Incorporating Diagnostic Expectations into the New Keynesian Framework

Jean-Paul L’Huillier  Sanjay R. Singh  Donghoon Yoo

2022 ASSA Meeting
January 7-9, 2022

Introduction

What are Diagnostic Expectations (DE)?
- “Representativeness heuristic” (Kahneman & Tversky)
- Tendency to exaggerate how representative a small sample is
- Advantages: Microfounded & tractable; realistic & portable

DE can be productively integrated into the NK framework
How do we show this?
First: Start off with technical contribution: solution method
Then:
A) Analytically, address 4 key issues
1. Amplification
2. Supply shocks
3. Fiscal policy
4. Overreaction of expectations
B) Empirically
- Show DE improve the fit of medium-scale models

Amplification: NK vs. RBC

New Keynesian Model
<table>
<thead>
<tr>
<th>Variable</th>
<th>RE</th>
<th>DE</th>
<th>Percentage Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>0.0048</td>
<td>0.0085</td>
<td>77%</td>
</tr>
<tr>
<td>Volatility of output</td>
<td>increases</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Frictionless) Real Business Cycle Model
<table>
<thead>
<tr>
<th>Variable</th>
<th>RE</th>
<th>DE</th>
<th>Percentage Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>0.0064</td>
<td>0.0059</td>
<td>-7%</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.0015</td>
<td>0.0030</td>
<td>100%</td>
</tr>
<tr>
<td>Investment</td>
<td>0.0533</td>
<td>0.0503</td>
<td>-6%</td>
</tr>
<tr>
<td>Volatility of output</td>
<td>falls</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

“Covid” Shock: Fall of Output Gap After Negative TFP Shock

Intuition: DE agent expects TFP to fall by a lot (in excess of reality)
implies Sharp drop in consumption

Fiscal Policy

Proposition
Consider i.i.d. government spending shocks.
1. Under DE, the multiplier is greater than 1 iff $\theta > \phi_\tau$.
2. The multiplier is greater under DE than under RE.
3. The multiplier is increasing in $\theta$, and tends to $\infty$ as $\theta \to \phi_\tau + \pi^{-1}$.

Diagnostic Fisher equation:
$$\hat{r} = \hat{h} - \mathbb{E}[r_{t+1}] - \theta(\tau_t - \mathbb{E}_{t-1}[\tau_t])$$

Role of endogenous extrapolation of inflation
- Dominates effect of monetary policy if $\theta > \phi_\tau$

Bayesian Estimation

Rich model with host of frictions and shocks

Question: Do DE improve the fit to the data, even in the presence of all these other nominal, real, and informational frictions?

$\theta$ post. mode: 0.99, conf. interval: [0.77; 1.21]
Marginal likelihoods:
- RE model: -1590.66
- DE model: improvement to -1584.31

$2 \log(\text{BF}) = 12.70$
Strong evidence in favor of DE