Discussion of
Carlos Carvalho and Oleksiy Kryvtsov
Price Selection

Peter Karadi

ECB

May 2019

The views expressed here are solely those of the authors and do not necessarily reflect the views of the ECB or the Eurosystem
Price selection

- Which prices change, when an aggregate shock hits
Price selection

- *Which* prices change, when an aggregate shock hits

- Calvo (1983): no selection - random, which prices change
Price selection

- Which prices change, when an aggregate shock hits
- Calvo (1983): no selection - random, which prices change
- State-dependent menu-cost models: can have high selection
  Caplin and Spulber (1987); Golosov and Lucas (2007) - those prices adjust that are far from their optimum
Why do we care?

- A crucial determinant of monetary non-neutrality
Why do we care?

- A crucial determinant of monetary non-neutrality
- Can be as important as *how many* prices change (see e.g. Caplin and Spulber, 1987)
What does this paper do? - Big picture

- Reduced-form measure of selection
What does this paper do? - Big picture

- Reduced-form measure of selection
- UK and Canadian CPI, US IRi scanner datasets
What does this paper do? - Big picture

- Reduced-form measure of selection

- UK and Canadian CPI, US IRi scanner datasets

- Selection at sectoral level, mixed results at aggregate level
  (yes in UK, no in Canada, US)
What does this paper do? - Big picture

- Reduced-form measure of selection
- UK and Canadian CPI, US IRi scanner datasets
- Selection at sectoral level, mixed results at aggregate level (yes in UK, no in Canada, US)
- Multi-sector menu cost model lowers aggregate selection
What does this paper do? - Big picture

- Reduced-form measure of selection

- UK and Canadian CPI, US IRi scanner datasets

- Selection at sectoral level, mixed results at aggregate level
  (yes in UK, no in Canada, US)

- Multi-sector menu cost model lowers aggregate selection

- More flexible (low selection) sectors get over-weighted
Praise

- Well motivated question:
  - There are menu cost models with high selection Golosov and Lucas (2007) and with low selection Midrigan (2011).
  - It is ultimately an empirical question.
  - The paper is doing exactly this.
Praise

▶ Well motivated question:
  ▶ There are menu cost models with high selection Golosov and Lucas (2007) and with low selection Midrigan (2011)
  ▶ It is ultimately an empirical question.
  ▶ The paper is doing exactly this.

▶ Empirical tour-de-force: uses three different datasets.
Praise

- Well motivated question:
  - There are menu cost models with high selection Golosov and Lucas (2007) and with low selection Midrigan (2011)
  - It is ultimately an empirical question.
  - The paper is doing exactly this.

- Empirical tour-de-force: uses three different datasets.

- Also uses a model to show that selection and non-neutrality are closely linked, and multi-sector model goes in the right direction
Comments

- Empirical
  - Potential small-sample bias in the particular measure.
  - Might account for part of the difference between sectoral (small sample) and aggregate (large sample) results.
Comments

▶ Empirical

▶ Potential small-sample bias in the particular measure.
▶ Might account for part of the difference between sectoral (small sample) and aggregate (large sample) results

▶ Theoretical

▶ The ultimate question is aggregate selection.
▶ What can sectoral selection add to it?
Empirical measure of selection

- Reduced-form measure of selection ($\gamma$)

$$p_{st}^{pre} = \gamma D P_{st} + \delta_s + \delta_{cal}$$
Empirical measure of selection

- Reduced-form measure of selection ($\gamma$)

$$p_{st}^{pre} = \gamma DP_{st} + \delta_s + \delta_{cal}$$

- Intuition: high selection (low $\gamma$) if
  - When an expansionary shock hits and $DP_{st}$ is high
  - Those prices change, which are below average, i.e. $p_{st}^{pre}$ is low
Empirical measure of selection

- Reduced-form measure of selection ($\gamma$)

\[ p_{st}^{pre} = \gamma DP_{st} + \delta_s + \delta_{cal} \]

- Intuition: high selection (low $\gamma$) if
  - When an expansionary shock hits and $DP_{st}$ is high
  - Those prices change, which are below average, i.e. $p_{st}^{pre}$ is low

- In a model with continuum of firms, selection and monetary non-neutrality related
## Results

<table>
<thead>
<tr>
<th>Level of aggregation</th>
<th>Number of groups</th>
<th>Regular prices, excluding subs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A. U.K.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stratum 8941</td>
<td>-0.371***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td></td>
</tr>
<tr>
<td>Category 1037</td>
<td>-0.385***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td></td>
</tr>
<tr>
<td>Basic class 66</td>
<td>-0.361***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td></td>
</tr>
<tr>
<td>Aggregate 1</td>
<td>-0.197***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.072)</td>
<td></td>
</tr>
<tr>
<td><strong>B. Canada</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stratum 9165</td>
<td>-0.285***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td></td>
</tr>
<tr>
<td>Aggregate 1</td>
<td>-0.003</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Data sources are described in notes for Table 1. For row “Stratum” the entries are price selection coefficients at a stratum level replicated from Table 2. Other rows provide price selection for aggregated groups (category, basic class, and aggregate). For the U.K., basic class corresponds to Classification of Individual Consumption by Purpose (COICOP). “Aggregate” rows provide the estimated values of the coefficient in the time-series regression (10) of aggregate preset price level on the aggregate size of price changes, with calendar-month fixed effects. Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Empirical measure of selection, cont.

- Potential issue: small sample bias
  - Measure can be hijacked by idiosyncratic shocks
Empirical measure of selection, cont.

- Potential issue: small sample bias
  - Measure can be hijacked by idiosyncratic shocks
  - Those prices change that happen to be low
Empirical measure of selection, cont.

- Potential issue: small sample bias
  - Measure can be hijacked by idiosyncratic shocks
  - Those prices change that happen to be low
  - $p_{st}^{pre}$ is low, $DP_{st}$ is high, measured selection high
Empirical measure of selection, cont.

- Potential issue: small sample bias
  - Measure can be hijacked by idiosyncratic shocks
  - Those prices change that happen to be low
  - $p_{st}^{pre}$ is low, $DP_{st}$ is high, measured selection high
  - $DP_{st}$ might not be driven by aggregate shocks
Empirical measure of selection, cont.

- Is the sample small?
  - In some cases, definitely.
Empirical measure of selection, cont.

- Is the sample small?
  - In some cases, definitely.
  - Challenge: homogenous categories: UK CPI 1100 product categories, 22 region+shop type groups
Empirical measure of selection, cont.

- Is the sample small?
  - In some cases, definitely.
  - Challenge: homogenous categories: UK CPI 1100 product categories, 22 region+shop type groups
  - Median regular price changes in a month at the stratum level: 1 (mean: 1.5)
Empirical measure of selection, cont.

▶ Is the sample small?

▶ In some cases, definitely.

▶ Challenge: homogenous categories: UK CPI 1100 product categories, 22 region+shop type groups

▶ Median regular price changes in a month at the stratum level: 1 (mean: 1.5) [Stratum]

▶ At the category level (66): 250 (mean: 492) [Coicop]
Empirical measure of selection, cont.

▶ Is the sample small?

▶ In some cases, definitely.

▶ Challenge: homogenous categories: UK CPI 1100 product categories, 22 region+shop type groups

▶ Median regular price changes in a month at the stratum level: 1 (mean: 1.5)  

▶ At the category level (66): 250 (mean: 492)  

▶ In the aggregate level: 10105 (mean: 10642)
Empirical measure of selection, cont.

- Is the sample small?
  - In some cases, definitely.
  - Challenge: homogenous categories: UK CPI 1100 product categories, 22 region+shop type groups
  - Median regular price changes in a month at the stratum level: 1 (mean: 1.5)
  - At the category level (66): 250 (mean: 492)
  - In the aggregate level: 10105 (mean: 10642)
  - With lumpy adjustment, large idiosyncratic shocks, small aggregate shocks: even 250 can be a small sample (Berger, Caballero and Engel, 2017)
Empirical measure of selection, cont.

- Proposed solution: simulated method of moments
  - Use a model (e.g. CalvoPlus) to simulate price changes
Empirical measure of selection, cont.

- Proposed solution: simulated method of moments
  - Use a model (e.g. CalvoPlus) to simulate price changes
  - Replicate the small sample multiple times
Empirical measure of selection, cont.

- Proposed solution: simulated method of moments
  - Use a model (e.g. CalvoPlus) to simulate price changes
  - Replicate the small sample multiple times
  - Measure the reduced-form selection
Empirical measure of selection, cont.

- Proposed solution: simulated method of moments
  - Use a model (e.g. CalvoPlus) to simulate price changes
  - Replicate the small sample multiple times
  - Measure the reduced-form selection
  - See what the empirical measure implies for the level of non-neutrality in the model
Selection at the sectoral level

If we are interested in aggregate selection, why measure sectoral selection?
Selection at the sectoral level

► If we are interested in aggregate selection, why measure sectoral selection?

► Two motivations
  ► Additional moments to match
  ► Informative about frictions that matter for the aggregate + more variation
Selection at the sectoral level

- If we are interested in aggregate selection, why measure sectoral selection?

- Two motivations
  - Additional moments to match
  - Informative about frictions that matter for the aggregate + more variation

- Multi-section menu cost model:
  - To match both sectoral and aggregate moments
  - Sectoral selection informative about frictions that influence aggregate selection
Alternative frameworks

▶ Rational inattention (Mackowiak and Wiederholt, 2009)
  ▶ Can be optimal to concentrate on idiosyncratic/sectoral shocks (larger) and ignore aggregate shocks
  ▶ Selection at the idiosyncratic/sectoral level will not be informative for the aggregate
Alternative frameworks

- Rational inattention (Mackowiak and Wiederholt, 2009)
  - Can be optimal to concentrate on idiosyncratic/sectoral shocks (larger) and ignore aggregate shocks
  - Selection at the idiosyncratic/sectoral level will not be informative for the aggregate

- Strategic complementarities (Carvalho, 2006; Woodford, 2011; Nakamura and Steinsson, 2010)
  - Macro complementarities (e.g. intermediate inputs) can generate non-neutrality
  - With idiosyncratic/sectoral selection still high
Selection at the sectoral level, cont.

▶ Sectoral selection can be a useful additional moment
Selection at the sectoral level, cont.

- Sectoral selection can be a useful additional moment
- Sectoral heterogeneity goes in the right direction
Selection at the sectoral level, cont.

- Sectoral selection can be a useful additional moment

- Sectoral heterogeneity goes in the right direction

- But other mechanisms (e.g. rational inattention, strategic complementarities) might be more relevant
Selection at the sectoral level, cont.

- Sectoral selection can be a useful additional moment.
- Sectoral heterogeneity goes in the right direction.
- But other mechanisms (e.g. rational inattention, strategic complementarities) might be more relevant.
- Less informativeness of sectoral selection for aggregate selection.
Conclusion

- Great work
  - Asks a very relevant question
  - Arrives at interesting results
Conclusion

▶ Great work
  ▶ Asks a very relevant question
  ▶ Arrives at interesting results

▶ Comments
  ▶ Control for small sample bias
  ▶ Clarify the importance of sectoral selection
Histogram of monthly regular price changes by stratum
Histogram of monthly regular price changes by categories

References II


