# Economics 442
# Macroeconomic Policy
(11/16/2020)

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UW Madison
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# Outline

- The flattening Phillips curve
- Hysteresis

# Two Stylized Facts: Blanchard, Cerutti, Summers

- While inflation has decreased, it has decreased less than anticipated, suggesting a breakdown of the relation between inflation and activity.
- In most advanced countries, output remains far below the pre-recession trend, suggesting hysteresis.

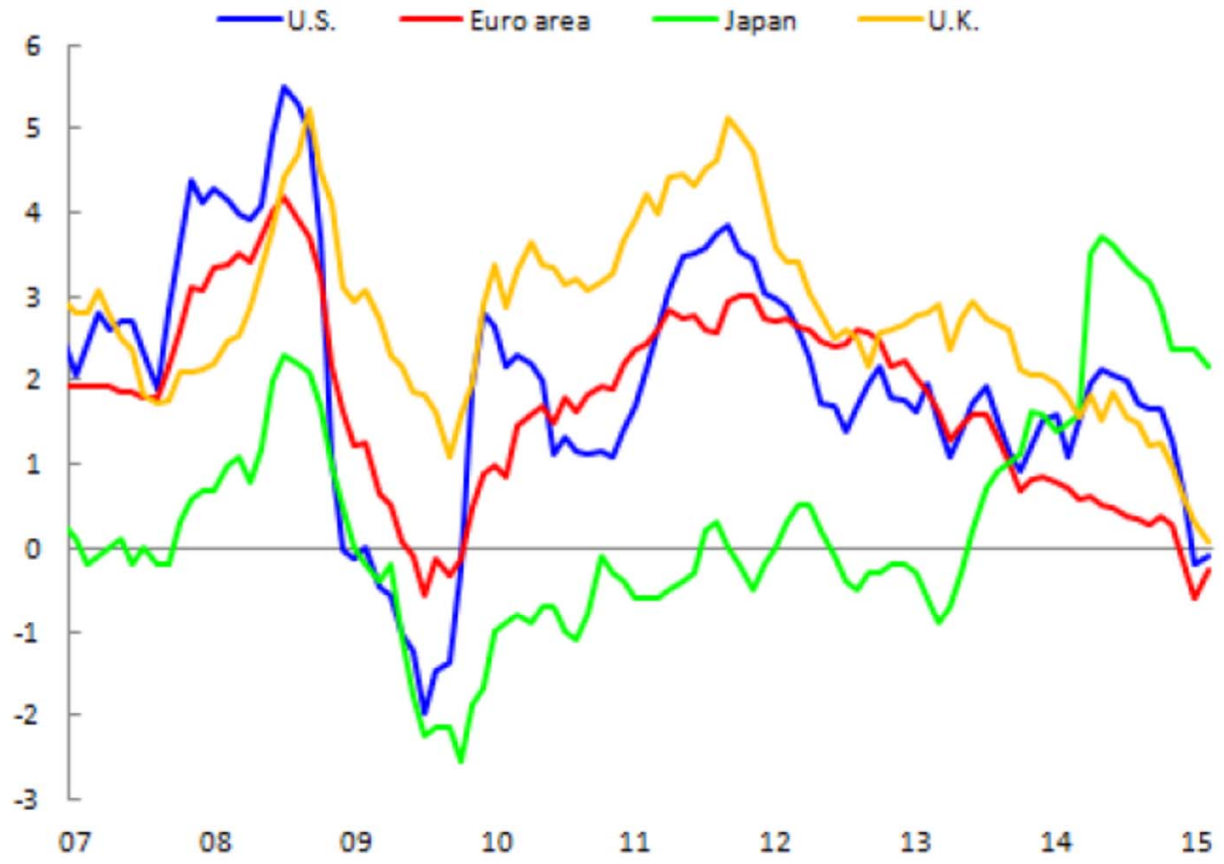
# The Flattening Phillips Curve

# Analysis

- 122 recessions
- Sample 1960-2014
- 23 (advanced) countries
- Quarterly data

# Flattening Phillips Curve

**Figure 7:** Advanced Economies CPI Headline Inflation (percent, year over year)




Source: IMF, *Global Data Source.*

# Phillips Curve Estimation

$$\pi_t = \theta_t(u_t - u_t^*) + \lambda_t \pi^e_t + (1-\lambda_t)\pi^*_{t-1} + \mu_t \pi_{mt} + \varepsilon_t \qquad (1)$$

Where $\pi_t$ is headline CPI inflation (defined as quarterly inflation, annualized), $u_t$ is the unemployment rate, $u_t^*$ is the natural rate, $\pi^e_t$ is long-term inflation expectations, $\pi^*_{t-1}$ is the average of the last four quarterly inflation rates, and $\pi_{mt}$ is import price inflation relative to headline inflation.

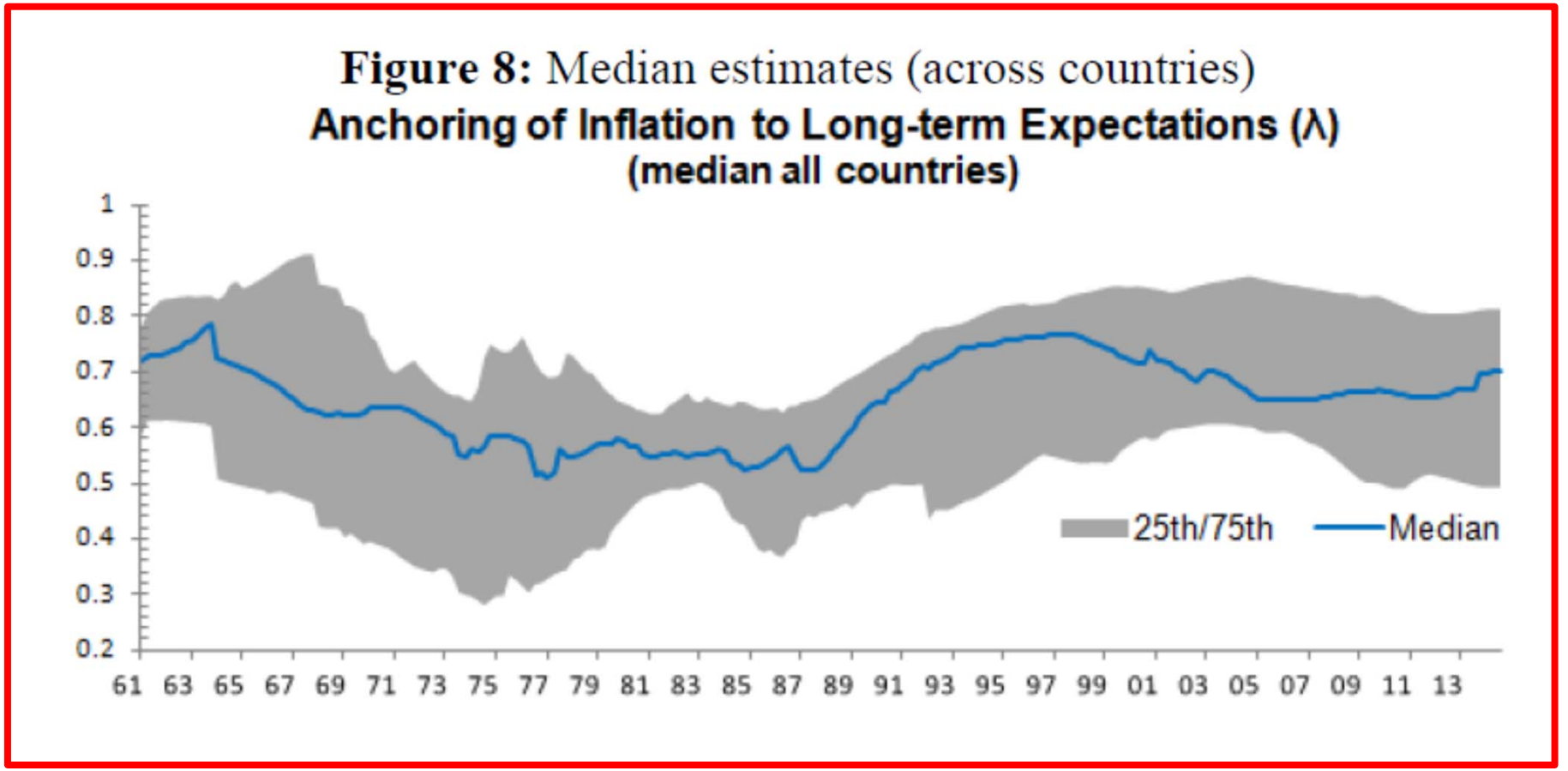
Consensus Forecasts

The parameters $\lambda_t$ (the coefficient reflecting the stability of inflation expectations), $\theta_t$ (the slope of the Phillips curve), and $\mu_t$ (the coefficient reflecting the importance of import-price inflation), as well as the natural rate, $u_t^*$, which is unobservable, are all assumed to follow constrained random walks (the constraints being $\theta_t$ and $\mu_t \geq 0$, and $0 \leq \lambda_t \leq 1$).[15]

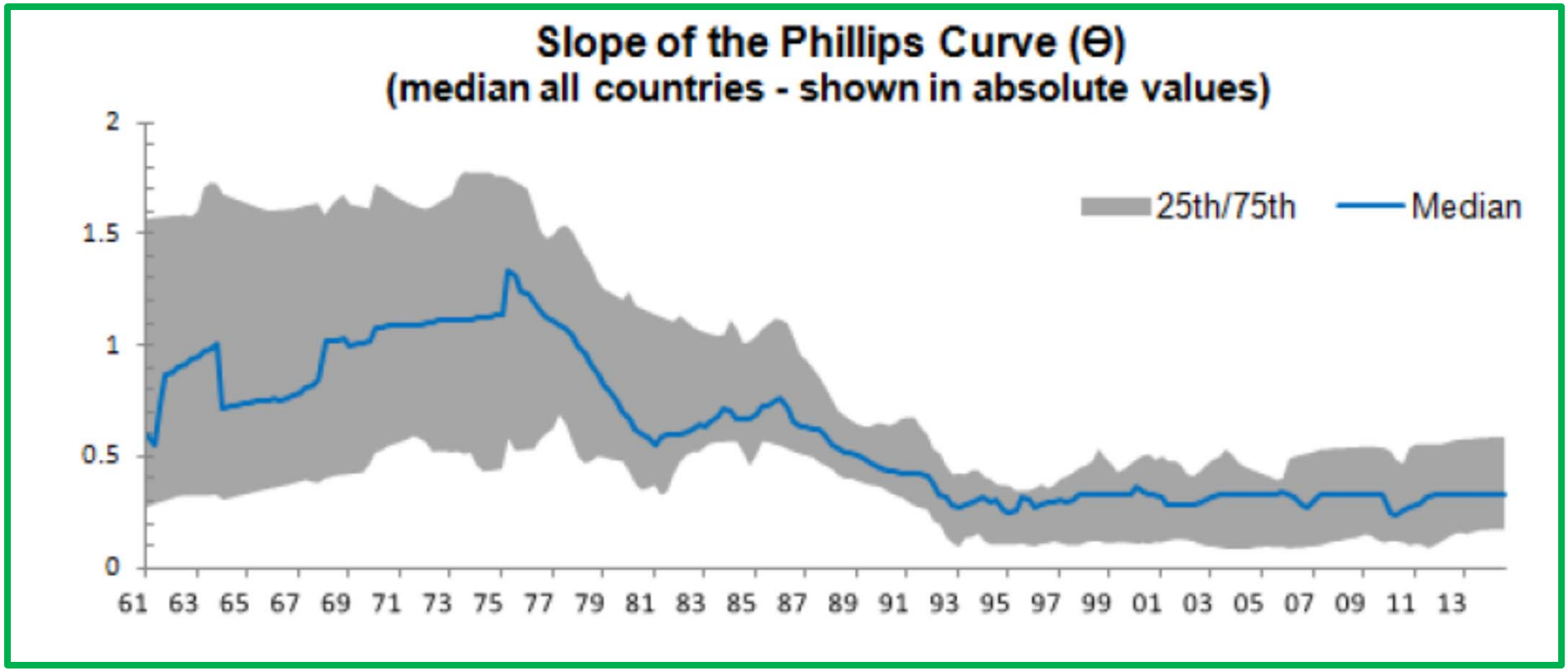
Time varying parameters estimated using Kalman filter

Note that estimation allows time variation of u*, which might be hard to distinguish from variation in θ

# Stability of Inflation Expectations, λ

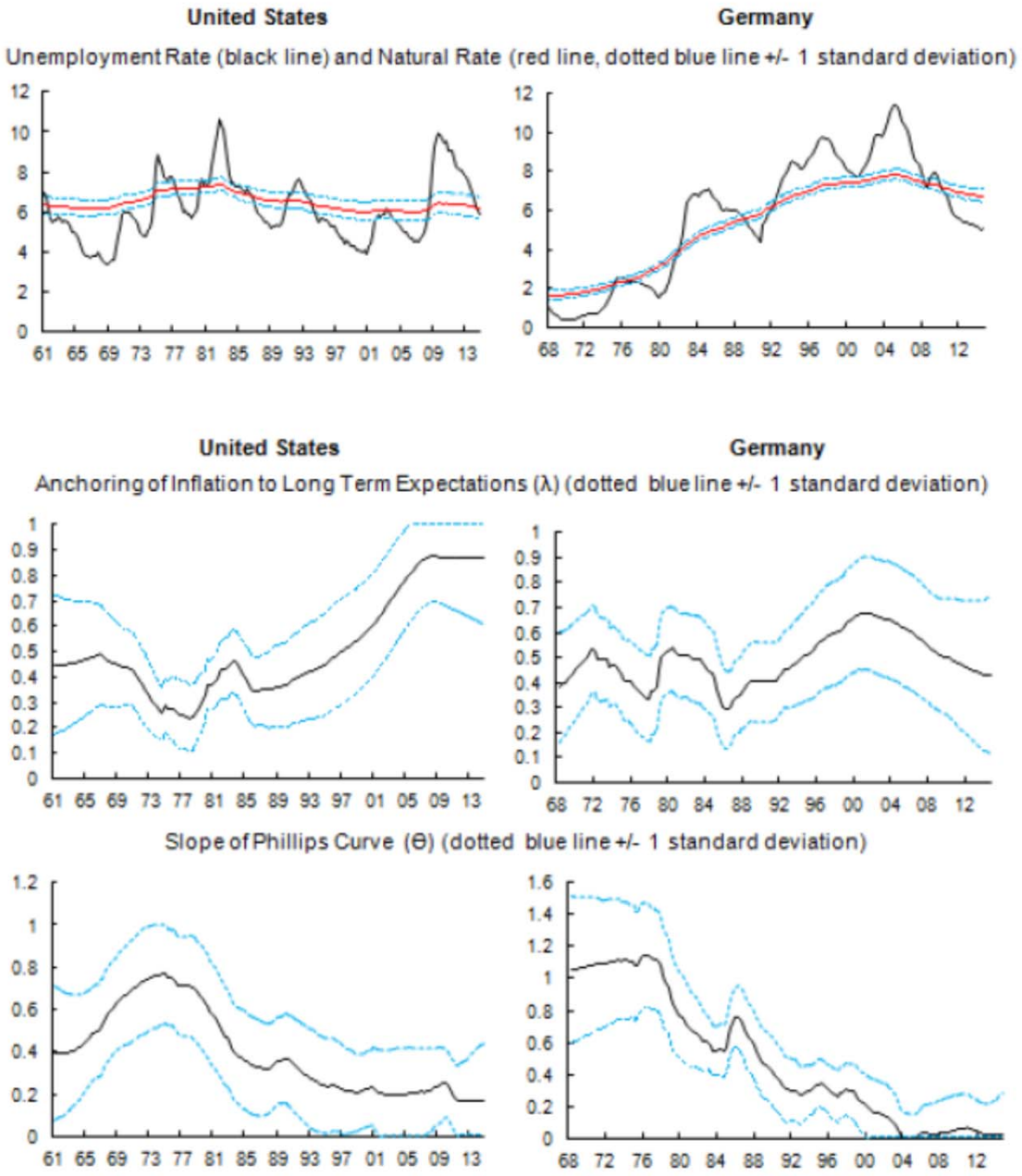


# Phillips Curve Slope, θ




Question: Is it variation in θ or variation in u*?

**Figure 9:** Estimates for Germany and the US



# TVP vs OLS approach

- 1990-2014 (also subperiods, 1990-2007; 2007-14)
- Estimate via Kalman filter, and holding u* constant at sample average

# **Table 6**: Slope of the Phillips Curve

| Country | Sample Period | Natural rate: U* | | Natural Rate: Ū | |
|---|---|---|---|---|---|
| | | Coefficient 1/ | Standard Deviation | Coefficient 1/ | Standard Deviation |
| United States | *1990-2014* | -0.29 *** | 0.07 | -0.25 *** | 0.07 |
| | *2007-2014* | -0.26 * | 0.13 | -0.24 * | 0.12 |
| Japan | *1990-2014* | -1.09 *** | 0.17 | -0.50 *** | 0.09 |
| | *2007-2014* | -2.37 *** | 0.64 | -1.54 *** | 0.43 |
| Germany | *1990-2014* | -0.11 | 0.09 | -0.12 | 0.07 |
| | *2007-2014* | 0.15 | 0.20 | 0.11 | 0.14 |
| United Kingdom | *1990-2014* | 0.04 | 0.11 | 0.02 | 0.10 |
| | *2007-2014* | -0.04 | 0.30 | -0.04 | 0.28 |
| France | *1990-2014* | -0.49 *** | 0.14 | -0.32 *** | 0.08 |
| | *2007-2014* | -0.63 *** | 0.20 | -0.52 *** | 0.16 |
| Italy | *1990-2014* | -0.12 | 0.09 | -0.15 *** | 0.06 |
| | *2007-2014* | -0.30 *** | 0.10 | -0.25 *** | 0.08 |
| Canada | *1990-2014* | -0.32 *** | 0.16 | -0.21 | 0.13 |
| | *2007-2014* | -0.52 | 0.45 | -0.50 | 0.41 |
| Australia | *1990-2014* | -0.68 *** | 0.14 | -0.49 *** | 0.10 |
| | *2007-2014* | -0.78 ** | 0.38 | -0.79 ** | 0.36 |

| Country | Sample Period | Natural rate: U* | | Natural Rate: Ū | |
|---|---|---|---|---|---|
| | | Coefficient 1/ | Standard Deviation | Coefficient 1/ | Standard Deviation |
| Spain | *1990-2014* | -0.08 ** | 0.04 | -0.07 *** | 0.03 |
| | *2007-2014* | -0.09 * | 0.05 | -0.07 * | 0.04 |
| Netherlands | *1990-2014* | -0.40 *** | 0.12 | -0.31 *** | 0.10 |
| | *2007-2014* | 0.01 | 0.20 | -0.01 | 0.16 |
| Switzerland | *1990-2014* | -0.71 *** | 0.15 | -0.64 *** | 0.08 |
| | *2007-2014* | -0.59 | 0.79 | -0.65 | 0.60 |
| Sweden | *1990-2014* | -0.55 *** | 0.12 | -0.48 *** | 0.09 |
| | *2007-2014* | -1.21 *** | 0.32 | -1.10 *** | 0.26 |
| Belgium | *1990-2014* | -0.62 *** | 0.20 | -0.37 *** | 0.14 |
| | *2007-2014* | -1.13 * | 0.62 | -0.74 ** | 0.30 |
| Norway | *1990-2014* | -0.06 | 0.20 | -0.07 | 0.20 |
| | *2007-2014* | -0.80 | 1.52 | -0.73 | 1.41 |
| Austria | *1990-2014* | -0.68 *** | 0.25 | -0.11 | 0.14 |
| | *2007-2014* | -1.62 *** | 0.42 | -1.26 *** | 0.36 |
| Denmark | *1990-2014* | -0.17 | 0.12 | -0.13 | 0.10 |
| | *2007-2014* | 1.72 *** | 0.49 | 1.53 *** | 0.44 |
| Ireland | *1990-2014* | -0.28 *** | 0.04 | -0.21 *** | 0.03 |
| | *2007-2014* | -0.26 *** | 0.08 | -0.22 *** | 0.07 |
| Greece | *1990-2014* | -0.15 ** | 0.07 | -0.14 *** | 0.03 |
| | *2007-2014* | -0.19 *** | 0.06 | -0.11 *** | 0.04 |
| Portugal | *1990-2014* | -0.23 *** | 0.07 | -0.17 *** | 0.05 |
| | *2007-2014* | -0.01 | 0.11 | -0.02 | 0.08 |
| New Zealand | *1990-2014* | -0.50 *** | 0.09 | -0.33 *** | 0.11 |
| | *2007-2014* | -0.60 * | 0.34 | -0.58 * | 0.28 |

1/ *** indicates significance at 1 percent, ** at 5 percent, and * at 10 percent, respectively, based on robust standard errors.

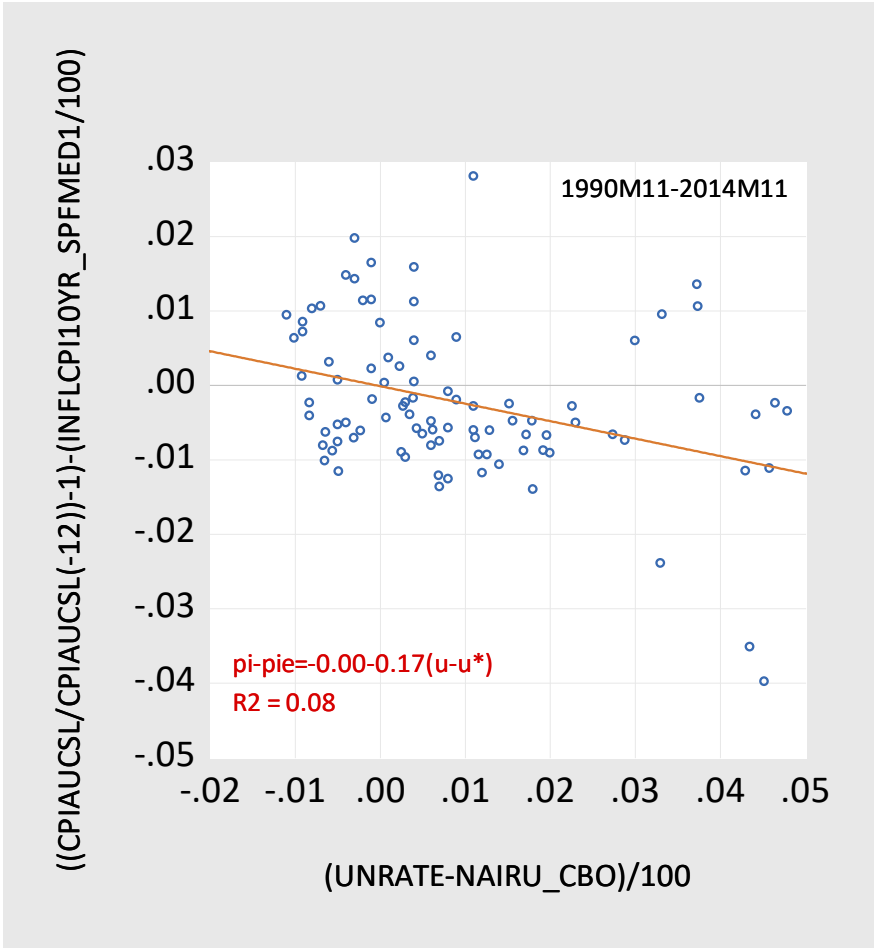
# Conclusions

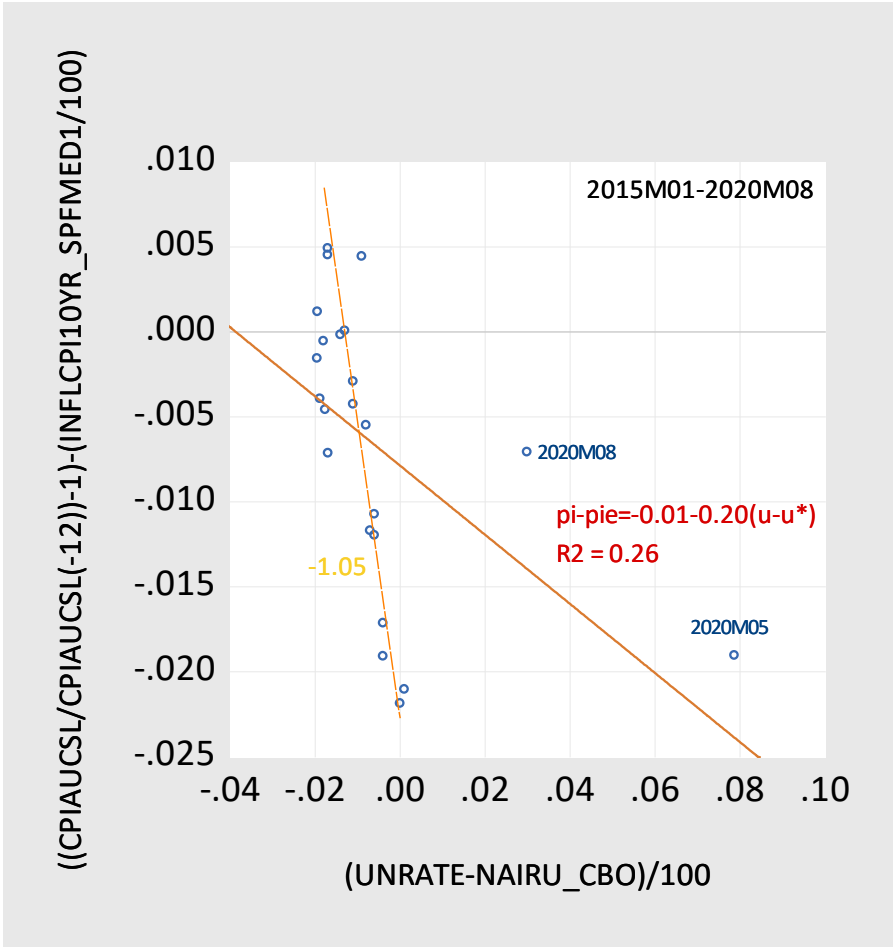
- Phillips curve is indeed flatter than previously
- But most of the change occurred between the mid-1970's and early 1990's
- Phillips curve slope mostly constant since early 1990's
- But there is still a significant relationship
- I.e., the Phillips curve is not dead

# Policy Conclusions

- Stabilizing inflation might require much larger changes in the unemployment gap than previously
- But without knowing why $\theta$ is smaller, we don't have further implications

# Update


((CPIAUCSL/CPIAUCSL(-12))-1)-(INFLCPI10YR_SPFMED1/100)
.03
.02
.01
.00
-.01
-.02
-.03
-.04
-.05
-.02
-.01
.00
.01
.02
.03
.04
.05
1990M11-2014M11
pi-pie=-0.00-0.17(u-u*)
R2 = 0.08
(UNRATE-NAIRU_CBO)/100


((CPIAUCSL/CPIAUCSL(-12))-1)-(INFLCPI10YR_SPFMED1/100)
.010
.005
.000
-.005
-.010
-.015
-.020
-.025
-.04
-.02
.00
.02
.04
.06
.08
.10
2015M01-2020M08
2020M08
pi-pie=-0.01-0.20(u-u*)
R2 = 0.26
-1.05
2020M05
(UNRATE-NAIRU_CBO)/100

# Hysteresis

# Hysteresis (from physics)

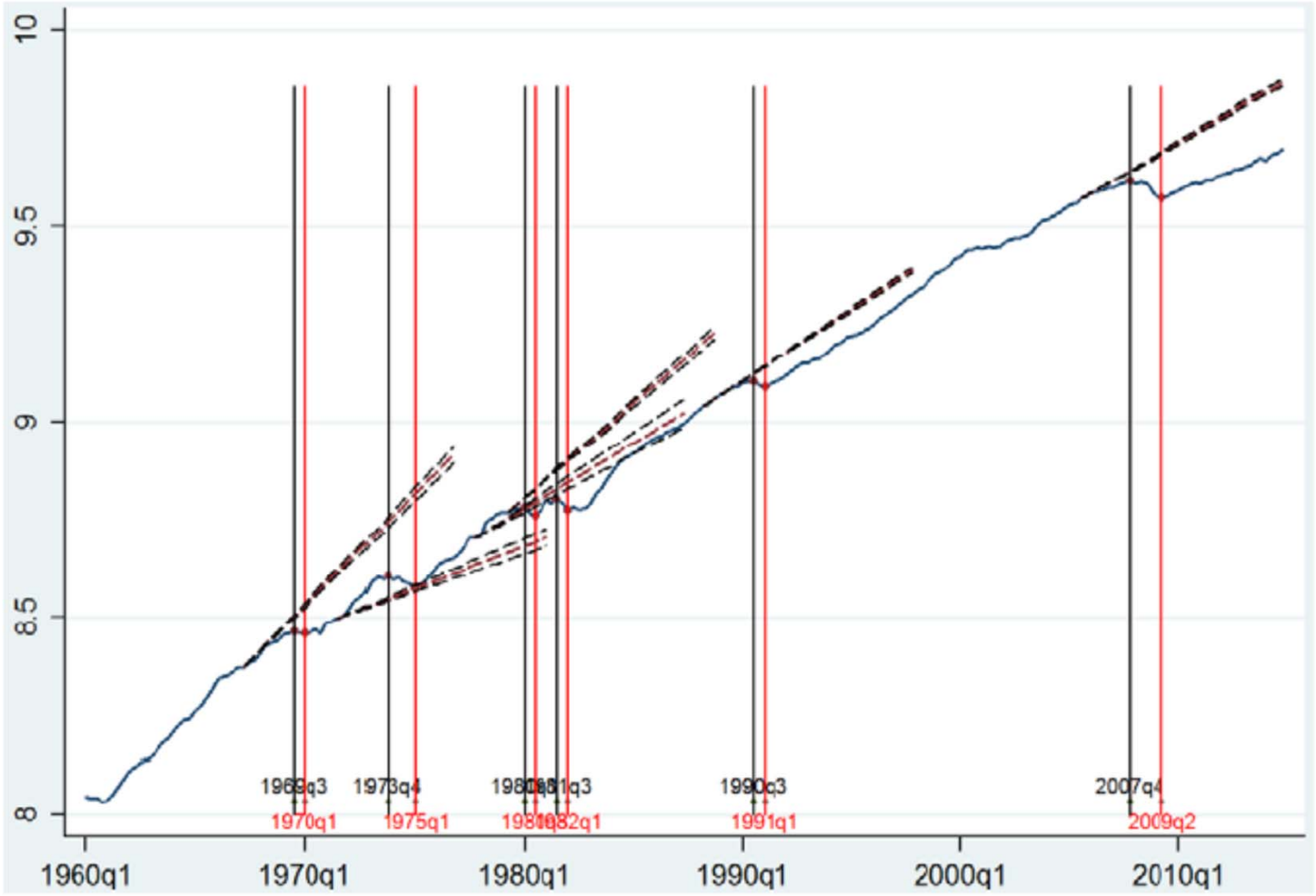
the phenomenon in which the value of a physical property lags behind changes in the effect causing it

# In terms of economics

- "[The] hysteresis hypothesis, defined as the hypothesis that recessions may have permanent effects on the level of output relative to trend."
- "'super-hysteresis' effects (the term used by Laurence Ball (2014) for the impact of a recession on the growth rate rather than just the level of output).

# Recessions and After-Effects

**Figure 3**: United States –Evolution of log real GDP and Extrapolated Trends



# Three Possible Reasons

- Recessions cause hysteresis/super-hysteresis
- Third factor causes recession and slower growth
- True reverse causation – anticipated slower growth induces recession

Use 23 countries, 50 years (ex 1960s, 2010's) for 122 recessions

# Summary

- In 31% of all cases, sustained (adjusted) output gap does not follow recession
- In 69% of all cases, a sustained (adjusted) output gap follows recession
- In 33% of all cases, the (adjusted) output gap grows over time

# Explanations

- For hysteresis: (1) insider/outsider-labor unions, (2) lower capital investment, (3) reduced R&D, (4) lower job creation/destruction -> slower reallocation
- For super-hysteresis: (1) legal/self-imposed restrictions on finance, (2) changes in taxation
- For common shock, supply shocks obvious candidate (incl. financial crises)
- For reverse causality, productivity slowdowns precede recessions (Gordon).

# Characteristics by Shock

- More with sustained output gaps if supply (oil)
- More with sustained output gaps if financial shocks.
- More with sustained output gaps if intentional disinflation

# Policy Implications

- If due to hysteresis/super-hysteresis, implies that monetary policy should be more active in offsetting recessions, as costs are greater
- If due to reverse causality, then there's a greater risk of overshooting (the new) potential output

# Implies Aggressive Action to Counter Deep/Persistent Recession