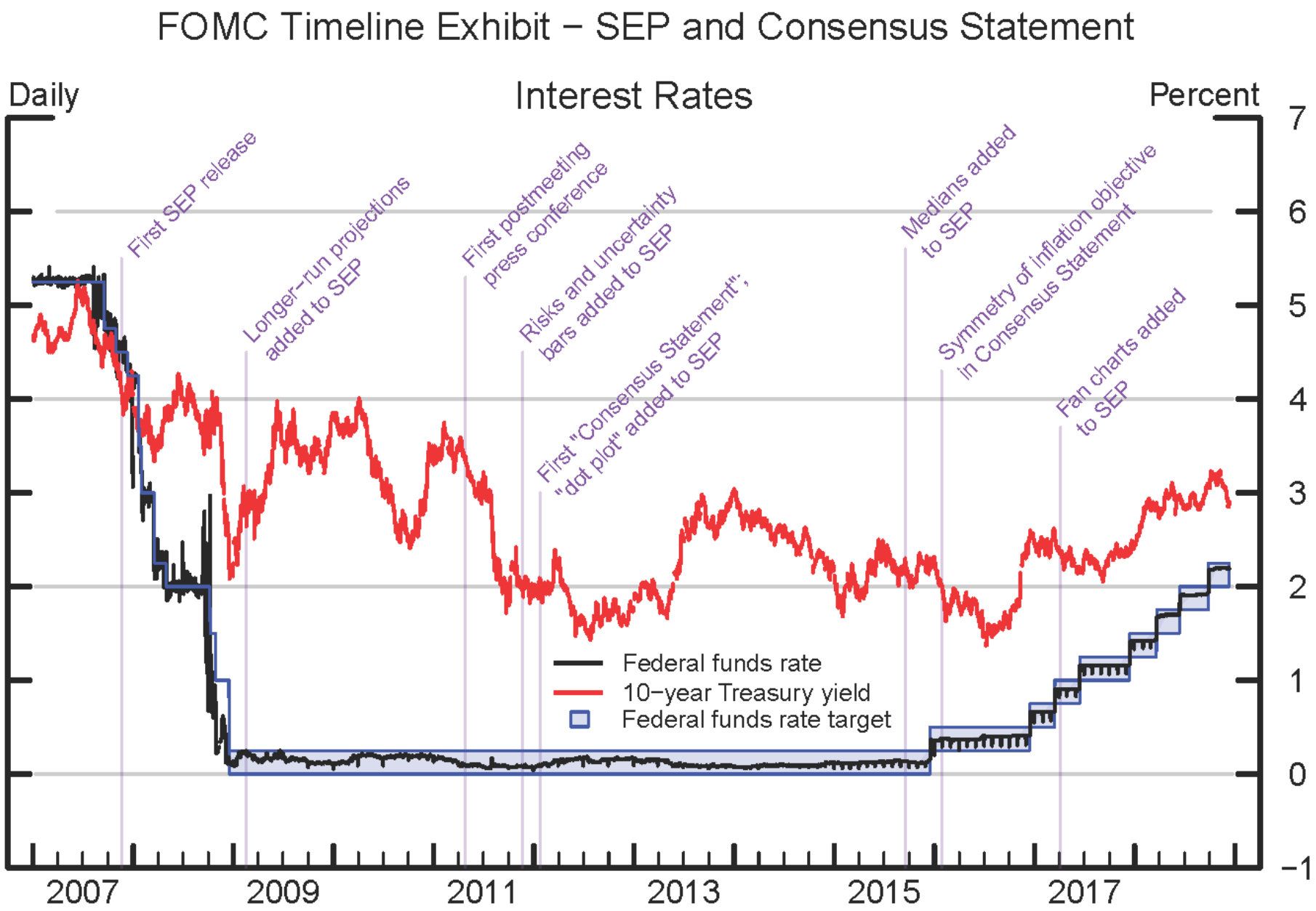
# Monetary policy timeline: LSAPs

- QE1 (December 2008-March 2010) was $1.35 trillion in agency MBS and debt and $300 billion in Treasury securities
- QE2 (November 2010-June 2011) was $600 billion in Treasuries only
- Operation Twist (Sep 2011-December 2012) was replacing short maturity Treasuries with long maturities
- QE3 (September 2012-October 2014) was open-ended program of buying both MBS and Treasuries

# Monetary policy timeline: Forward Guidance

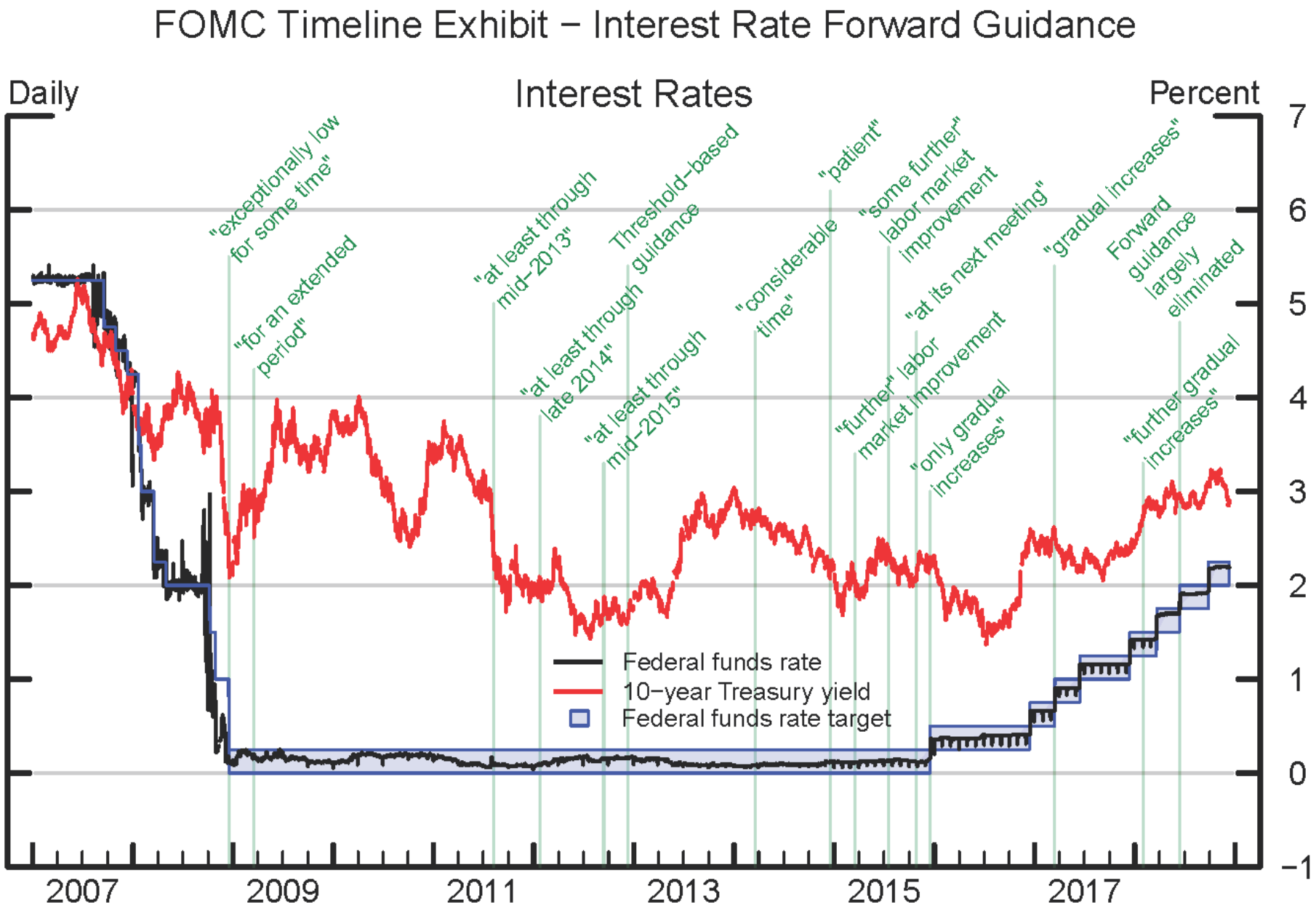
- At the start of the ZLB period, exceptionally low levels warranted “for some time”
- March 2009: Changed to “extended period”
- August 2011: Replaced with date-based forward guidance
- December 2013: Replaced with threshold-based forward guidance
- December 2014: Reverts to more qualitative forward guidance
- Dot plots remain a form of quantitative forward guidance, though not a consensus forecast of the FOMC
- Market expectations were for quick liftoff until the date-based forward guidance was introduced (Swanson and Williams (2014))

# Monetary policy timeline




Source: Federal Reserve Board

# Monetary policy timeline




Source: Federal Reserve Board

# Evidence on the effect of LSAPs on yields

- Event study evidence is particularly useful for QE1 announcements which came as surprises
- Gagnon et al. (2011) and Krishnamurthy and Vissing-Jorgenson (2011) add up jumps to get around 100 bps on Treasuries from QE1
- Various questions
  - Spillovers to other assets. Perhaps long-term Treasury purchases created scarcity of these Treasuries, with smaller effects on other assets.
  - Persistence of effects (Wright (2012), Swanson (2017), Greenwood et al. (2018))
  - Channel of effects. Could be some signaling, but if it were only signaling that should lower short term forward rates but raise longer term forward rates which did not happen. Term premium/local supply effects (D'Amico et al. (2012))
  - Effects on lending quantities. (Di Maggio, Kermani and Palmer (2016), Rodnyanski and Darmouni (2017), Foley-Fisher, Ramcharan and Wu (2016).

# Evidence on the effect of LSAPs on yields

- Effect of 1 percent of GDP LSAP of ten-year equivalent Treasuries on yields:
  - Li and Wei (2013): Lowers by 10bps
  - Belton et al. (2018): Lowers by 6 bps
  - Hamilton and Wu (2012): Lowers by 5 bps
- Elasticities (yield change with respect to quantity) may depend on state of financial markets and the intermediary sector.
- MBS purchases probably have bigger effects on MBS yields and mortgage rates (Krishnamurthy and Vissing-Jorgenson (2011)), particularly for premium on new originations. Greater effect on real side (housing), though limited by negative equity and dampening of refinancing/originations.

# Evidence on the effect of forward guidance on yields

- Swanson (2017) uses event study framework to identify forward guidance shocks from intermediate rates and LSAP shocks from orthogonal movements in 10-Year yields
- Nakamura-Steinsson
- Greenwood, Hanson and Vayanos (2016)
- …

# Risks and Unintended Consequences

- Inflation overshoot feared by many, but never occurred
- Difficulty in controlling short rates, again turned out not to be a problem
- Greater risk-taking is the intended consequence of easier monetary policy, but there is evidence of “reach for yield” behavior
  - Insurance companies (Becker and Ivashina (2015))
  - Money market mutual funds (Di Maggio and Kacperczyk (2017) )
  - Pension funds (Chodorow-Reich (2014))
- Last 3 business cycles caused by asset market imbalances not ordinary inflation
- Remittances to Treasury could go to zero (Carpenter et al. (2013))
- International spillover effects

# Alternative Policy Frameworks: Negative Interest Rates

- Evidence that negative interest rates hurts financial sector and lending
  - Ampudia and Van Den Heuvel (2018), Brunnermeier and Koby (2017)
- Eggertson et al. (2019) and Ulate (2018) study negative interest rates in a DSGE model
- Ulate finds that interest rate cuts are less stimulative below zero
- Eggertson et al. find that they are contractionary
- For US Burke et al. (2010) conclude that -35 basis points is rock bottom negative rate
- Only slightly negative rates are possible, and are unlikely to help much