Comments on “A Behavioral New-Keynesian Model” by Xavier Gabaix

John H. Cochrane¹

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What the paper does

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

\[
x_t = ME_t x_{t+1} - \sigma (i_t - E_t \pi_{t+1}) \tag{1}
\]

\[
\pi_t = M^f \beta E_t \pi_{t+1} + \kappa x_t \tag{2}
\]

\[
i_t = \phi \pi_t + \hat{i}_t. \tag{3}
\]

Write as

\[
E_t x_{t+1} = \frac{1}{M} [x_t + \sigma (i_t - E_t \pi_{t+1})] \tag{4}
\]

\[
E_t \pi_{t+1} = \frac{1}{M^f} \frac{1}{\beta} [\pi_t - \kappa x_t] \tag{5}
\]

$M < 1$ induces instability to get determinacy in place of $\phi > 1$. 
A more careful statement

Write model in standard dynamic form

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

\[
E_t z_{t+1} = Az_t + \nu_t = Q \Lambda Q^{-1} z_t + \nu_t
\]

Both eigenvalues \( \lambda > 1 \) if

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

- 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.

\[ \phi = 0 \]
2. Standard model magic

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

![Graph showing the effects of a T=5 intervention in a standard NK model]

..implies a large change at T=0

A small change at T=5
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. $\downarrow \Rightarrow  \pi \downarrow$.
- (OK, unless you can arrange a $\delta$ shock. But that’s independent of $i$.)
- (Maybe true, but is there a model of temporary lower $\pi$ to test?)
- Gabaix fixes! $M = 0.4$ works just like $\phi = 1.48$!
How it works – \( M \) in place of \( \phi \)

Review:

\[
x_t = ME_t x_{t+1} - \sigma r_t
\]

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 \( \pi \)
- No \( \phi > 1 \) theoretical problems.
- This paper is important!
Doubts: the paper is too important to be true!

Range of $M$, $\kappa \sigma$ that produce determinacy

Rationality $M=1$

$(1 - M)(1 - M^f \beta) > \kappa \sigma$

To frictionless $\kappa = \infty$

$M = M^f$

$M^f = 1$

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

- $M$ near 1 do not work. $\kappa$ near frictionless do not work.
- To change $\lambda$ 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 ⇒ Clarida Galí and Gertler are wrong.
Too important: The foundations matter

\[ x_t = ME_t x_{t+1} - \sigma (i_t - E_t \pi_{t+1}) \]

- *Not* Irrational (adaptive) expectations, ambiguity, rule of thumb, small utility cost, hyperbolic discounting, 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...
Like NK $\phi > 1$, Gabaix produces a *permanent* decline in $\pi$ when $i$ rises. Long run neutrality?
Gabaix “extends the model to have backward looking terms.”

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

\(\pi_t^d\) is “‘default inflation’ coming from indexation, and \(\pi_t^{CB}\), 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: $M \ll 1, \phi = 0$: 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.