Identifying Fiscal Inflation

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Fiscal inflation

- **Starting observation:**
- Debt levels around the world skyrocket
- Theory (FTPL): if not backed by future surpluses $\Longrightarrow$ *fiscal inflation*
  - Sims, Leeper, Cochrane
  - "Inflation lures"
- Yet very little concern from policy makers & other academics
  - Fed, Gali, Krugman, ...
  - "Well where is inflation"
- **Objective:** reconcile both views

What we do

- **Approach:**
  - Estimate standard DSGE model
  - Active MP, passive FP
  - With no data on fiscal variables
- **Finding:**
  - One of the shocks is essentially reflecting fiscal policy
- **Interpretation:**
  - Contemporary DSGE models (with passive fiscal policy)
  - Interpret historical fluctuations in inflation as related to fiscal policy
  - Confirms concern for fiscal inflation

Contemporary DSGE models

- Standard DSGE model has
- Monetary policy rule (R =interest rate, π =inflation):

$$R_t = \rho_\pi \pi_t + ...$$

- Government budget constraint
- Fiscal policy rule (τ =taxes, d =debt):

$$\tau_t = \gamma_d d_{t-1} + ...$$

- Solution has debt dynamics of the form:

$$d_t = (\beta^{-1} - \gamma_d) d_{t-1} + ...$$

Standard policy mix

- Active Monetary policy (R =interest rate, π =inflation):

$$\begin{aligned} R_t &= \rho_\pi \pi_t + ... \\ \rho_\pi &> 1 \end{aligned}$$

- Passive Fiscal policy (τ =taxes, d =debt):

$$\begin{aligned} \tau_t &= \gamma_d d_{t-1} + ... \\ d_t &= (\beta^{-1} - \gamma_d) d_{t-1} + ... \\ (\beta^{-1} - \gamma_d) &< 1 \end{aligned}$$

Monetary policy: Taylor principle
Fiscal policy: passively stabilizes debt, moves taxes to do so
Coefficient restrictions imply determinacy

Contemporary DSGE models

- Absence of fiscal policy becomes more of an issue now

I. Zero Lower Bound

- MP's hands tied

II. Debt

- Huge deficits, rapidly increasing indebtedness (sustainable?)

$\Longrightarrow$ **Fiscal activism?**

Fiscal activism

- $\exists$ alternative determinate parameter constellation (Leeper, 1991)
- Passive Monetary policy (R =interest rate, π =inflation):

$$\begin{aligned} R_t &= \rho_\pi \pi_t + ... \\ \rho_\pi &< 1 \end{aligned}$$

- Active Fiscal policy (τ =taxes, d =debt):

$$\begin{aligned} \tau_t &= \gamma_d d_{t-1} + ... \\ d_t &= (\beta^{-1} - \gamma_d) d_{t-1} + ... \\ (\beta^{-1} - \gamma_d) &> 1 \end{aligned}$$

FP is not committed to stabilize debt (γ_d too low)
MP allows inflation to move to stabilize debt
$\Longrightarrow$ *Fiscal Inflation*

Policy mix

- Contemporary DSGE models typically exclude the second possibility
  - Active fiscal policy, passive monetary policy
- And therefore rule out fiscal inflation

- Our message:
- Even a standard DSGE model (active MP/passive FP) tells us we may have to worry about it

The model

- Standard DSGE model: Smets & Wouters (2007)
- Plus term structure: Expectations Hypothesis

$$\hat{R}_t^n = \frac{1}{n} E_t \left[\hat{R}_t + \hat{R}_{t+1} + ... + \hat{R}_{t+n-1} \right]$$

- De Graeve, Emiris & Wouters (2009)
- Fluctuations in yield curve well described by:
  - Macro-shocks (technology, preferences, mark-ups, monetary policy): slope
  - Inflation-target: level

- **Only change**: News shocks to inflation target

News shocks to inflation target

- Time-varying inflation target WITHOUT news shocks

$$\Delta\bar{\pi}_t = \rho_\pi \Delta\bar{\pi}_{t-1} + \epsilon_t$$

News shocks to inflation target

- Time-varying inflation target WITHOUT news shocks

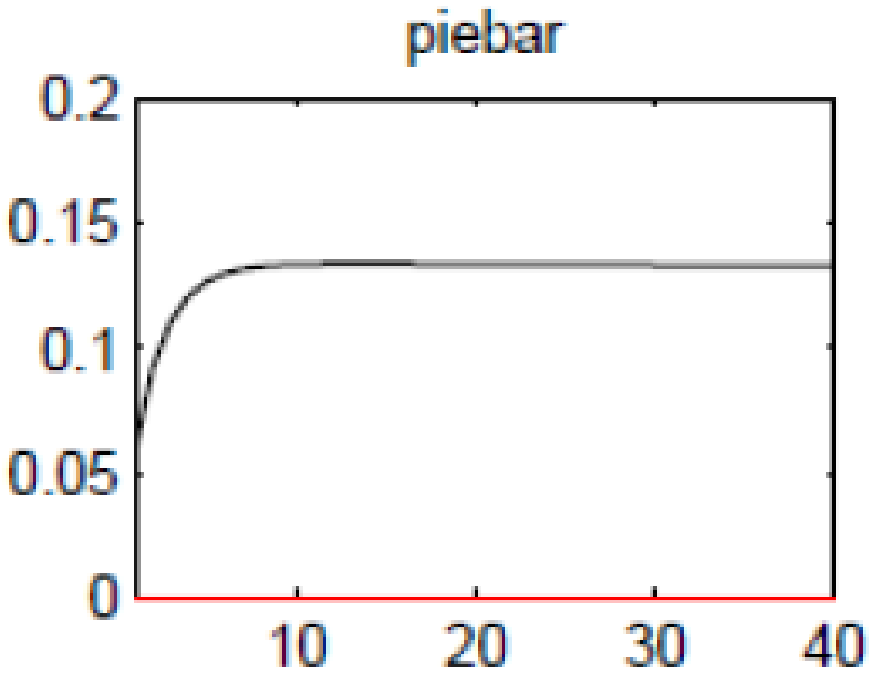
$$\Delta\bar{\pi}_t = \rho_\pi \Delta\bar{\pi}_{t-1} + \epsilon_t$$

- Time-varying inflation target WITH news shocks

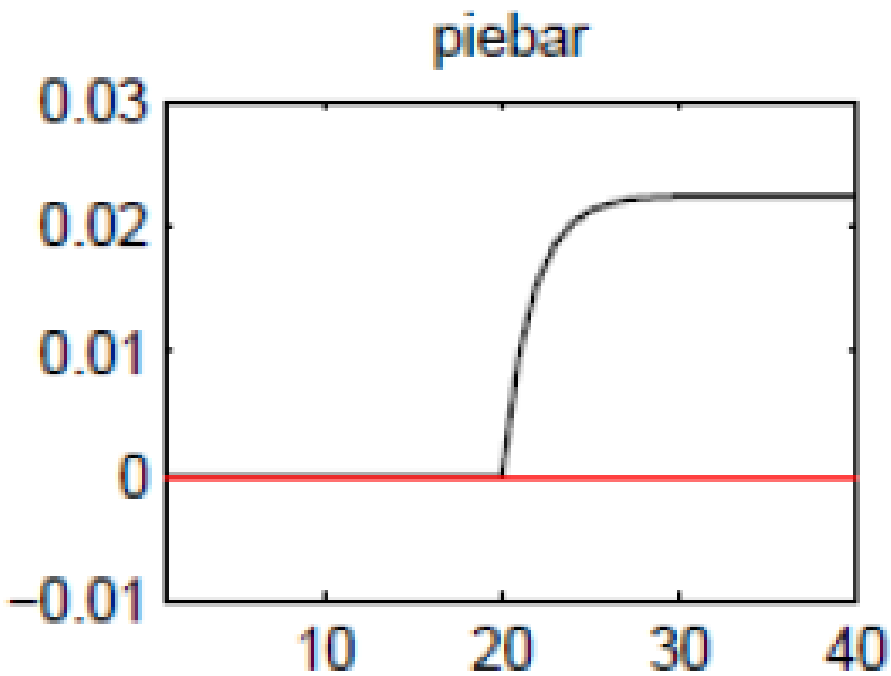
$$\Delta\bar{\pi}_t = \rho_\pi \Delta\bar{\pi}_{t-1} + \epsilon_t + \eta_{t-i}$$

η_{t-i} random innovation in $t-i$ but materialized in t

ϵ_t



η_{t-20}



News shocks to inflation target

- Time-varying inflation target WITHOUT news shocks

$$\Delta\bar{\pi}_t = \rho_\pi \Delta\bar{\pi}_{t-1} + \epsilon_t$$

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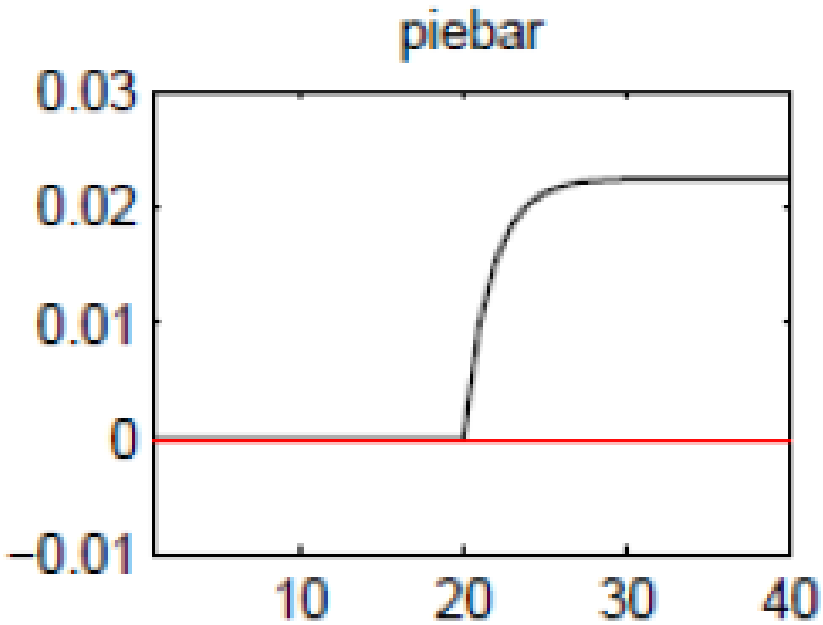
η_{t-i} random innovation in $t-i$ but materialized in t

- Why?
  1. Fiscal inflation
  2. Term structure

Motivation 1: Fiscal inflation

- Cochrane - Sims - Leeper
- At some point in the future, inflation may be determined by fiscal policy
  - Govt. budget constraint is equilibrium condition. Hence, if MP turns passive at some point, fiscal policy will determine inflation and MP stabilize the value of debt.
  - Implies inflation anticipation: η_{t-20}



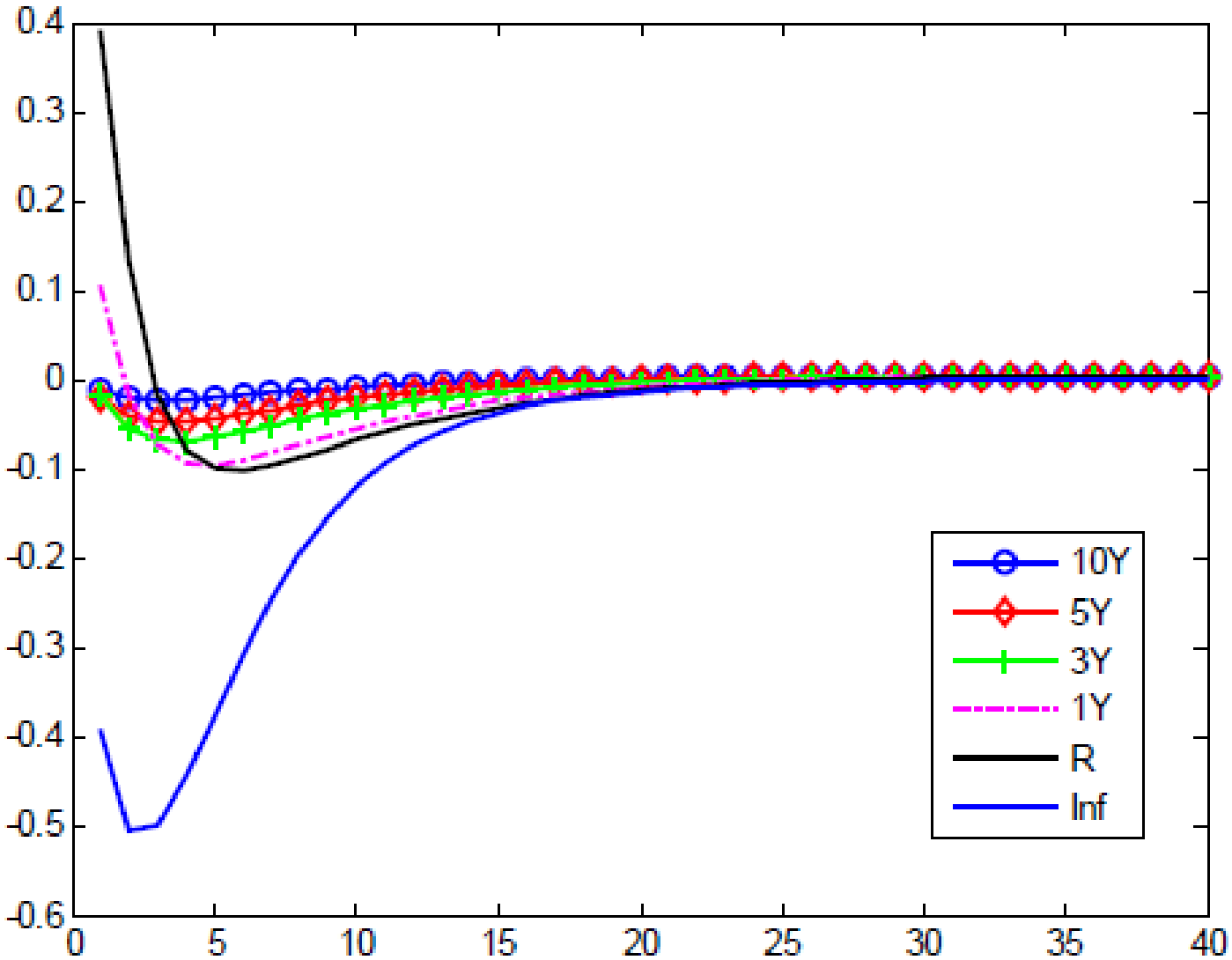
Motivation 2: Term structure

- Well-know from finance:
- Term structure variation driven largely by

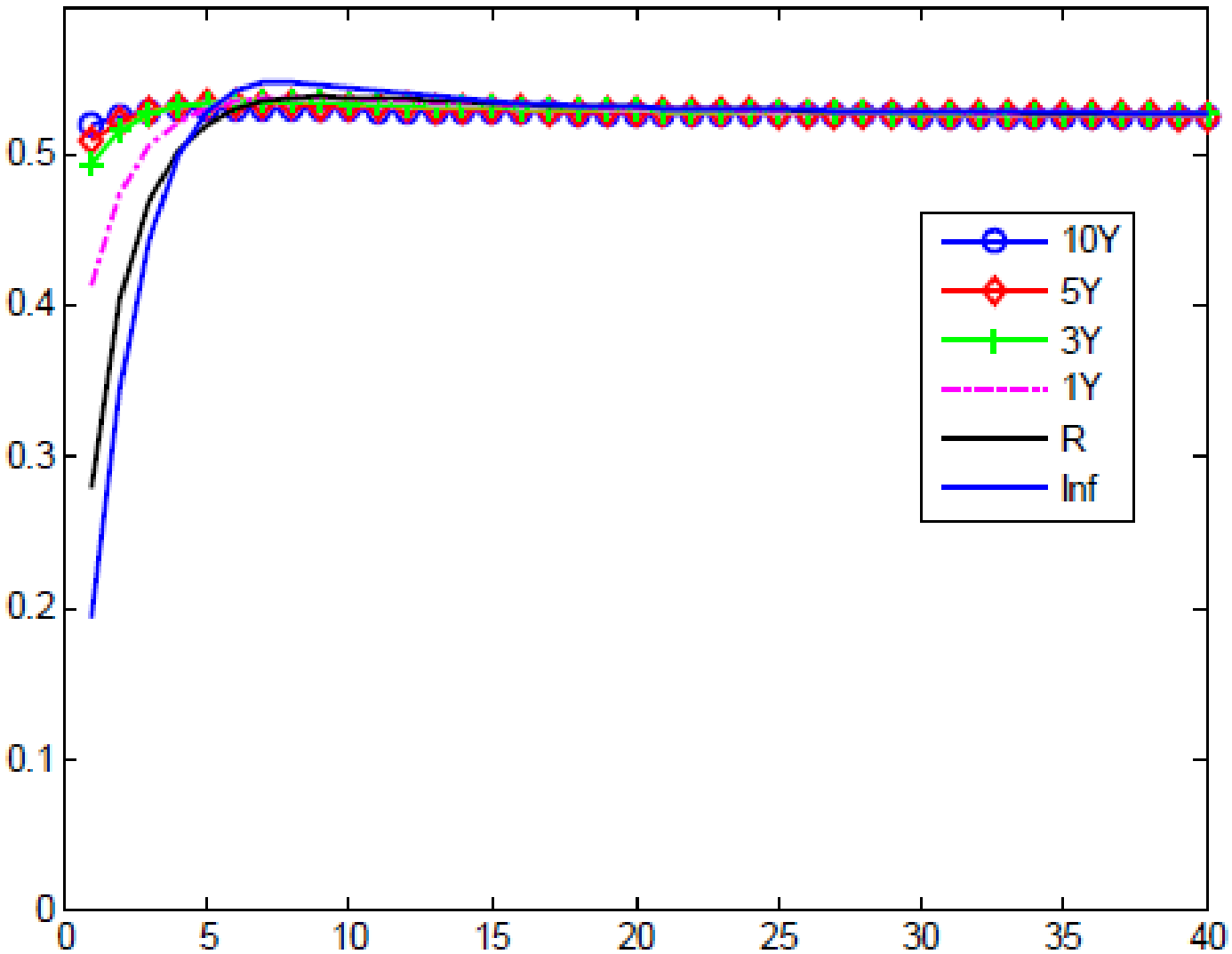
1. Level factor
2. Slope factor

- DSGE models match term structure in same fashion
  - With one (implicit) restriction
  - Almost all movements in slope are due to variation in short rate

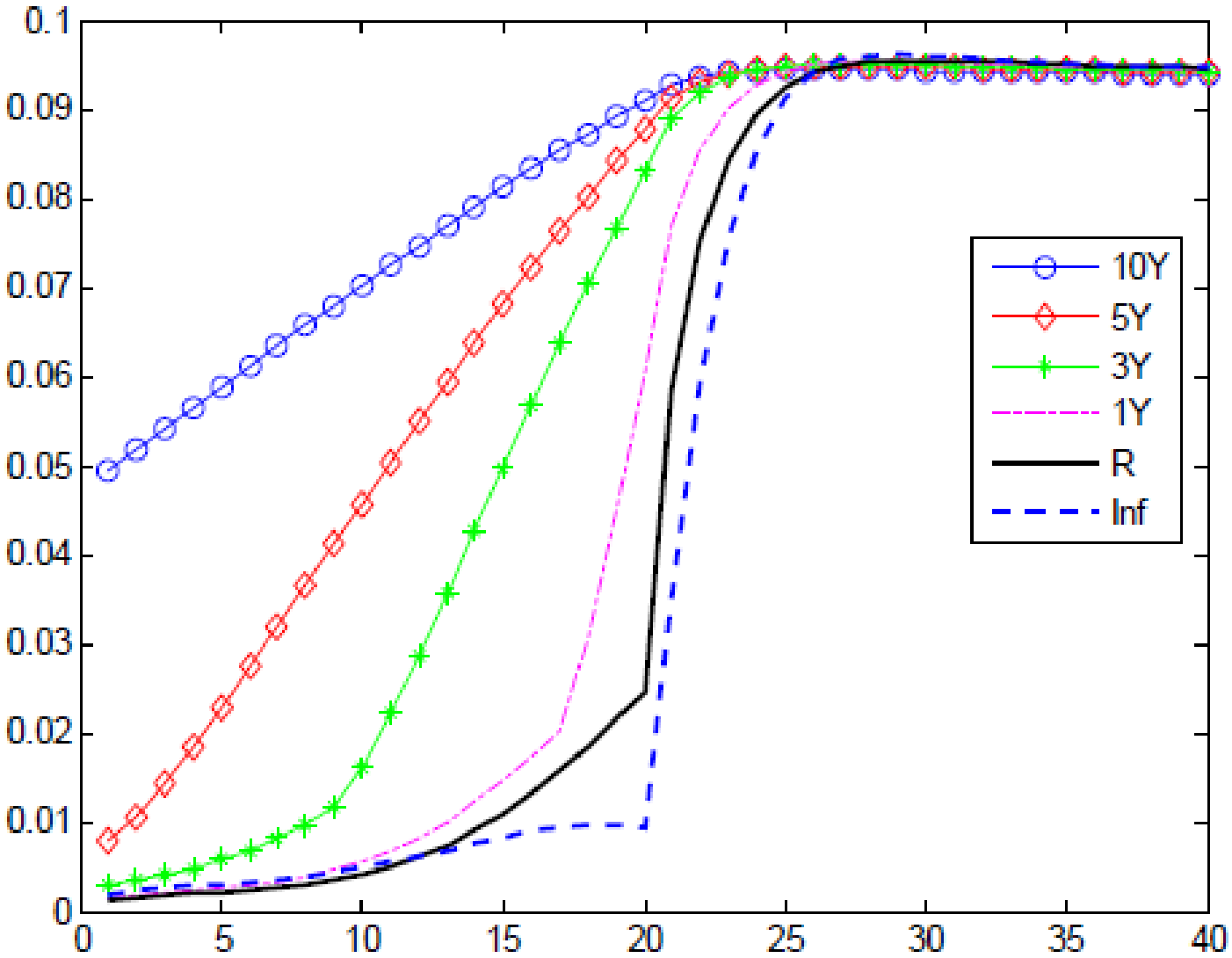
Slope: e.g. monetary policy shocks



Level: Inflation target shocks



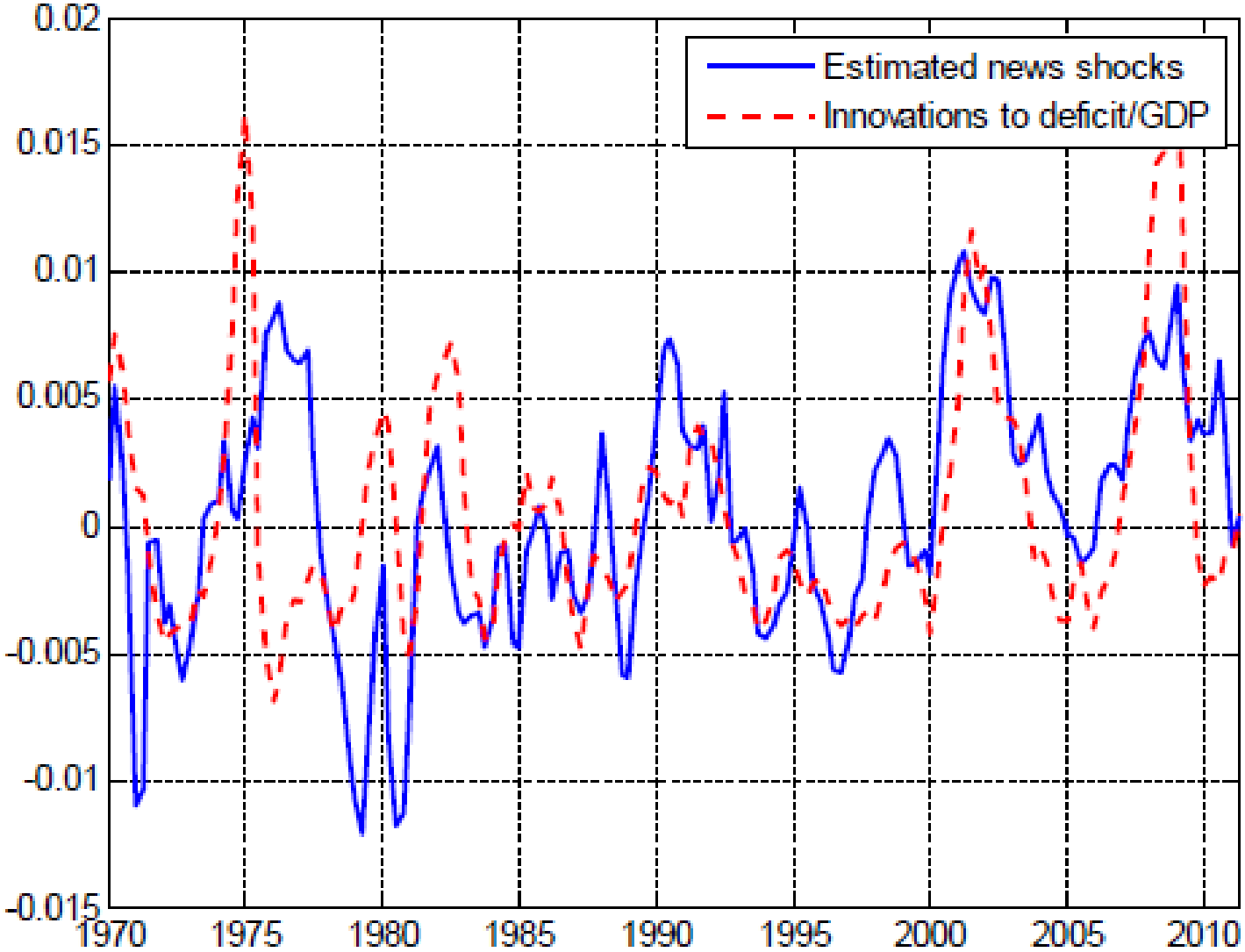
Identification: News to target is only shock ...



In sum

- Estimate
  - 1. Smets-Wouters
    2. Term structure
    3. Inflation target which can move for 2 reasons (1 new)
- Data:
  - U.S.
  - 1966:Q1 - 2011:Q2
  - 7 macro variables (dy, dw, dp, di, dc, l, r)
  - Long maturity interest rates (1y, 3y, 5y, 10y)
  - No data on fiscal policy

Result 1: News shock looks like fiscal policy



Result 1: News shock looks like fiscal policy

Table 1: Correlation between inflation target news shocks and different measures of fiscal innovations

Fiscal innovations	1966-2011	1966-1983	1984-2011
Primary deficit/GDP	0.44	0.12	0.70
CBO without stabilizers	0.37	0.09	0.56
Controlling for output gap	0.43	0.06	0.64
Controlling for output growth	0.45	0.16	0.58
Primary deficit/debt	0.37	0.15	0.67
Debt/GDP	0.29	0.26	0.32

Result 1 - Implication

- Even if you don't model fiscal policy, your DSGE model (partly) interprets inflationary fluctuations as fiscal
- $\Longrightarrow$ Should give fiscal effects more attention

Result 2: Small quantitative role for news shocks

- Variance decompositions
- News shock does not play a major role for historical fluctuations in

1. Inflation expectations (VDC: $<10\%$)
2. Macro variables

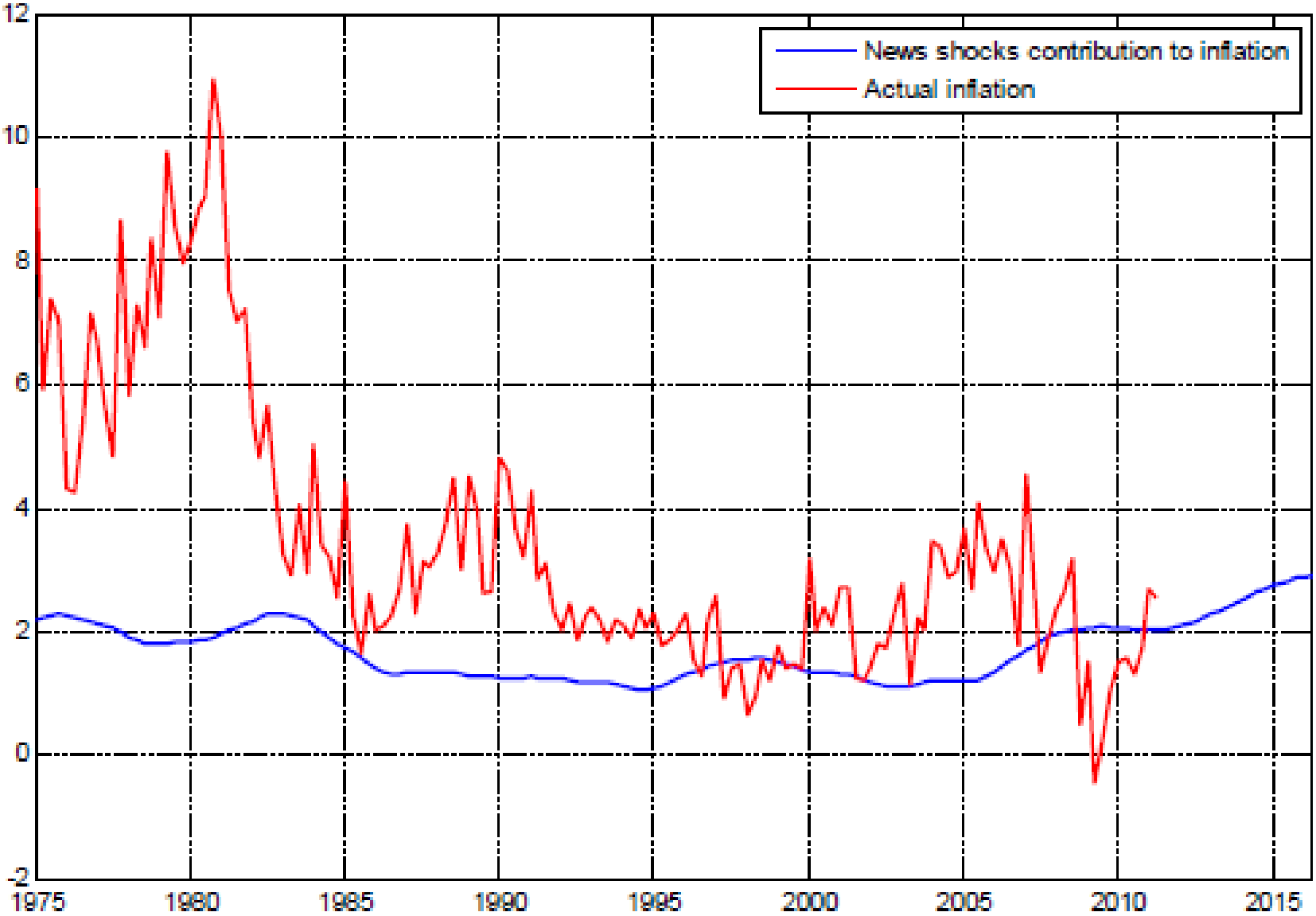
Result 2: Small quantitative role for news shocks

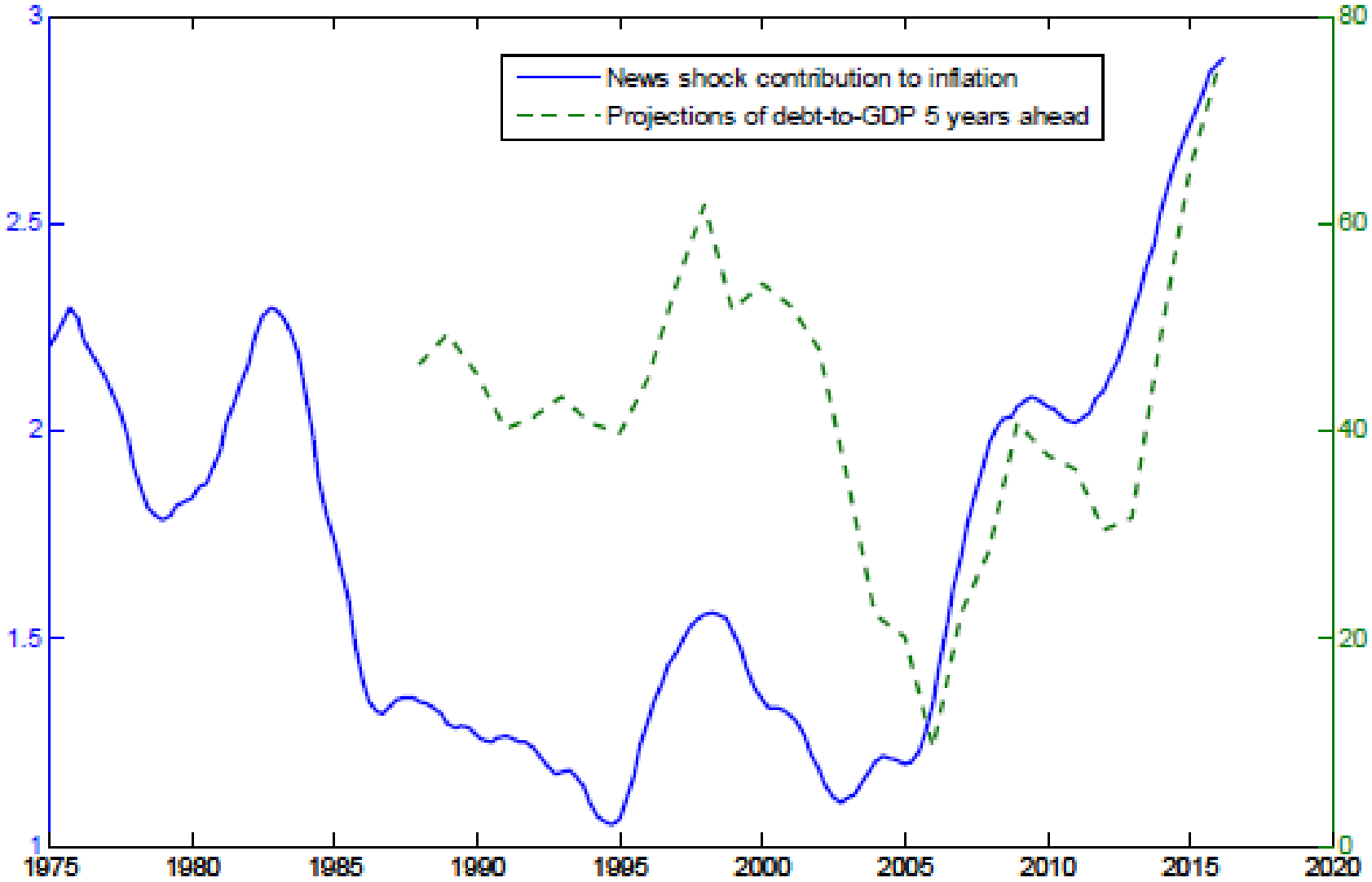
- Inconsistent with fiscal inflation interpretation?
- Sims:
  - (hyper-rational) inflation expectations = model-consistent RE + small prob(fiscal inflation)
- Leeper:
  - Markov-Switching btw active/passive MP/FP.
  - If probability of fiscal inflation regime small, real effects should be small
- Leeper-Walker:
  - Mean inflation expectations vs. high-inflation tails

$\Longrightarrow$The fact that inflation expectations are partly driven by fiscal concerns underlines the (priced) risk of fiscal inflation (although it may not have materialized)

Result 3: Fiscal inflation concerns today

- Variance decompositions suggest, on average, news not very important in the past
- ... but that may vary over time
- Contribution of news shocks to fluctuations in inflation


News shocks contribution to inflation
Actual inflation
12
10
8
6
4
2
0
-2
1975
1980
1985
1990
1995
2000
2005
2010
2015


News shock contribution to inflation
Projections of debt-to-GDP 5 years ahead
3
2.5
2
1.5
1
80
60
40
20
0
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020

Current debate

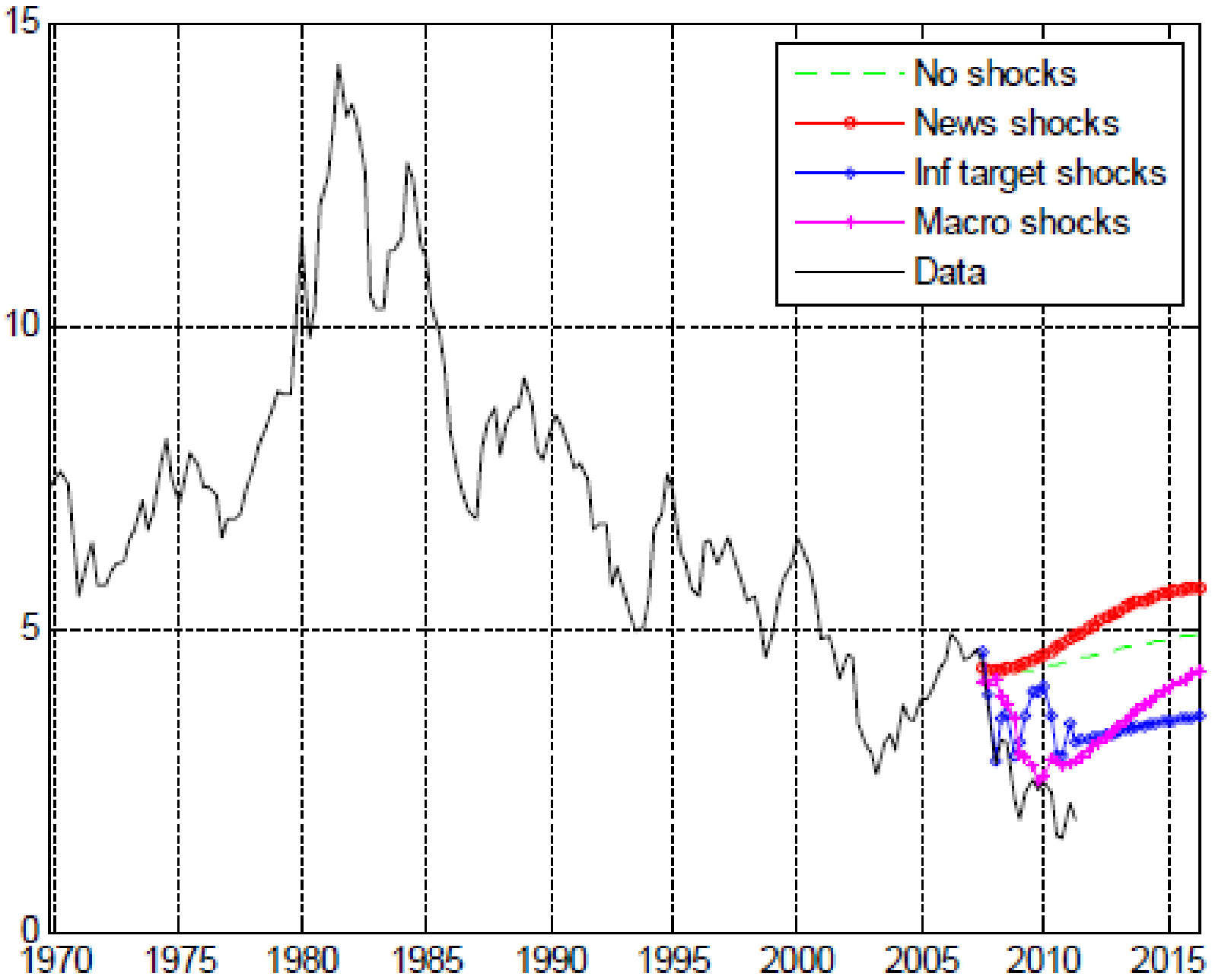
- Fed view:

"We'll worry about inflation when we see it"
$\Longrightarrow$ Fiscal inflation ignored

- Sims - Leeper - Cochrane

"Threat of fiscal inflation is present today already"

- Model:
  1. Shows empirical validity of fiscal inflation worry
  2. Explains why we don't see it (Fed view)


15
10
5
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
No shocks
News shocks
Inf target shocks
Macro shocks
Data

Why don't we observe high yields / high inflation today?

- I. Inflation-target shocks
  - <0
  - Forward guidance: short rates low now AND going forward
  - implies downward level-pressure on term structure
- II. "Real" shocks
  - combination of shocks drives Great Recession
  - $Y \downarrow \Longrightarrow E\pi \downarrow$

$\hookrightarrow$ Counteract upward fiscal inflation pressure

Hence, although there is conditional fiscal inflation pressure, can't see it in unconditional measures

Some issues

1. Lower news shock-fiscal correlation pre-1980s
2. Anticipation horizon

Lower news shock-fiscal correlation pre-1980s

- Some evidence for policy switch from PM/AF to AM/PF in eighties (Bianchi & Ilut, 2013)
- Q: Why not present in our news shock?
- A: Inflation simultaneously occurred $\Longrightarrow$ no role for anticipation

Anticipation horizon

Table 2: Correlation between inflation target news shocks at different anticipation horizons and fiscal innovations

Anticipation horizon	1966-2011	1966-1983	1984-2011
1 year	-0.03	0.08	-0.12
2 years	-0.21	-0.32	-0.13
3 years	0.01	-0.18	0.17
4 years	0.32	0.17	0.44
5 years	0.44	0.12	0.70
6 years	0.17	-0.11	0.39
7 years	0.11	0.13	0.09
8 years	0.01	-0.13	0.13

Maturity of government debt: 1) FTPL, 2) Data

Conclusions

- Standard DSGE model partly interprets historical fluctuations as related to fiscal policy (despite AM/PF policy mix)

1. Is clearly a part of inflation expectations (distilled via yields)
2. Has not been its main driver in past 50 years
3. Is becoming more important (as debt grows?)
4. Reconciles different views on fiscal inflation