Comments on "A Behavioral New-Keynesian Model" by Xavier Gabaix

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What the paper does

People pay attention $M \leq 1$ to future income / inflation

$$x_t = M E_t x_{t+1} - \sigma(i_t - E_t \pi_{t+1}) \tag{1}$$
$$\pi_t = M^f \beta E_t \pi_{t+1} + \kappa x_t \tag{2}$$
$$i_t = \phi \pi_t + \hat{\imath}_t. \tag{3}$$

Write as

$$E_t x_{t+1} = \frac{1}{M} \left[x_t + \sigma(i_t - E_t \pi_{t+1}) \right] \tag{4}$$
$$E_t \pi_{t+1} = \frac{1}{M^f} \frac{1}{\beta} \left[\pi_t - \kappa x_t \right] \tag{5}$$

$M < 1$ induces *instability* to get *determinacy* in place of $\phi > 1$.

A more careful statement

Write model in standard dynamic form

$$E_t \begin{bmatrix} x_{t+1} \\ \pi_{t+1} \end{bmatrix} = \frac{1}{\beta M^f M} \begin{bmatrix} \beta M^f + \sigma\kappa & \sigma\left(\beta M^f \phi - 1\right) \\ -\kappa M & M \end{bmatrix} \begin{bmatrix} x_t \\ \pi_t \end{bmatrix} + \frac{\sigma}{M} \begin{bmatrix} \hat{\imath}_t \\ 0 \end{bmatrix}$$

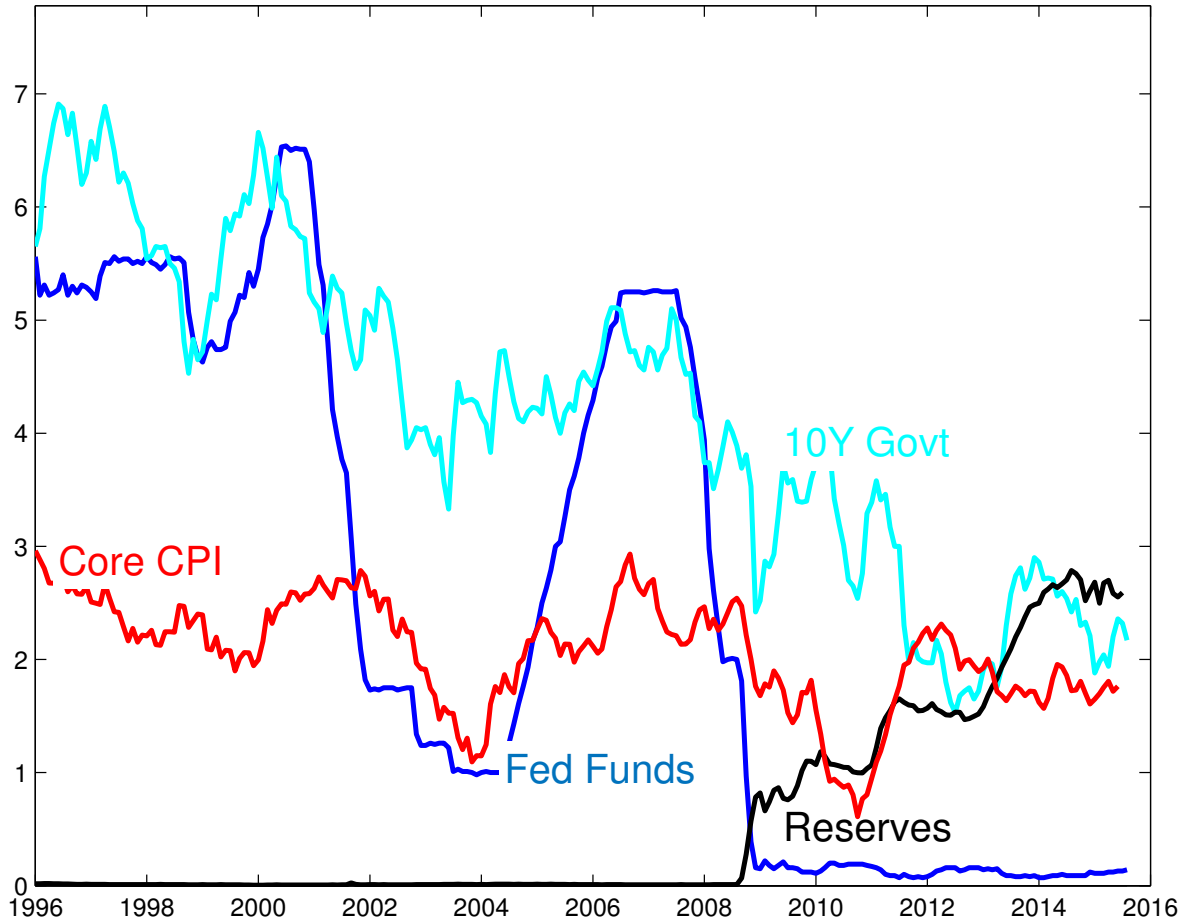
$$E_t z_{t+1} = A z_t + v_t = Q \Lambda Q^{-1} z_t + v_t$$

Both eigenvalues $\lambda > 1$ if

$$\phi + \frac{(1 - M)\left(1 - M^f \beta\right)}{\kappa\sigma} > 1.$$

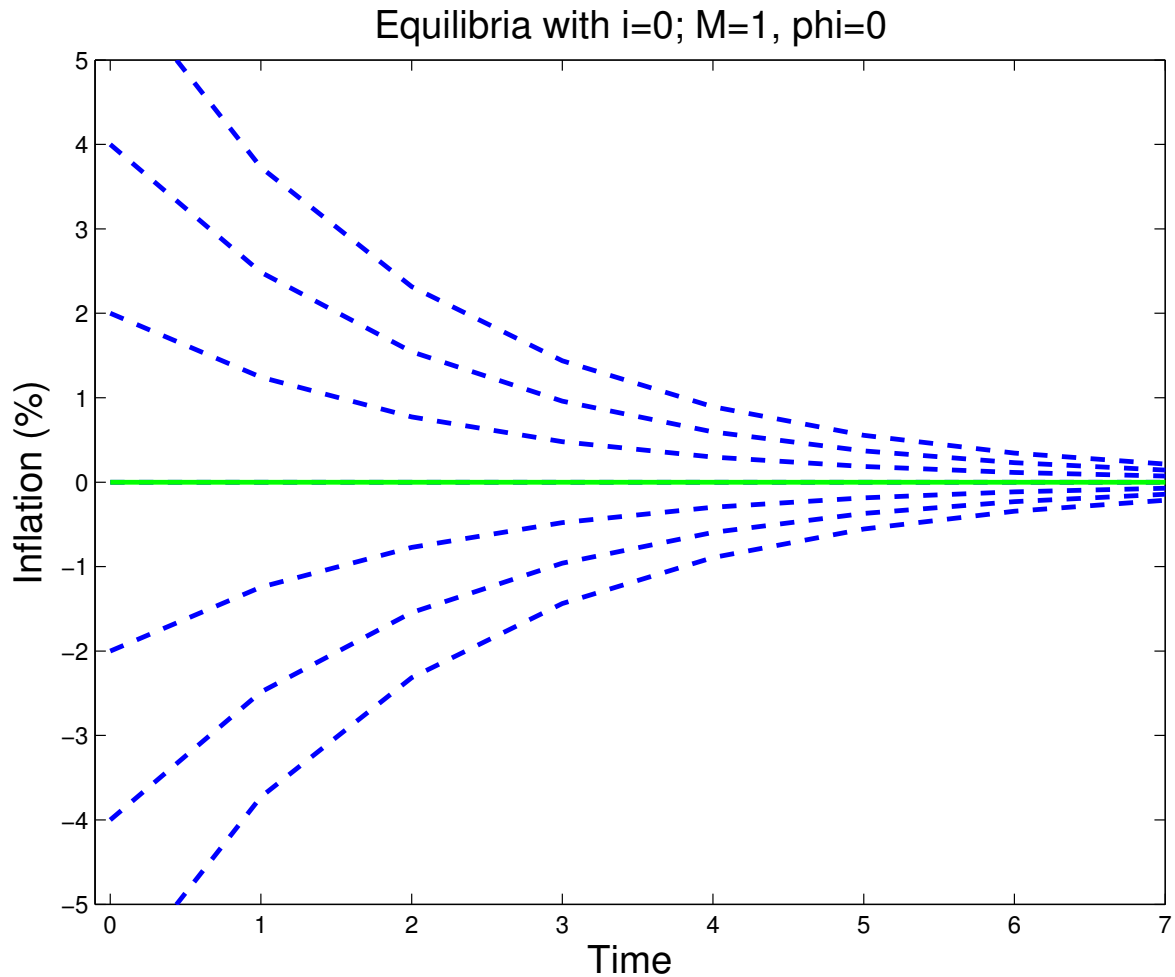
- With $\phi < 1$, $M = 1$, A has one stable, one unstable eigenvalue.
- Stability + only restrict $E_t \pi_{t+1} \rightarrow$ multiple stable sunspot equilibria.
- $M < 1$ raises eigenvalues, can give two unstable $\lambda > 1$ even with $\phi = 0$.
- $\rightarrow$ One non-explosive equilibrium, "determinacy."

Why this paper is important



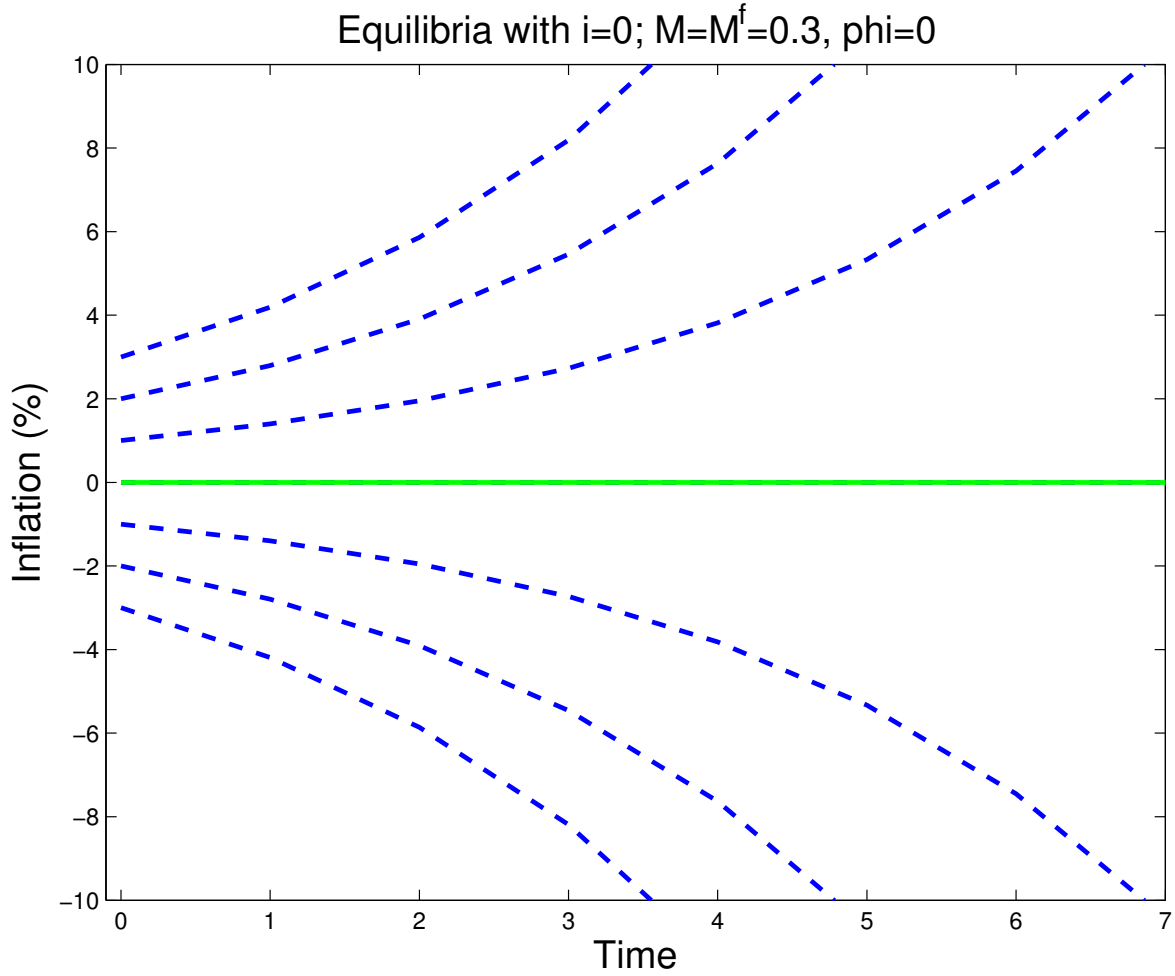
- Hit ZLB *and nothing happened*.
- Old K models predict spiral. New K models predict 1) sunspot volatility, 2) topsy turvy policy, 3) Fisherian response.
- Gabaix fixes! Restores standard NK $\phi > 1$ results with $\phi = 0$.

1. Standard model sunspots



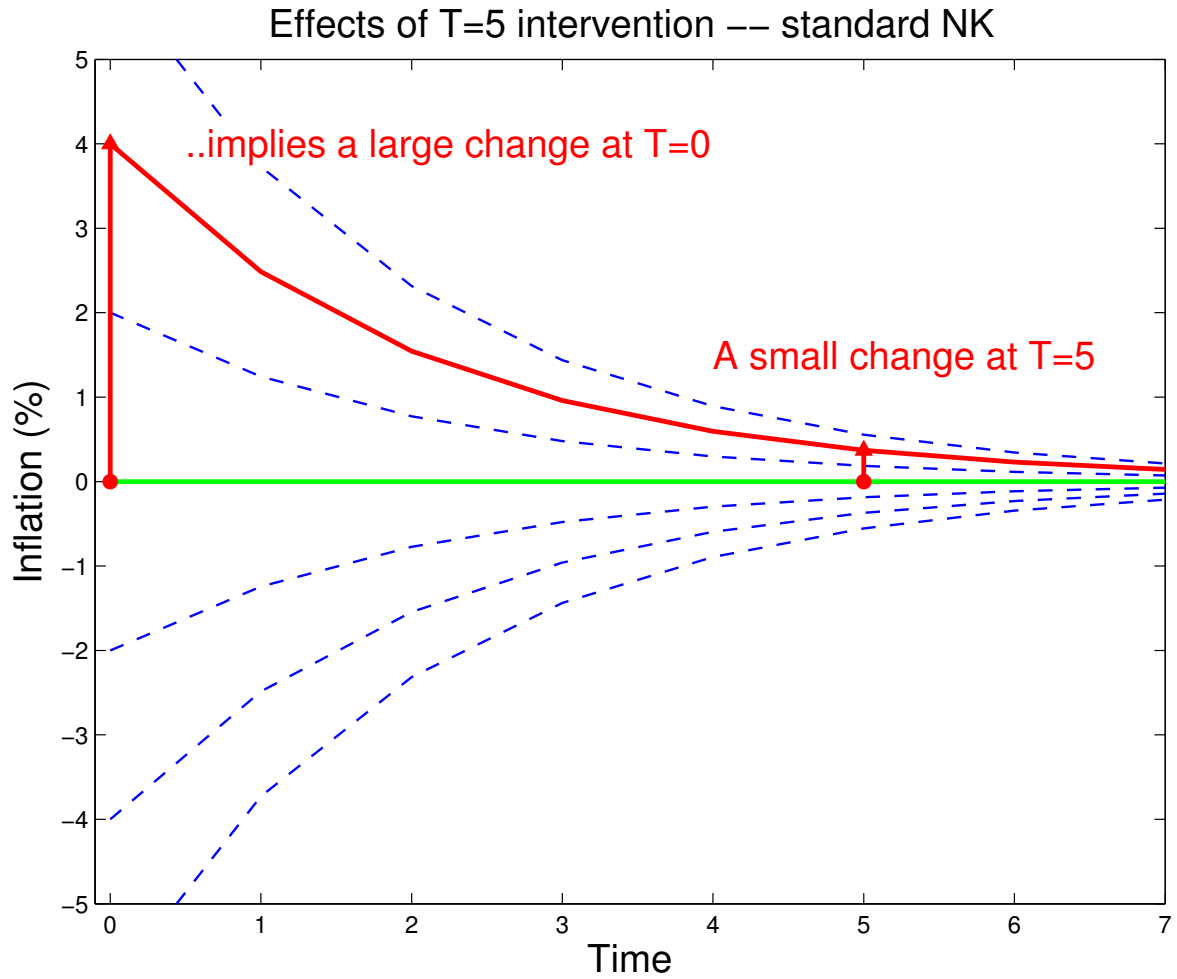
- Standard NK model with $M = 1$, $\phi = 0$ $i = 0$. Multiple stable equilibria, indeterminacy, sunspot volatility.

1. Gabaix fixes sunspots



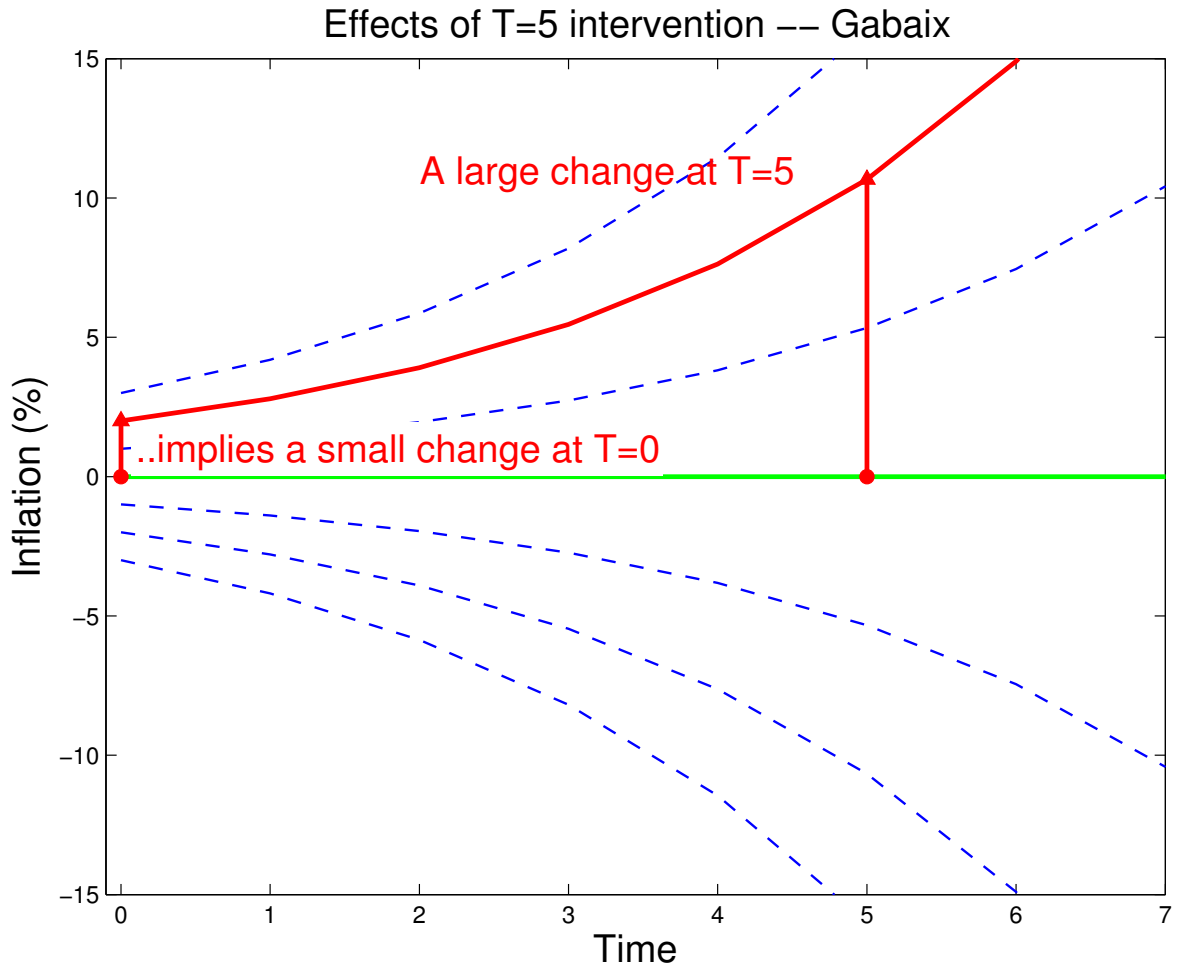
- $M < 1$ can make multiple equilibria explode, only $\pi = 0$ remains non-explosive.
- Determinacy despite $\phi = 0$.

2. Standard model magic



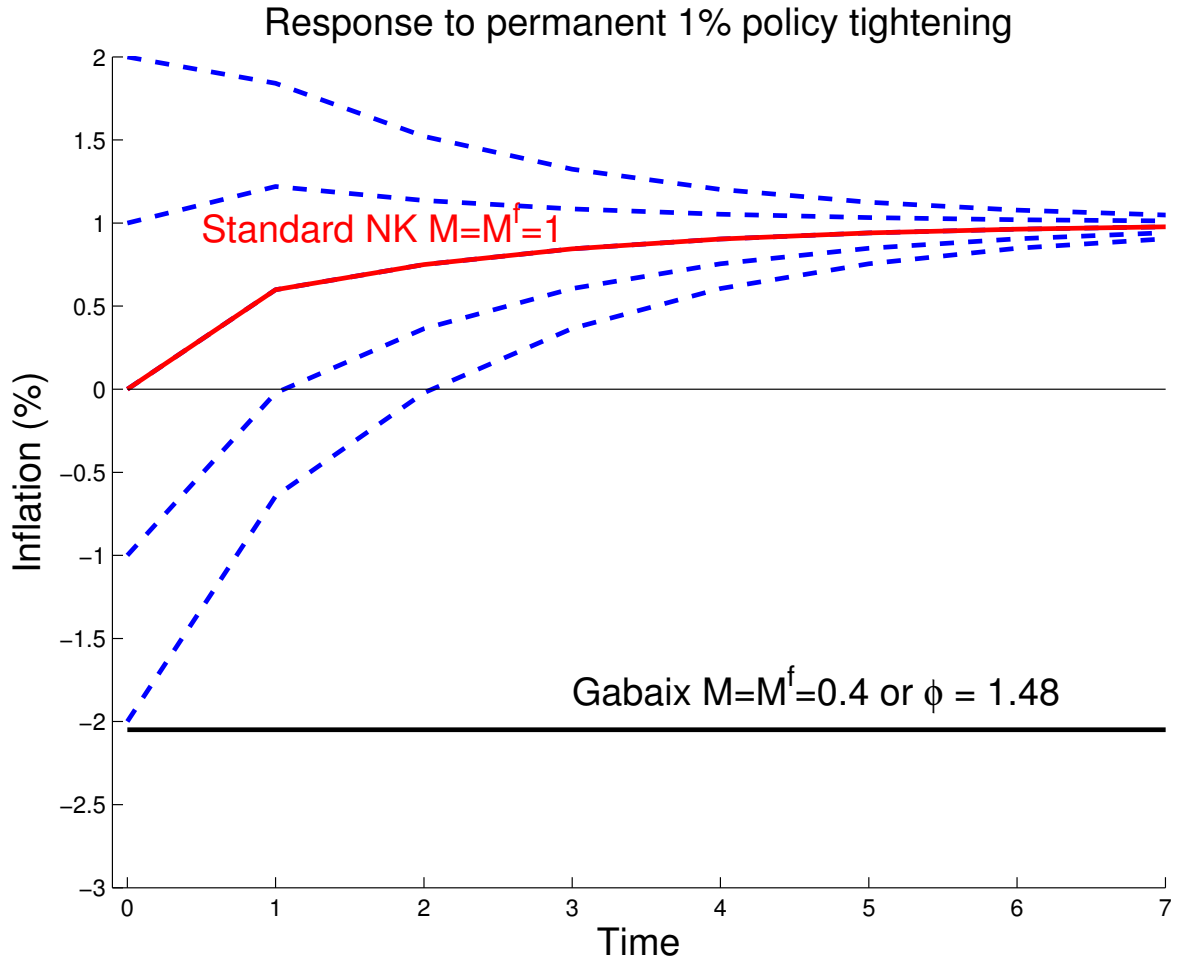
- Stability, multiple eq. $\rightarrow$ small future changes have big effects today.
- Less stickiness = faster dynamics, effects *further* from frictionless.

2. Gabaix fixes magic



- Gabaix $M < 1$ instability fixes magic, just like $\phi > 1$!

3. Standard model is Fisherian – Gabaix fixes



- $M = 1, \phi = 0$ NK model is Fisherian. $i \nearrow \Rightarrow \pi \nearrow$.
- (OK, unless you can arrange a δ shock. But that's independent of i.)
- (Maybe true, but is there a model of temporary lower π to test?)
- Gabaix fixes! $M = 0.4$ works just like $\phi = 1.48$!.

How it works – M in place of ϕ

Review:

$$x_t = M E_t x_{t+1} - \sigma r_t$$

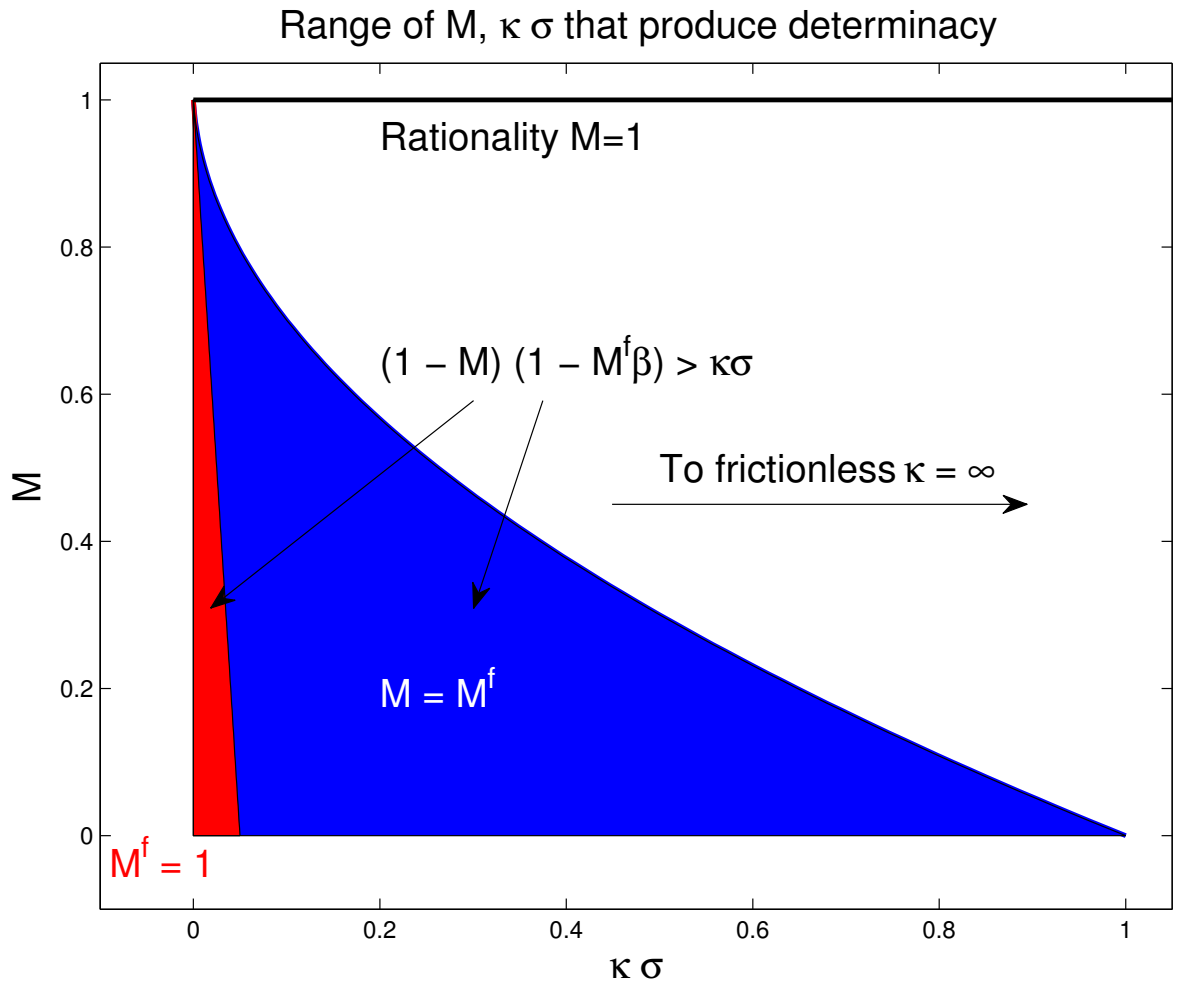
Both $\lambda > 1$ (unstable, determinate) if

$$\phi + \frac{(1-M)(1-M^f\beta)}{\kappa\sigma} > 1.$$

Lower M can substitute for $\phi > 1$ to make $\lambda > 1$, restoring standard NK model even at ZLB, $\phi = 0$ peg, passive M!

- Determinacy, stationarity, saddle-path stability
- Future promises have smaller effects.
- Conventional - sign of i on π
- No $\phi > 1$ theoretical problems.
- This paper is important!

Doubts: the paper is too important to be true!



$$(x_t = ME_t x_{t+1} - \sigma r_t)$$

- M near 1 do not work. κ near frictionless do not work.
- To change λ from < 1 to > 1 you can't change M a little bit.

Doubts – too important!

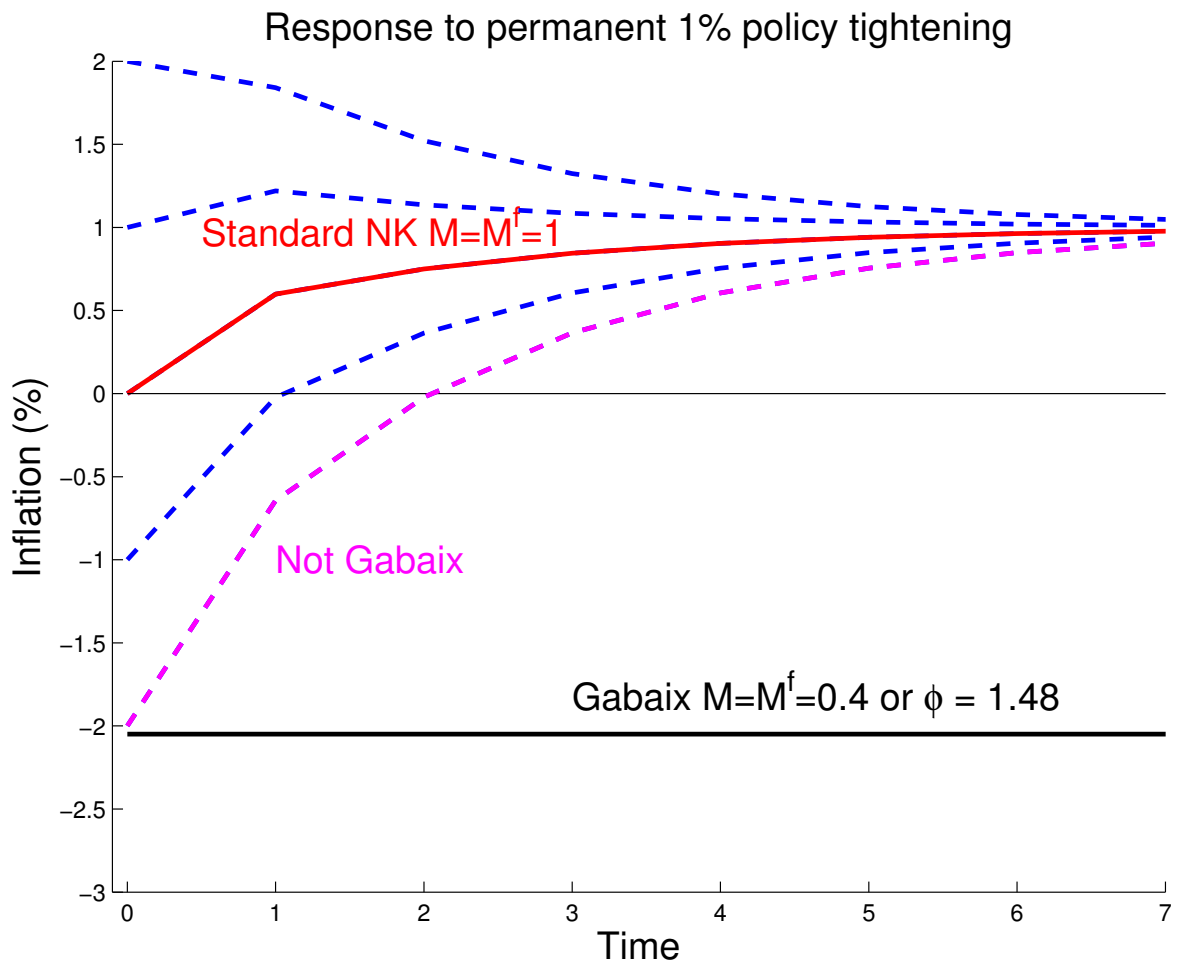
- Not: a *little* behavioralism is *sufficient* to better fit correlations.
- Yes: a *lot* of behavioralism is *necessary* for basic sign and stability of monetary policy.
- Can't nibble behavioralism – swallow it whole or not at all.
- Not: simple S&D get idea, wrinkles for dynamics.
- Yes: Monetary policy is *all about* deeply irrational behavior. We *do not* build on a simple rational story.
- Always and everywhere. Gabaix is right $\Rightarrow$ Clarida Galí and Gertler are wrong.

Too important: The foundations matter

$$x_t = M E_t x_{t+1} - \sigma(i_t - E_t \pi_{t+1}).$$

- *Not* Irrational (adaptive) expectations, ambiguity, rule of thumb, small utility cost, hyperbolic discouting, etc.
- React < 1 to some state variables, fully to others (i_t). Which ones? Hard!
- (Test: Grad students. Read last 3 papers, produce "the" behavioral NK model. I can't do it.)
- *Do not* just cite Gabaix, use as one more ad-hoc patch. Too important! This is the *basic foundation* of monetary policy.
- You will anyway. I did.
- So does Gabaix...

Long run



- Like NK $\phi > 1$, Gabaix produces a *permanent* decline in π when i rises. Long run neutrality?

Long run neutrality

- Gabaix "extends the model to have backward looking terms.. "

$$\pi_t = \beta M^f E_t \pi_{t+1} + \alpha \pi_t^d + \kappa x_t$$
$$\pi_{t+1}^d = \pi_t + \gamma(\pi_t^{CB} + (1-\zeta)\pi_t - \pi_t^d)$$

  π_t^d is "'default inflation' coming from indexation, and π_t^{CB}, the 'inflation guidance' by the central bank."
- $+$ Delicate balance of parameters.
- Abandoned "take behavioral microfoundations seriously"
- Need epicycles to get what should be easy, long-run neutrality of money.

Sufficient or Necessary?

- Important! Standard models *utterly* fail to explain quiet ZLB.
- Important! Fundamental change of the *basic story* of monetary economics. All or nothing.
- Sufficient, or Necessary? Locally necessary. Globally too?
- Standard NK, $M = 1, \phi = 0$: stable, indeterminate, rational, sunspots and puzzles.
- Gabaix: $M << 1, \phi = 0$: unstable, determinate, bounded away from rational & frictionless, needs epicycles for long run neutrality.
- NK + FTPL: $M = 1, \phi = 0$: stable, determinate, rational (robust to small irrationality), works in frictionless case, with smooth sticky price limit, gives short run negative and long run neutrality.
- Both fundamentally change stability and determinacy properties of the model, and basic story of monetary economics.
- Today: There is another! Gabaix is sufficient, but not globally necessary.