Xavier Gabaix (2016): A Behavioral New Keynesian Model

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Overview

Title?

- $C_0 = b(C0 + \frac{C_1}{R_0})$
- true income: $y_1 = y_1^d + \hat{y}_1$
- perceived income with myopia: $y_1^s = y_1^d + \bar{m}\hat{y}_1$
- $C_0 = \frac{b}{1-b}((1-\bar{m})d_0 + \frac{Y_1}{R_0})$
- $\frac{\delta Y_0}{\delta \Gamma_0} = \frac{b}{1-b}(1-\bar{m})$
- $\frac{\delta Y_0}{\delta G_0} = 1 + \frac{b}{1-b}(1-\bar{m})$
- $\frac{b}{1-b}$: multiplier
- $\hat{y}_1 = \Gamma$ (i.e. tax)
- d_0: deficit

The Behavioral Agent: Rational vs. Behavioral Consumption

- Gabaix's derivation of the IS and Phillips curve starts with the individual consumption function $c_t = c_t^d + \hat{c}_t$
- $\hat{c}_t$, the deviation from default consumption c_t^d, is where agent's (ir)rationality comes into play
- There are different myopia parameters: $\bar{m}$ is a general "cognition discounting" parameter, m_r and m_y allow for agents beeing partly inattentive to innovations in r or y

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The Behavioral Agent: Rational vs. Behavioral Consumption

- $\hat{c}_t$ is the agent's *rational* expectation

$$\hat{c}_t = E_t[\sum_{\tau \geq t} \frac{1}{R^{\tau - t}}(b_r(k_r)\hat{r}_\tau + b_y \hat{y}_\tau)] + O(||x||^2)$$

- $b_r(k_t) := \frac{\frac{r}{R}k_t - \frac{1}{\gamma}c^d}{R^2}$ and $b_y := \frac{r}{R}$ are the sensitivities of consumption to an increase in r or y
- With myopic agents, expectation is *subjective* as $\bar{m}$, m_r and $m_y < 1$:

$$\hat{c}_t = E_t^s[\sum_{\tau \geq t} \frac{\bar{m}^{\tau - t}}{R^{\tau - t}}(b_r(k_r) m_r \hat{r}_\tau + b_y m_y \hat{y}_\tau)] + O(||x||^2)$$

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The Behavioral IS Curve

- From individual consumption function to aggregate demand: in a New Keynesian world without capital, $\hat{y}_\tau = \hat{c}_\tau$ and $x_\tau = \frac{\hat{y}_\tau}{c^d}$, which gives

$$x_t = E_t[\sum_{\tau \geq t} \frac{\bar{m}^{\tau - t}}{R^{\tau - t}}(b_y m_y x_\tau + \tilde{b_r} \hat{r}_\tau)]$$

- Gabaix uses $M := \frac{\bar{m}}{R - r m_y} \in [0, 1]$ (attention parameter) and $\sigma := \frac{m_r}{\gamma R(R - r m_y)}$ (governs reactions of x_t to changes in $\hat{r}t$)
- After some steps, he arrives at

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

- If agents are perfectly rational and $M = 1$, we have the traditional IS curve

The Behavioral IS Curve

- So what about reactions to a one-time fall of the real interest rate?
- With common knowledge of rationality, agents also expect future consumptions of other agents to increase, resulting in a large multiplier
- Most experimental setups reject this strong assumption
- Bounded rationality: partial inattention to future changes as well as inattention to indirect effects on other lead to a smaller multiplier
- More realistic?

The Behavioral IS curve and Fiscal Policy

- Transfers (Γ) and government debt (B), but no government consumption: budget deficit is $d_t = \Gamma_t + rB_t$
- Iteration gives that *subjective* expectation of Γ at time τ is $E_t^s[\Gamma_\tau] = -\frac{r}{R}B_t + m_y\bar{m}^{\tau-t}(d_\tau - r\sum_{u=t}^{\tau-1} d_u)$
- Partially rational agents anticipate that a given initial debt has to be repaid, but only partly capture future deficits
- The modified IS curve:

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

- $b_d = \frac{rm_y}{R-m_y r}\frac{R(1-\bar{m})}{R-\bar{m}}$ is the sensitivity to budget deficits
- Tax cuts do have an impact!

The Behavioral Phillips Curve

- Phillips curve with partially rational firms:

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

- With $M^f := \bar{m}[\theta + (1-\theta)\frac{1-\beta\theta}{1-\beta\theta\bar{m}} m^f]$ and $\kappa = \bar{\kappa} m^f$, where θ is price stickiness and m^f inattention to future markup innovations
- Firms are more forward-looking (βM^f higher) for higher price stickiness (θ higher)
- Also, they pay more attention to future macro outcomes (m^f), because "they simply have to" (Gabaix 2016, p. 19)
- Myopia seems to be less of a problems for firms

Empirical Evidence

- Galí and Gertler (1999) find, with a $\beta \simeq 0{,}95$, that a $\beta M^f \simeq 0.75$ is necessary, which leads to an $M^f \simeq 0.8$
- A $\theta = 0.2$ (80% of firms can reset their prices after a year) would then lead to an $m^f = 0.75$
- Johnson et al. (2006) show that tax rebates have a substantial effect on aggregate consumption demand
- Ricardian equivalence doesn't seem to hold empirically, which implies b^d is in fact greater that zero

The Big Picture

Traditional NK

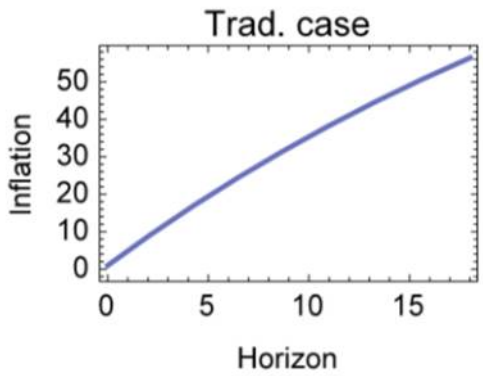
- Announcement of *future* rate change matters today
- Unboundedly costly ZLB
- Multiple Equilibria
- Elusive Keynesian short-run deflation

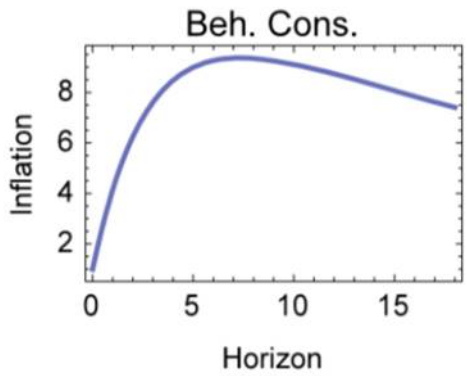
Behavioral NK

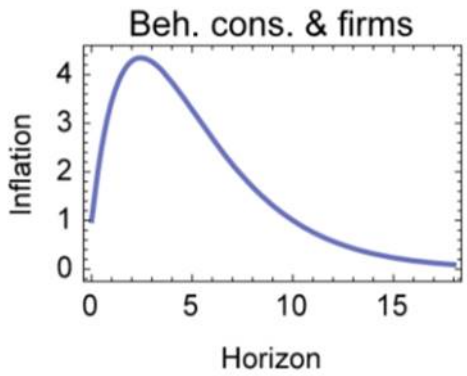
- *Initial* conditions have large impact today
- Less costly ZLB
- Single Equilibrium
- Keynesian short-run, Fisher long-run

Forward Guidance Puzzle

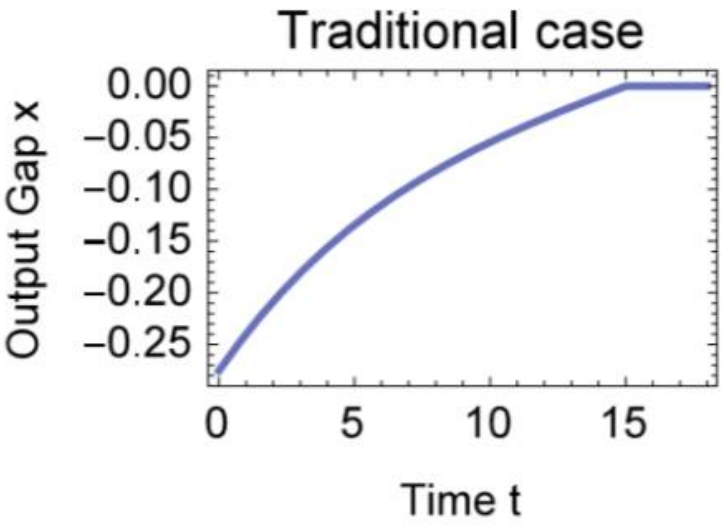
- The further in the future the CB announces rate cut, the less inflation *today* is impacted:

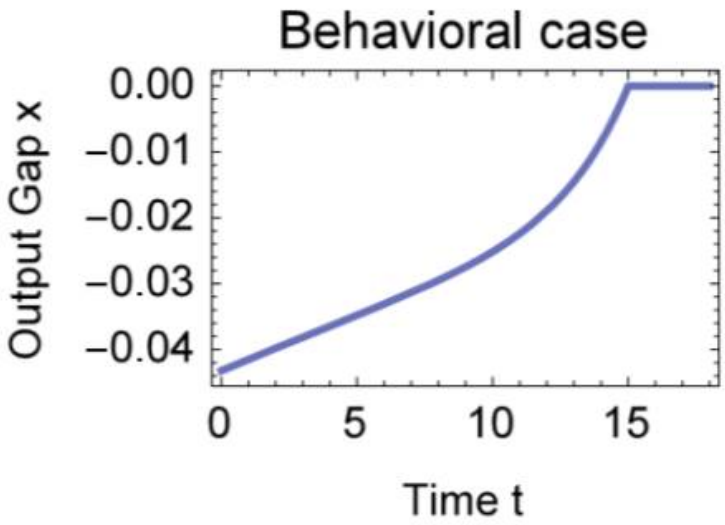




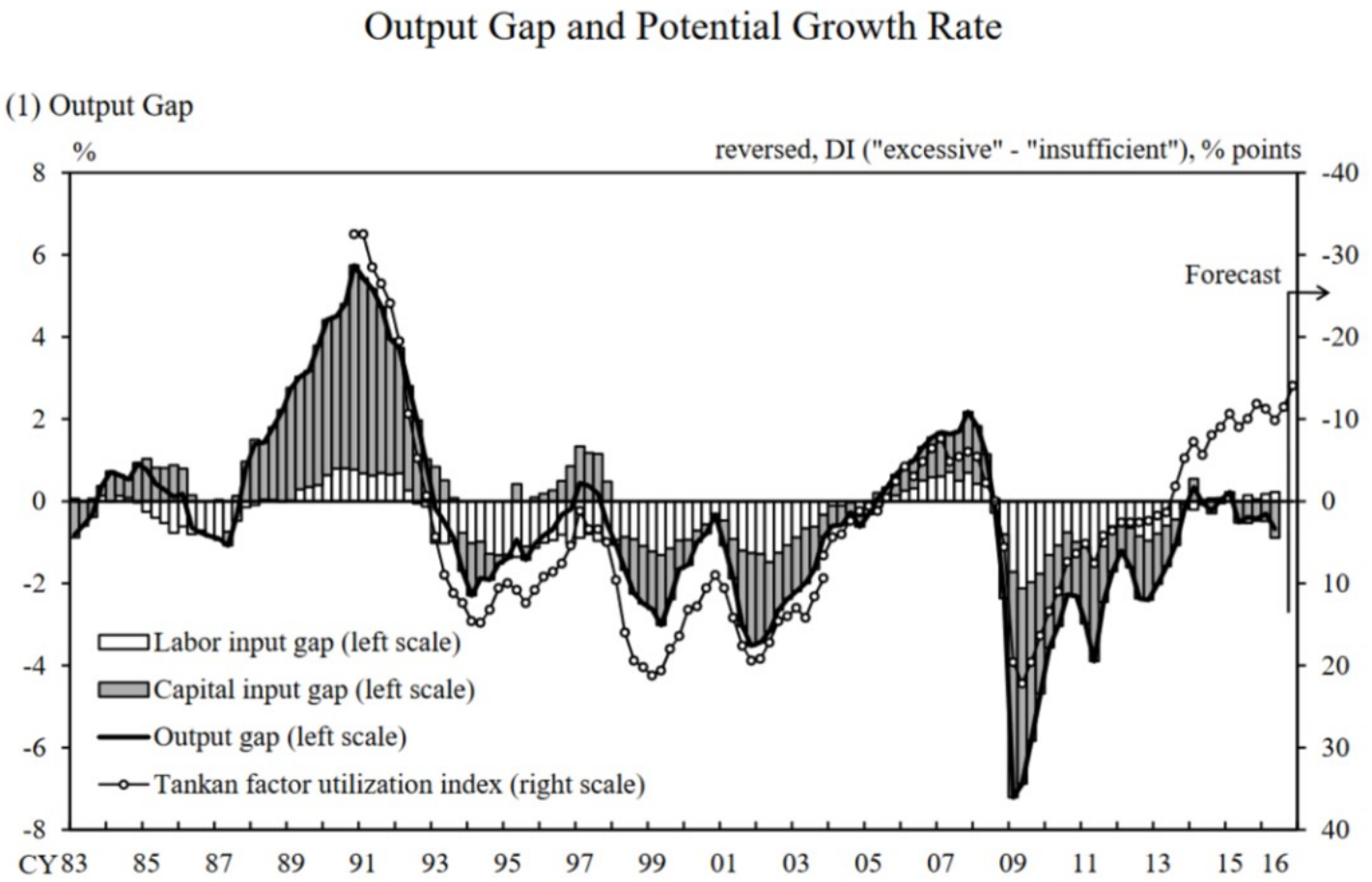


Less Costly ZLB





Less Costly ZLB



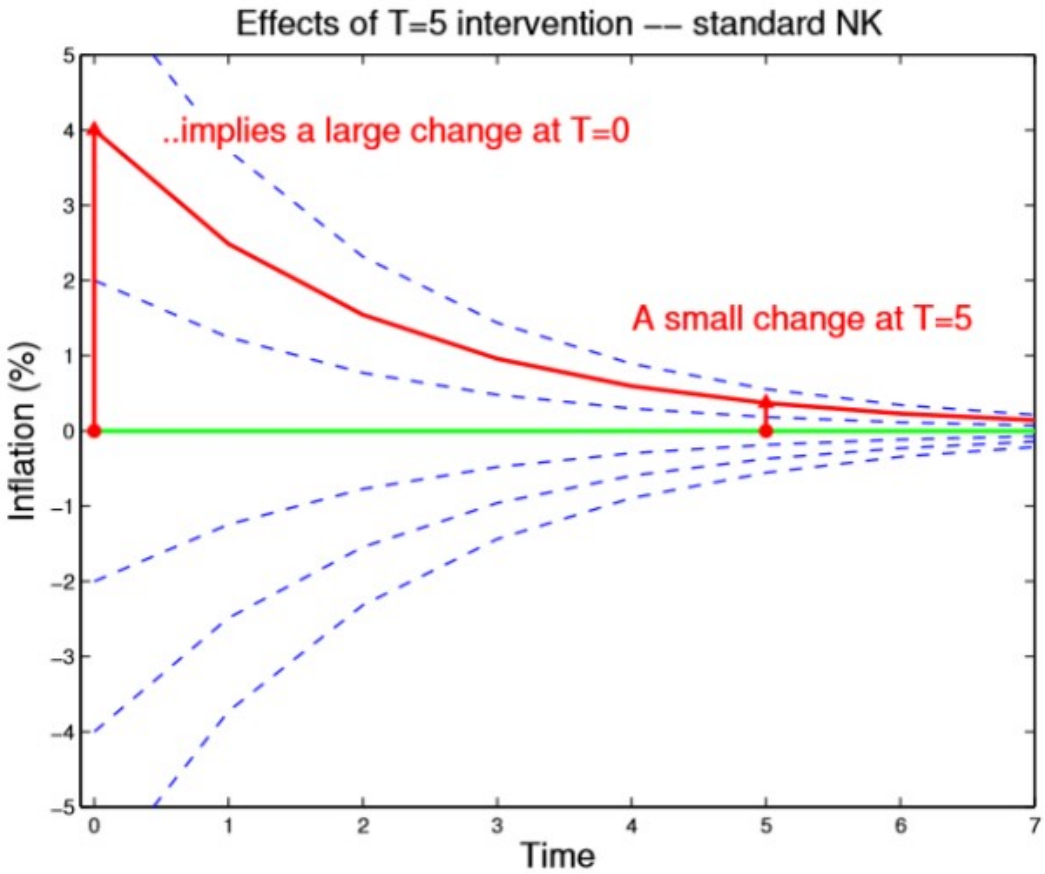
- ZLB in Japan since the 1990s is only boundedly costly

Deterministic Model

- Taylor Rule: $\hat{R}_t = \Phi_\pi \hat{\Pi}_t + \Phi_x x_t + \epsilon_t$
- $M < 1$ instead of $\phi > 1$ due to ZLB
- Restore determinacy under passive monetary policy (Cochrane, pp. 6)
- Sunspot Equilibria in traditional model

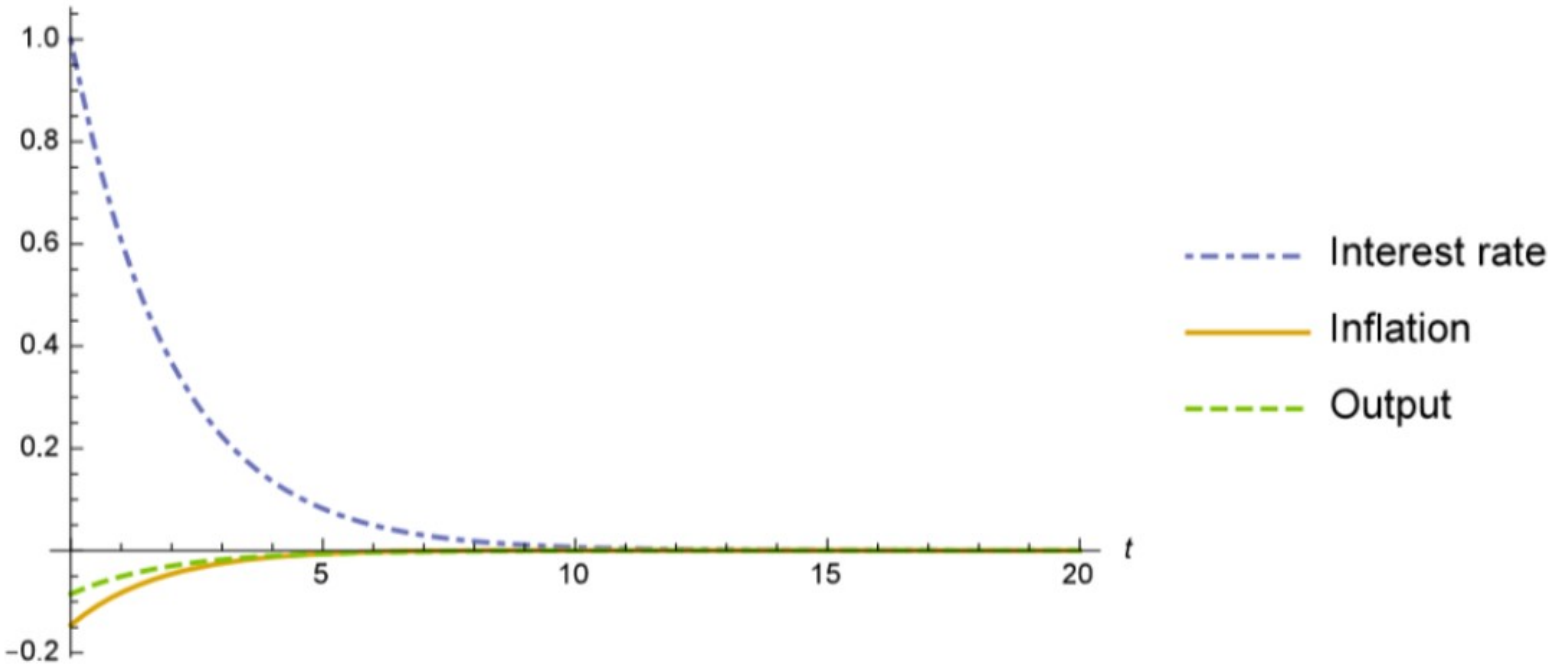
Deterministic Model and Forward Guidance

- $i = 0, M = 1, \phi = 1$
- More than one stable path



Fisher and Keynes

- Inflation and Output after a temporary increase in the nominal interest rate:



Cochrane Critique

- Undoubtedly an important paper
- Main contribution: replace active monetary policy (impossible at ZLB) with behavioral parameter
- $M < 1$ instead of $\phi > 0$
- Too important to be true (Cochrane, pp. 15)
- Poor and unnecessary (?) behavioral foundations
- Alternative models to Gabaix (Cochrane 2016b)

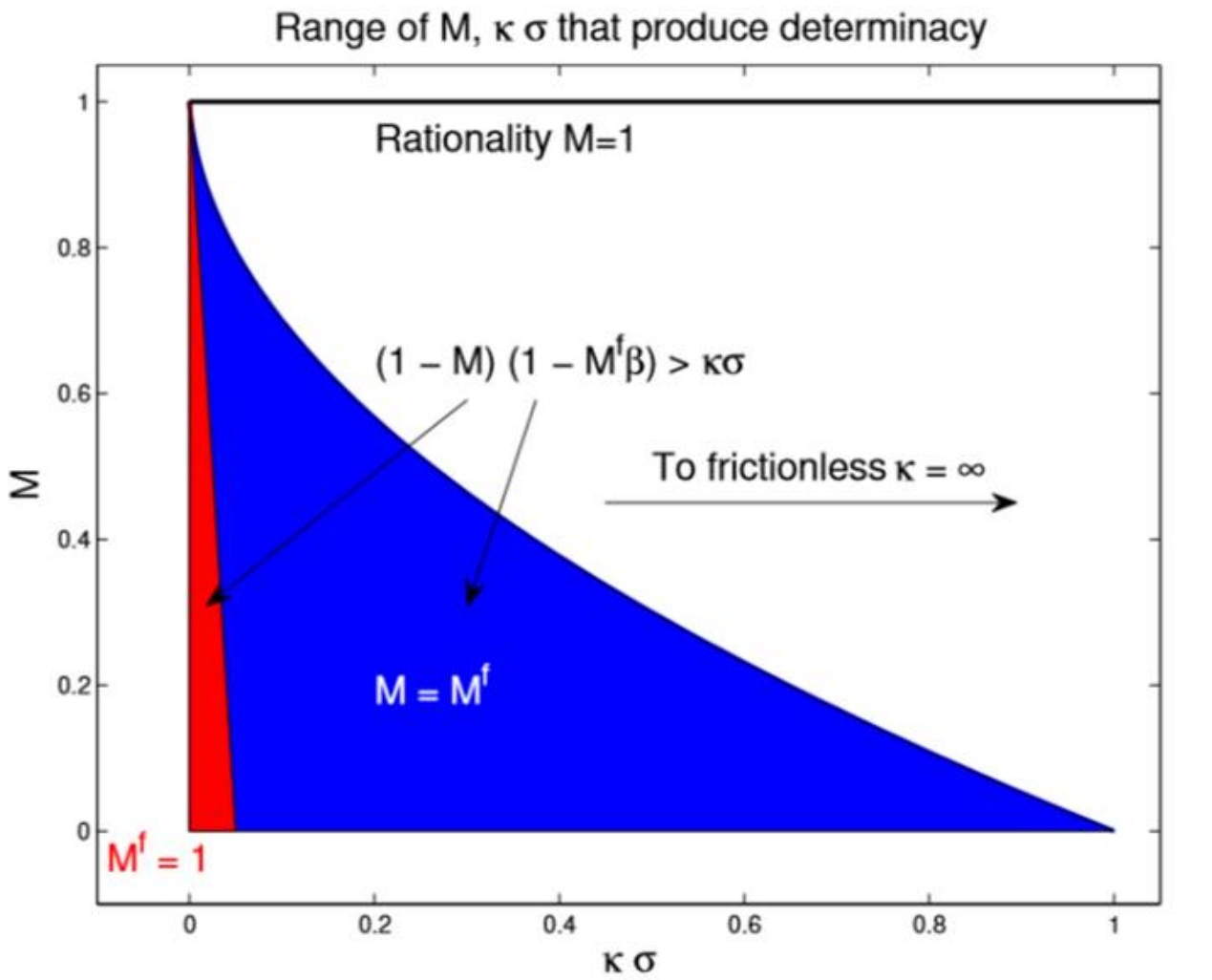
Cochrane Critique

- Rather than assuming rationality and accepting irrational influence, Gabaix assumes irrationality
- If people become more rational or prices become flexible, problems might emerge
- Why? Price flexibility demands more irrationality to achieve deterministic result
- Can the behavioral foundations be taken seriously?

Cochrane Critique

- Model in reduced form

Cochrane Critique



In a nutshell

- In conclusion, we have a model with quite systematic microfoundations, empirical support in its non-standard features, that is also simple to use. (Gabaix, pp.34)
- Gabaix offers a fundamental change of the basic story of monetary economicsA discrete and large amount of irrationality lies at the core of the basic sign, stability, and mechanism of monetary policy. (Cochrane, pp. 23)