Discussion of

Precautionary Pricing: The Disinflationary Effects of ELB Risk

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Disclaimer: The views expressed on the slides are my own and do not necessarily represent those of the ECB.

This paper

Explores how *'ELB risk'* affects macro outcomes *away* from the ELB using DSGE model with occasionally binding ELB constraint

Motivation:

- Some countries have started to raise policy rates from ELB
- Yet, it's possible that ELB constraint might become binding again in the future, in particular if equilibrium policy rates are low
- In the United States, for instance, market participants see 20% probability (median) of moving to ELB at some point between now and the end of 2020 (NY Fed Survey of Market Participants 07/08 2018)

ELB risk in a simple model

Semi log-linearized behavioral constraints of the private sector

$$\pi_t = \kappa y_t + \beta E_t \pi_{t+1}$$

$$y_t = E_t y_{t+1} - \sigma \left(i_t - E_t \pi_{t+1} - r_t^n \right),$$

where r_t^n follows a two-state Markov process

$$r_H^n > 0 \text{ (high state)}$$

$$r_L^n < 0 \text{ (low state)}$$

Neither state H nor state L is an absorbing state.

Monetary policy and equilibrium

- Benevolent central bank acting under discretion

$$\kappa\pi_t + \lambda y_t \begin{cases} = 0 & \text{iff } i_t > 0 \\ < 0 & \text{iff } i_t = 0 \end{cases} \quad \text{(Binding ELB)}$$

  where $\lambda \geq 0$.

- Focus on equilibrium where the ELB constraint is binding in the low state ($i_L = 0$) and slack in the high state ($i_H > 0$)

Equilibrium allocations and disinflationary bias

In the low state:

- $\pi_L < 0$
- $y_L < 0$
- $i_L = 0$ Target criterion not satisfied: $\kappa\pi_L + \lambda y_L < 0$

and in the high state:

- $\pi_H \leq 0$ NKPC: $\pi_H = \kappa y_H + \beta \underbrace{\left[(1-p_H)\pi_H + p_H\pi_L\right]}_{\mathsf{E}_H\pi<0}$
- $y_H > 0$
- $i_H < r_H^n$ Target criterion satisfied: $\kappa\pi_H + \lambda y_H = 0$

▸ Graph

Amano, Carter and Leduc (2018)

- Complement and extend existing studies on implications of ELB risk for inflation dynamics away from ELB[1]
- Augment standard non-linear New Keynesian framework with
  - recursive preferences
  - Investment + endogenous growth resulting from investment externality

  to amplify the effects of ELB risk
- In their benchmark model, average inflation away from ELB is 60bp below central bank's target

[1] e.g. Adam and Billi (2007, JME), Hills, Nakata and Schmidt (2016), Seneca (2016)

My comments

1. The size of the disinflationary bias

2. The role of investment and the investment externality

3. Implications for the design of monetary policy

1. The size of the disinflationary bias

In the United States after the December 2015 policy rate liftoff

- **Inflation** hovered below the 2% objective for quite some time
- **Unemployment rate** moved below most estimates of its natural rate
- Various measures of **inflation expectations** were below pre-crisis levels

$\rightarrow$ Seems to be consistent with models of ELB risk

1. The size of the disinflationary bias c'td

But how large should we expect the disinflationary bias to be?

Table: Mean of monthly US inflation rates (year-on-year) after liftoff

	PCE (core)	PCE (headline)	CPI (core)	CPI (headline)
-Aug. 18	1.7 %	1.6 %	2.1%	1.9%
-Dec. 17	1.6%	1.4 %	2.0%	1.7%

Smaller target deviations than in benchmark model, even so policy rates were still close to lower bound after Dec. 2015

- More sophisticated monetary policy? (QE, forward guidance, etc)

2. The role of investment and the investment externality

Production technology: $y_{i,t} = k_{i,t}^{\alpha}(A_t l_{i,t})^{1-\alpha}$.

Investment externality: $A_t = k_t$.

Would like to see more discussion of modeling choice.

How does investment externality affect the bias?

2. The role of investment c'td

Inspect the role of investment in economy *without externality* by showing results for different values of the investment-adjustment cost parameter

My intuition: Capital investment fosters disinfl. bias away from ELB

- Negative ξ shock leads to increase in desired saving and decrease in desired investment
- Away from the ELB, to equate desired saving and investment, policy rate has to decline by more than in economy with fixed capital stock
- At ELB, to equate the two output has to decline by more than in economy with fixed capital stock (Christiano et al, 2011, JPE)

3. Implications for the design of monetary policy

- Policies that improve stabilization outcomes at the ELB also mitigate disinflationary bias away from ELB

- However, ELB risk creates *trade-off* between inflation and output stabilization away from ELB $\rightarrow$ how to resolve this trade-off?

- In Nakata and Schmidt (2018, JME), we show that 'inflation conservatism' is desirable for welfare

  (In the simple model: $\lambda \downarrow \rightarrow \pi_H \uparrow \rightarrow \pi_L, y_L \uparrow$, y_H ambig.)

Conclusion

- Very interesting paper on a policy-relevant topic
- I'm looking forward to the next draft

References

Adam, K., and R. Billi (2007). Discretionary monetary policy and the zero lower bound on nominal interest rates. *Journal of Monetary Economics*.

Christiano, L., M. Eichenbaum, and S. Rebelo (2011). When Is the Government Spending Multiplier Large? *The Journal of Political Economy*.

Hills, T., T. Nakata, and S. Schmidt (2016). The risky steady state and the interest rate lower bound. ECB WP No 1913.

Nakata, T., and S. Schmidt (2018). Conservatism and liquidity traps. *Journal of Monetary Economics*.

Seneca, M. (2016). Risk shocks close to the zero lower bound. BoE, Staff WP No 606.

Background slides

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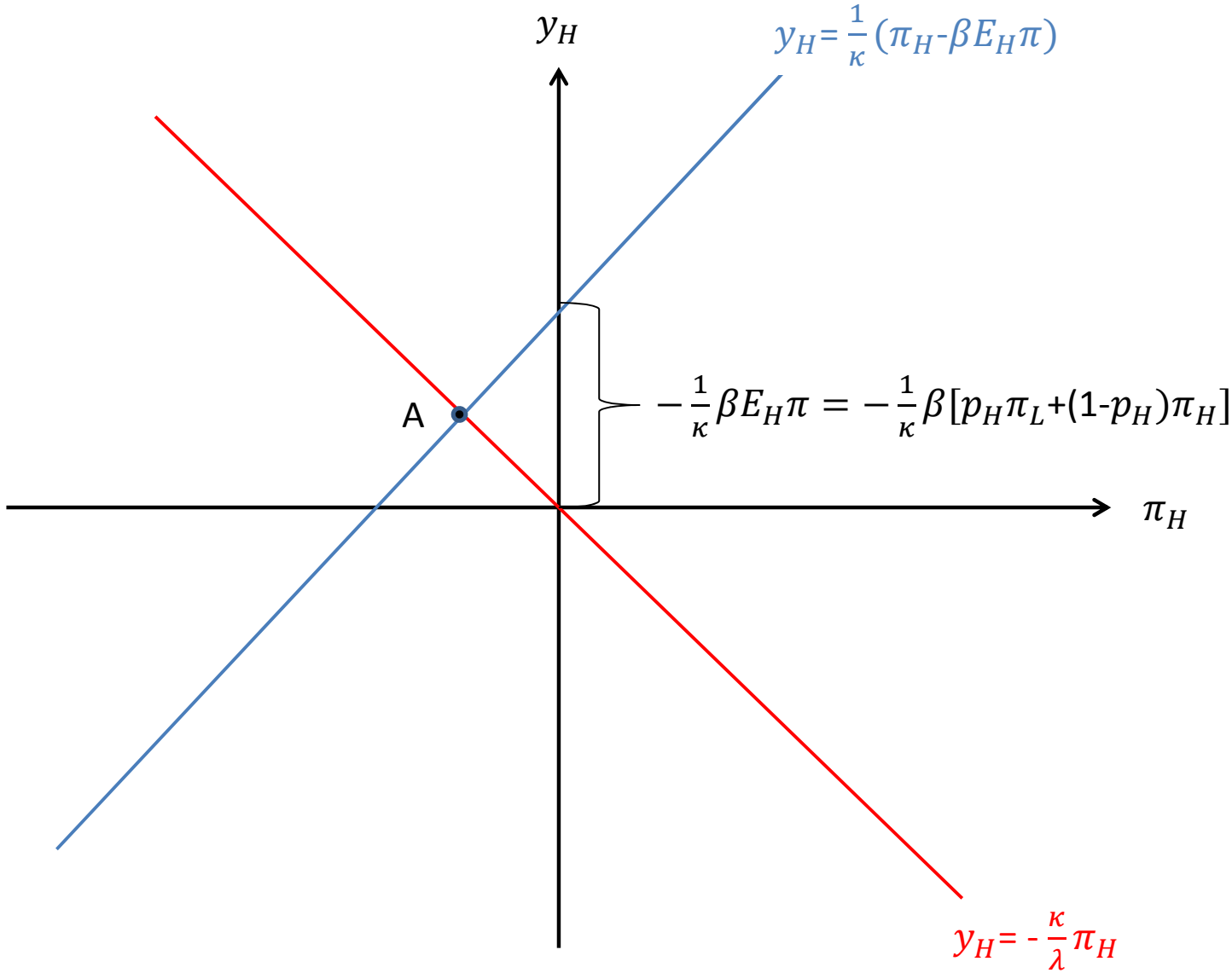
y_H
$y_H = \frac{1}{\kappa}(\pi_H - \beta E_H \pi)$
A
$-\frac{1}{\kappa}\beta E_H \pi = -\frac{1}{\kappa}\beta[p_H \pi_L + (1-p_H)\pi_H]$
π_H
$y_H = -\frac{\kappa}{\lambda}\pi_H$

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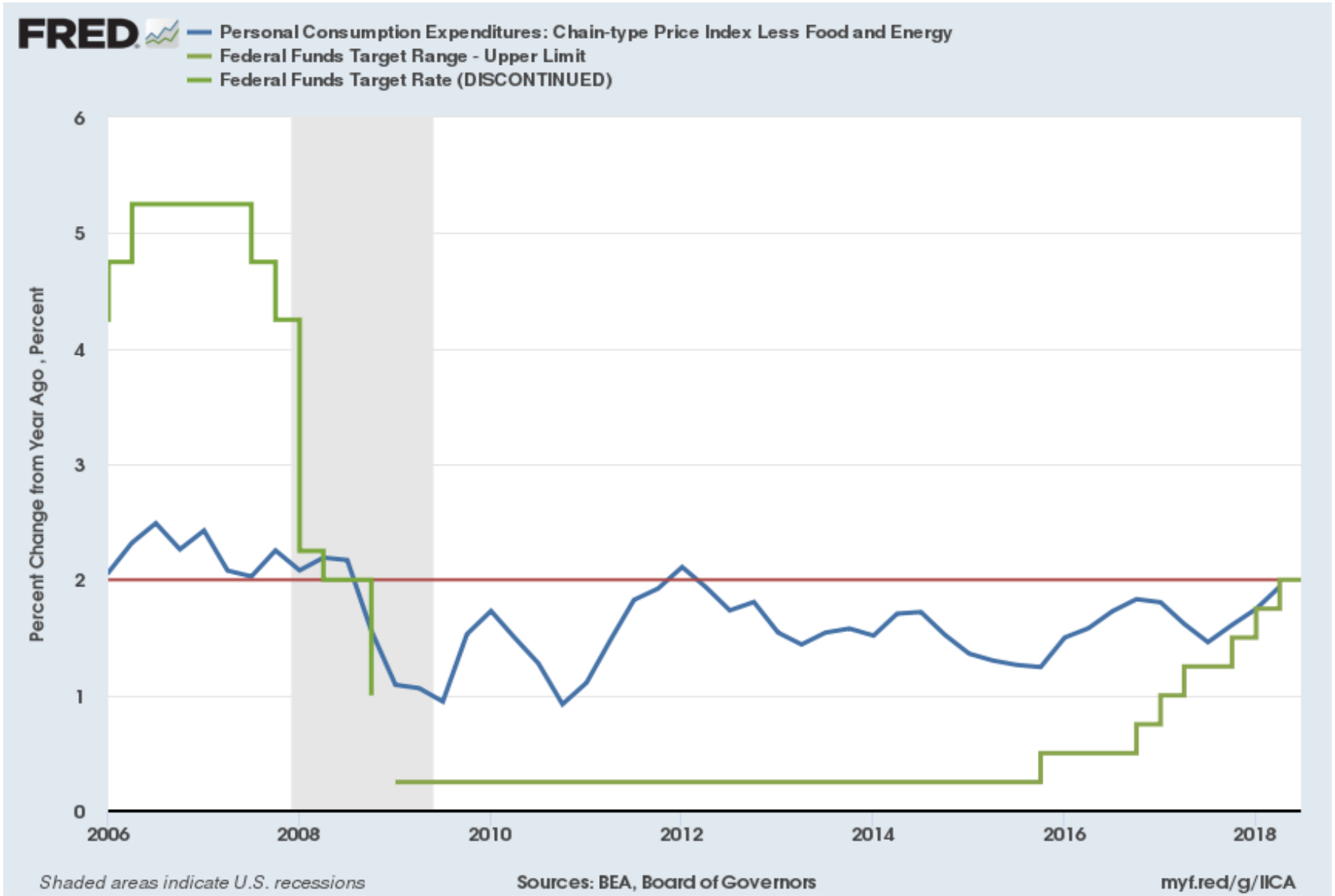
FRED
Personal Consumption Expenditures: Chain-type Price Index Less Food and Energy
Federal Funds Target Range - Upper Limit
Federal Funds Target Rate (DISCONTINUED)
Percent Change from Year Ago , Percent
6
5
4
3
2
1
0
2006
2008
2010
2012
2014
2016
2018
Shaded areas indicate U.S. recessions
Sources: BEA, Board of Governors
myf.red/g/IICA