Shocks vs Menu Costs: Patterns of Price Rigidity in an Estimated Multi-Sector Menu-Cost Model

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Discussion by
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1The views expressed herein do no necessarily reflect those of the Federal Reserve System.
Discussion Overview

1. Quick Summary

2. Intuition for Main Findings

3. Other Dimensions of Heterogeneity

4. Minor questions/comments
Background & Questions

Micro Price Data: Two of the most pervasive features

1. Heterogeneity
2. Importance of Idiosyncratic Shocks

This paper’s questions:

- What drives the heterogeneity across sectors?
  - Different pricing frictions or shock processes (or both)?
- What are implications of heterogeneity for monetary non-neutrality?
Approach and Findings

**Approach:** Use structural menu-cost model and data moments (freq, share +, median size, IQR, kurtosis) to:

1. estimate product-level $\lambda$, $\mu$, $\sigma$ and $\rho$
2. assess heterogeneity’s amplification of monetary non-neutrality

**Contribution:** single set-up to estimate *relative* importance of Calvo ($\lambda$) and menu-cost ($\mu$) components

**Key Findings:**

- Calvo friction important to fit micro data patterns
  - $\lambda/freq \approx 60\% - 80\%$
  - Variation in $\lambda$ contributes a lot to variation in freq
- Other parameters also display substantial heterogeneity
  - Shock parameters important for dispersion of price changes.
- Heterogeneity matters for monetary non-neutrality: $\approx 4\times$
Intuition for Main Findings

1. Large proportion of price changes associated with $\lambda$
Intuition for Main Findings

1. Large proportion of price changes associated with $\lambda$

<table>
<thead>
<tr>
<th></th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data</strong></td>
<td></td>
</tr>
<tr>
<td>Min</td>
<td>2.3</td>
</tr>
<tr>
<td>10th Percentile</td>
<td>3.3</td>
</tr>
<tr>
<td>Median</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Models</strong></td>
<td></td>
</tr>
<tr>
<td>Golosov-Lucas</td>
<td>1.0</td>
</tr>
<tr>
<td>Calvo</td>
<td>6.0</td>
</tr>
</tbody>
</table>
Intuition for Main Findings

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2. $\lambda$ most important for heterogeneity in frequency, but other parameters, particularly $\mu$, also play a role
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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Freq Increases</th>
<th>Median</th>
<th>IQR</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\lambda$</td>
<td>+</td>
<td>−</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>$-\mu$</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>$\rho$</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Evaluated at baseline parameter values (see Figures 3 & 4)
Only $\lambda$ varies $\Rightarrow \text{corr}(\text{freq, kurtosis}) > 0$
No $\lambda$ variation $\Rightarrow$ (likely) $\text{corr}(\text{freq}, \text{size}) > 0$
$\lambda$ accounts for much of $freq$ variation
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Amplification from Heterogeneity

Carvalho (2006) uses Calvo model:

- Frequency composition effect
- Strategic interaction effect

Nakamura and Steinsson (2010) extend to menu-cost model:

- Multi-sector model boosts real effects 3x
- Strategic complementarities another 3x

Note that variation in frequency across goods is exogenous (Calvo) or reflects variation in non-cyclical factors (menu-cost).
What about other forms of heterogeneity?

Durability

▶ Barsky, House, Kimball (2007): non-neutrality depends on stickiness of durables (non-durables not important)

▶ Durables have higher frequency than NDs & Services (in US)
  ▶ Note that Table 1 shows low frequency for durables in France
  ▶ But, data does not include autos or apparel
Figure 2: Frequency vs. Durability in the U.S. CPI
What about other forms of heterogeneity?

Durability
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Cyclicality
- Sectors with more cyclical real consumption expenditure growth have higher frequency of price change
- IF price flexibility is responding to cyclical shocks, the pattern may suggest less monetary non-neutrality.
Frequency vs Cyclicality

Figure 3: Frequency vs. Cyclicality in the U.S. CPI
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Price Selection

- Carvalho-Kryvtsov (2018)
How a data moment varies with a particular parameter depends on the values of the other parameters.

- If $\lambda = 0$, median size is increasing in menu cost.
- For baseline $\lambda$ (Figure 3), median size decreases in menu cost (due to composition effect).
- May raise questions about parameter identification.
Additional Questions/Comments

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Comparison with sufficient statistic approach of Alvarez, Le Bihan, and Lippi (AER, 2016) was interesting.

- Sufficient statistic approach $\Rightarrow$ 2.4 amplification for fully heterogeneous model
- Simulation $\Rightarrow$ amplification effect in from 3.5 to 4.7
Conclusion

- Paper is well executed and results are clearly articulated.

- Contribution is methodological/quantitative: estimate both Calvo and menu-cost parameters and assess importance of heterogeneity for non-neutrality.

- May be useful to provide more intuition about what features of the data, such as covariance of moments, are driving the estimates.
Figure 3
Figure 4