Discussion of "The Optimal Inflation Target and the Natural Rate of Interest"

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BPEA, September 5, 2019

Overview

- Very nice paper that makes a big contribution to a critical question
- Studies how optimal inflation rate should respond to changes in natural rate of interest, taking into account lower bound on nominal rates
- Incredibly clean and transparent analysis, full of very useful results
- Carefully and comprehensively characterize the (r^*, π^*) relationship for medium-scale New Keynesian model + ZLB (or ELB) constraint
- Central bank's optimal inflation target varies considerably
- Hockey stick relationship between r^* and π^*, with slope near -1 for $r^* \leq 5\%$ and near 0 for $r^* > 6\%$ (roughly)

Discussion

- Strong result: pushes us further away from Friedman's (1969) optimal disinflation rule and from the complete price stability prescribed by the textbook NK model (*e.g.*, Woodford, 2003)
- Inflation target is not a universal constant; it varies with the economic environment and perhaps other policies: $\bar{\pi}^* \rightarrow \pi^*(\cdot)$
- My discussion approaches the results from the practical question of if /how much should target be raised
- I will push outside the basic framework to bring up some uncertainties regarding empirically-based estimates of some key components of the analysis
- Given these uncertainties, it may be more prudent to consider ZLB-specific policies, such as "make-up" policies implemented in the aftermath of ZLB realizations

Under the hood

- Analysis focuses on the following tradeoff:

  Setting a higher inflation target reduces costs associated with ZLB constraint, but entails larger welfare losses from higher inefficient price dispersion

- Three key components net out to generate the hockey-stick relationship:

  1. The average severity of ZLB episodes $(+)$
  2. The probability of entering a ZLB episode going forward $(+)$
  3. The severity of inefficient price dispersion $(-)$

The severity of ZLB episodes: Theory

- Why are ZLB episodes so much worse than a regular recession + passive monetary authority?
- Theory says: the ZLB triggers a deflationary spiral: prices fall, demand contracts, prices fall more,...
- Key to this spiral is the formation of expectations by private agents
- If when seeing that prices fall, agents expect prices will continue to fall, they converge to the deflationary equilibrium (Benhabib, Schmitt-Grohe and Uribe, 2001; Armenter, 2017)
- This can happen if agents have rational expectations: the deflationary equilibrium is a REE
- But the deflationary equilibrium is not learnable, so how do agents get there?
- Perhaps it is just a theoretical curiosity?

The severity of ZLB episodes: Practice

- Deflationary spirals have not been seen since the Great Depression
  - Even in Japan modest deflation: around -1%
- Inflation in the GR much higher than expected given drop in output:
  - High inflation expectations (Coibion and Gorodnichenko, 2015) : consumer expectations responded to oil price growth
  - Bad news: expectations in the US are unanchored $\Rightarrow$ may spiral next time
  - Informational frictions (Stevens, 2019) : firms averse to cutting prices in uncertain environment
  - Good news: precautionary motive may limit deflationary spiral
- Controlled lab experiments could be useful here
  - Encouraging news? Asset market experiments have found overvaluation relative to the RE response in markets with decreasing

The severity of ZLB episodes: Practice

- Empirical relevance of the deflationary equilibrium is unclear

  $\Rightarrow$ Analysis may overstate severity of ZLB episodes even absent alternative policy interventions

  $\Rightarrow$ We need better models of expectations formation

  $\Rightarrow$ Experiments with declining prices may provide useful data

The probability of ZLB episodes

- Model estimate: $> 10\%$ going forward if inflation target kept around 2%
- Values based on simulations of a model that is estimated (e.g. vs. Coibion et al, 2012 ZLB paper)
- Sensible: work with what you have
- But plagued by the same challenges as any attempt to estimate rare events (financial crises, sovereign defaults)
- It would be more comforting to have more data

$\Rightarrow$ A lot of uncertainty around these estimates; may be too low

The shocks bringing us to the ZLB

- ZLB probas represent what one might expect given historical shocks
- Not only the size, but also type of shocks may differ in the future:
- Increased policy uncertainty relative to Great Moderation period (fiscal and monetary) which may be inflationary [see U.S. circa 1960s and 1970s]
- Increased risk taking in a low r^* environment may increase likelihood and magnitude of financial shocks in the future, which may contribute to inflation
    - Lian and Ma (2018) controlled lab experiment: individuals show stronger preference for risky assets when the risk-free rate is low
    - More risk taking may fuel more financial cycles that may generate inflation variability: Abbate et al (2017): financial shocks can move output and inflation in opposite directions

The shocks bringing us to the ZLB

$\Rightarrow$ Inflationary shocks may make it more costly for the Fed to control inflation; costs rise sharply as inflation rises above 5%

$\Rightarrow$ Such shocks may also limit deflationary spirals that make ZLB episodes so costly, tipping the scales towards a lower inflation target

The severity of pricing frictions

- Model uses nominal price and wage rigidities a la Calvo plus exogenous indexation, estimated to match some time series
- The estimated values imply low price rigidity

  $\Rightarrow$ low level of inefficient price dispersion $\Rightarrow$ higher inflation not so costly

  $\Rightarrow$ the severity of pricing rigidities during ZLB episodes is low $\Rightarrow$ the deflationary spiral more severe $\Rightarrow$ ZLB episodes more costly
- Both of these effects bias inflation target upwards
- Alternative: estimate values of these parameters to match the degree of monetary non-neutrality by matching the effects of monetary policy shocks on output in non ZLB times

The nature of pricing frictions

- Results may not be robust to nature of pricing frictions
- Calvo frictions do not generate a good approximation of the welfare costs of nominal price rigidities (Sheremirov, 2019)
- They under-estimate the level of inefficient price dispersion vs. the data
- They generate a sensitivity of inefficient price dispersion to inflation that is at odds with the data
- Alternatively Morales-Jimenez and Stevens (2019) model of inattentive pricing matches price dispersion in the data and yields
    - higher price rigidity
    - larger inefficient price dispersion for a given level of inflation
    - both of which point to lower inflation target

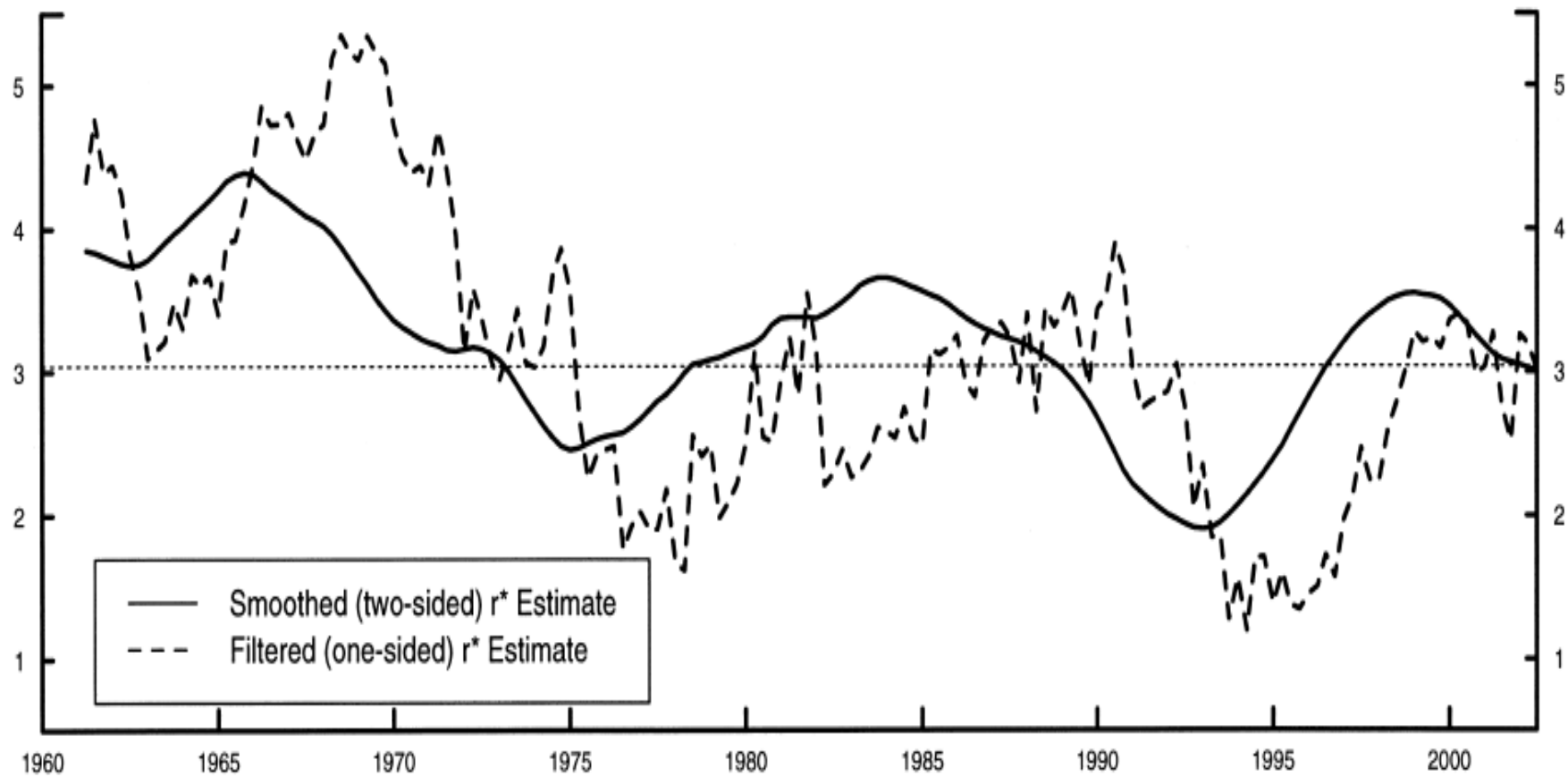
Natural rate uncertainty

- The paper is motivated by growing evidence of a persistent decline in risk free rates around the world

- But estimates of r^* are very imprecise, depend on the estimation method, are subject to considerable revisions as we accumulate more data

Natural rate uncertainty

FIGURE 1.—ONE- VS. TWO-SIDED ESTIMATES OF THE NATURAL RATE OF INTEREST (BASELINE MODEL)

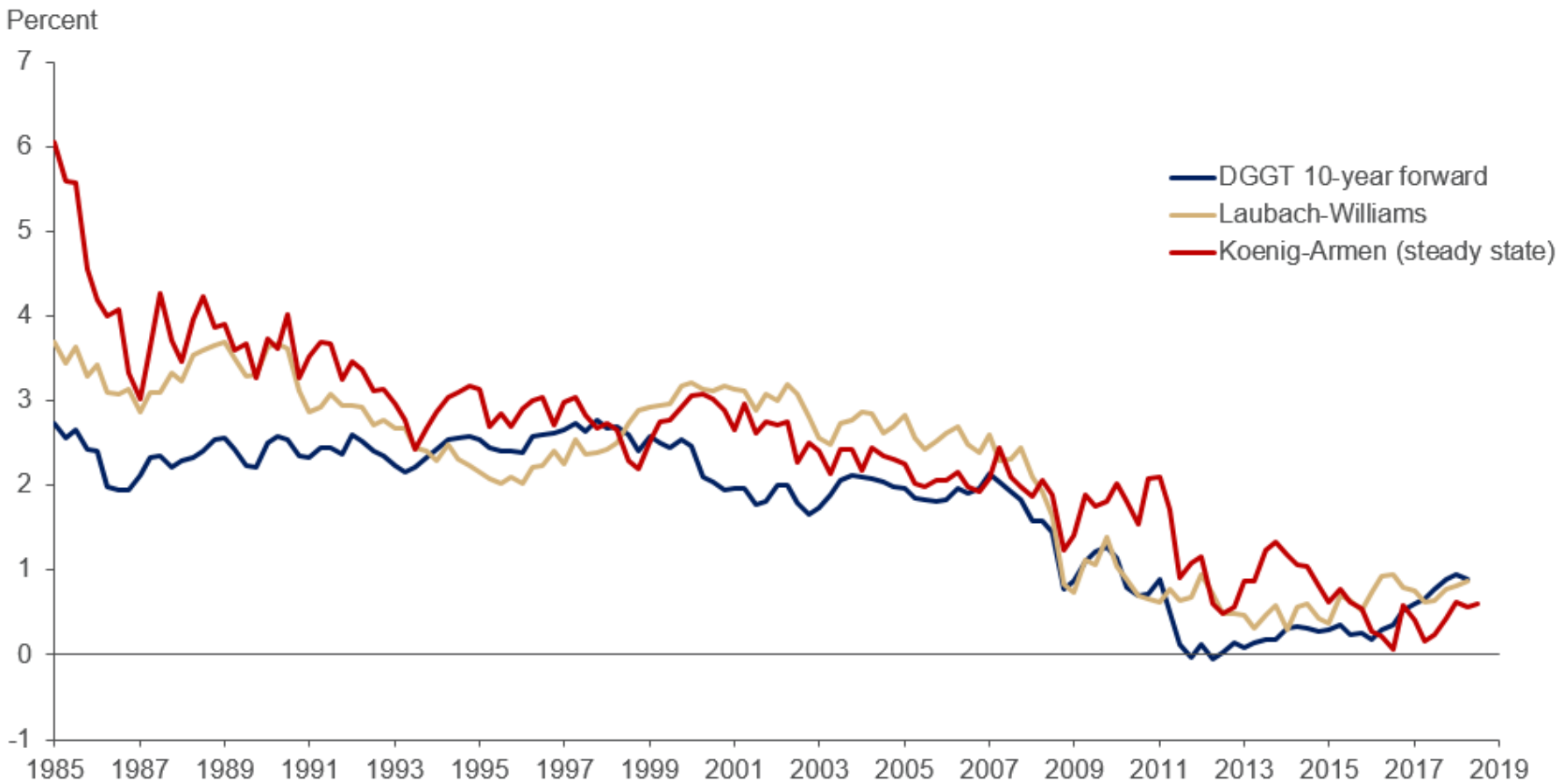


The solid line shows the smoothed (two-sided) estimates of the natural rate of interest for the baseline specification in which z is assumed to follow a random walk. The dashed line shows the corresponding filter (one-sided) estimates.

Laubach and Wiilliams (2002) one-sided and two-sided estimates

Natural rate uncertainty

Chart A-1
Estimates of the Longer-Run Real Neutral Rate



SOURCES: Laubach and Williams (2003), Armen and Koenig (2015), Del Negro et al. (DGGT) (2017).

range of estimates from different studies

Natural rate uncertainty

- This uncertainty that not only is there a risk that what is perceived as a permanent decline in r^* turns out to be transitory
- ... but there is also the practical difficulty of knowing what the rate currently is so as to know what the current inflation target should be
- The model predicts that the inflation target is very sensitive to changes in the real rate for rates below 5%
- This would call for an unstable inflation target
- We may prefer instead to solve for a robust policy in the face of natural rate uncertainty (Orphanides and Williams, 2002)

More practical considerations

- Results imply considerable variation in optimal inflation target in the U.S.

  1.2% circa 1990 ($r^* = 3.5\%$)

  2.2% circa 2005 ($r^* = 2.5\%$)

  3.5% circa 2015 ($r^* = 1.0\%$)

  4.2% circa 2020 ($r^* = 0.5\%$)

  $\Rightarrow$ Increasingly frequent increases in the inflation target!

  - how to implement?
  - what will people think?

Interpretation, Credibility, Expectations

- How should we expect private agents to interpret and respond to such a path of the inflation target?
- Private agents could have one or more interpretations of a given policy action
  - correctly understand and respond to the change
  - think inflation target has been abandoned
  - not believe the commitment to a higher target long term

  $\Rightarrow$ High likelihood of increased dispersion in beliefs and unanchoring of expectations
- Mixture of beliefs regarding the new policy regime $\Rightarrow$ loss of effectiveness

  $\rightarrow$ Similar to Andrade, Gaballo, Mengus and Mojon (2017) results concerning effectiveness of FG with heterogeneous beliefs

Interpretation, Credibility, Expectations

- Private agents could also differ in how they update beliefs — immediately, or in a gradual, adaptive way — resulting in very different welfare implications

- Experiments on the formation of expectations find significant support for gradual adjustment rather than discrete updating to regime changes

- Khaw, Stevens, Woodford (2019) experiment in a strategic environment with regime changes: noisy, adaptive learning

- Consequences? Branch and Evans (2015): increasing inflation target when agents have adaptive expectations $\Rightarrow$ bad outcomes including overshooting target

Alternative policies

- One key result: smaller changes in inflation target are optimal when
  - the monetary authority implements price level targeting (in which case the estimated slope is closer to -0.3 rather than -0.9)
  - the inflation-based rule features higher interest rate smoothing (with slope around -0.7)
- Both alternatives substantially reduce the costs of the ZLB constraint
- I found this deviation very encouraging!

Conclusion

- Given the big uncertainty surrounding
  - the risks of deflationary spirals and the depth of ZLB recessions
  - the proba of hitting the ZLB going forward
  - inflationary pressures going forward
  - the prevailing rate of natural interest and its stability
  - the costs of higher target inflation
  - how private expectations would react

- it may be much more prudent to focus on ZLB-specific policies
  - e.g. pursuing 'lower-for-longer' policy for the nominal rate upon exiting the ZLB (Reifschneider and Williams, 2000; Bernanke, 2017; Yellen, 2018)

- rather than trying to implement a higher inflation target uniformly
  - which increases distortions
  - to help deal with infrequent episodes
  - of unknown frequency and severity.