

# A Behavioral New Keynesian Model: Dynare Implementation

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Current Research in Macroeconomics

January 14, 2017

# Overview

- 1 Model Recap
- 2 The Forward Guidance Puzzle
- 3 The Zero Lower Bound

# Gabaix' Behavioral Approach

- Attempts to tackle some of the **puzzling “aggregate outcomes”** of the traditional New Keynesian model
- Addition of a new **parameter “M”** representing myopia of economic agents. Large consequences for monetary and fiscal policy!
  - ▶ Myopia = “Short-sightedness” - agents can't see very far into the future
- New version of the paper posted on December 26th
  - ▶ Minor changes to the main model, mostly involving parameter specification

# Five Major Implications

- 1 **Forward Guidance Puzzle**: FG is now less powerful.
- 2 **Fiscal Policy**: Traditionally Ricardian Equivalence no longer holds, so lump-sum tax cuts **do** have an effect on consumption.
- 3 **Zero Lower Bound**: Recessions are only “**boundedly costly**” at the ZLB
- 4 **Equilibrium Selection**: The model is now “**deterministic**”.
- 5 **Neo-Fisherian Paradox**: Inflationary effects of monetary policy are now “Keynesian” in the short-run and “Fisherian” in the long-run.

# Five Major Implications

- In his new version, Gabaix describes two additional implications of his model:
  - ▶ Explains why economies at the ZLB can be stable
  - ▶ Qualitative changes in optimal policy when firms are behavioral
- For today, we will focus on the implications of the model for **Forward Guidance** and the **Costliness of the Zero Lower Bound**

- The Behavioral IS-Curve:

$$x_t = M E_t[x_{t+1}] - \sigma(i_t - E_t\pi_{t+1} - r_t^n)$$

- The Behavioral Phillips Curve:

$$\pi_t = \beta M^f E_t[\pi_{t+1}] + \kappa x_t$$

# Breakdown of 'M'

- There are three main behavioral parameters:

$$M = \frac{\bar{m}}{R - m_y(R - 1)}$$

$$\sigma = \frac{m_r}{(\gamma R(R - (R - 1)m_y))}$$

$$M^f = \bar{m}(\theta + m_\pi^f(1 - \theta))$$

- Kappa also has a behavioral component:

$$\kappa = \left(\frac{1}{\theta} - 1\right)(1 - \beta\theta)(\gamma + \phi)m_x^f$$

- What about the other parameters  $\bar{m}$ ,  $m_y$ ,  $m_r$ ,  $m_\pi^f$ , and  $m_x^f$ ?

# Parameterization

Parameter	Traditional Model	Behavioral Model
$\bar{m}$	1	0.85
$m_y$	1	1
$m_r$	0.2	0.2
$m_{\pi}^f$	1	1
$m_x^f$	0.2	0.2
$\beta$	0.99	0.99
$\phi$	1	1
$\theta$	0.7	0.7
$\gamma$	1	1
$\rho$	0.5	0.5

Table: Left: Rational households; Right: Myopic households



- Focus on the Forward Guidance Puzzle and the Costliness of the ZLB
- For each analysis, we looked at the effects of shocks across three cases:
  - 1 Traditional Model ( $M = 1$ )
  - 2 Household Myopia ( $M < 1$  for individual households)
  - 3 **Household & Firm Myopia** ( $M < 1$  for household and  $M^f < 1$  firms)??

# Forward Guidance in Dynare

- Gabaix uses a more general approach to Forward Guidance that is independent of the ZLB
- He follows the approach used by McKay, Nakamura, and Steinsson in their 2016 papers on the Euler Equation and Forward Guidance Puzzle:
  - ▶ The central bank follows a “naive” interest rate rule:

$$r_t = i_t - E_t \pi_{t+1} = r_t^n + \epsilon_{t,t-j}$$

- ▶  $\epsilon_{t,t-j}$ : A shock to period  $t$ , becomes known in period  $t - j$
- ▶ e.g. A one-time 1% rate cut is announced to take place several years in the future

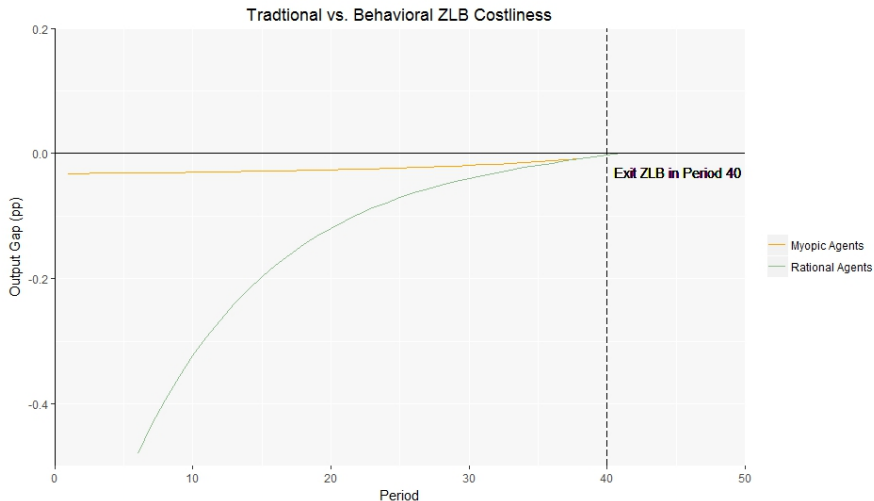
# Forward Guidance in Dynare

- figures

- We implemented the ZLB using a large, negative technology shock in conjunction with the `max` operator in MATLAB
- The simulation implements a ZLB for 40 periods (10 years), with a lift-off in period 41
- The same "naive" central bank policy rule from McKay, Nakamura, and Steinsson (2016) applies here as well

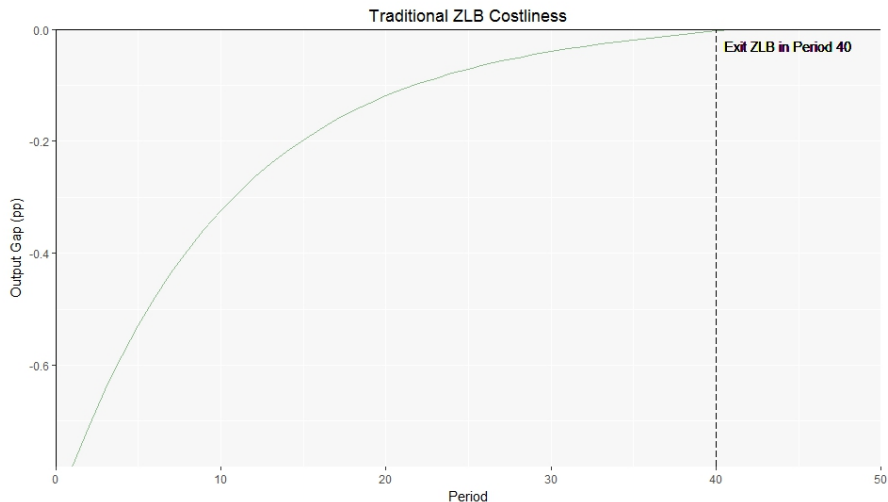
# ZLB in Dynare

- The response of the output gap when the economy is at the ZLB for 40 periods:



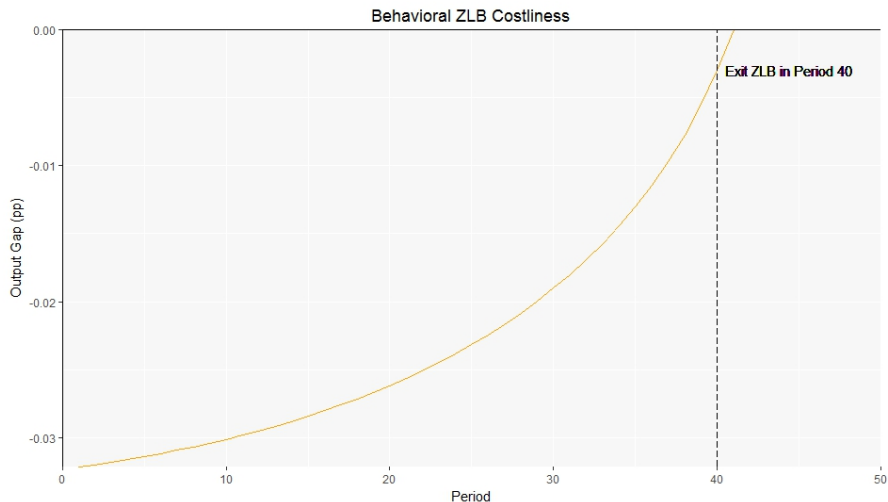
# Traditional Model: A Closer Look

- **Qualitatively** we observe a potentially **unbounded** recession:



# Behavioral Model: A Closer Look

- The shape of the the behavioral response tells the opposite story:



# Final Thoughts

- We were able to successfully reproduce Gabaix' results using Dynare
- However, his approach to modeling central bank policy-making seems overly simplified and serves mainly to explain his underlying concept



# References

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