

The extensive and intensive margin of price
adjustment to cost shocks:
Evidence from Danish multiproduct firms

Discussion

Almut Balleer^{1,2}

¹RWTH Aachen, IIES Stockholm, and CEPR

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Summary

- What the paper asks
 - 1 What is the pass-through of costs to prices?
 - 2 Estimating the pass-through of costs to prices, can we learn something about macroeconomic models of price setting?
 - price setting of multiproduct firms
 - state- versus time-dependent pricing

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 - ① What is the pass-through of costs to prices?
 - ② Estimating the pass-through of costs to prices, can we learn something about macroeconomic models of price setting?
 - price setting of multiproduct firms
 - state- versus time-dependent pricing
- What the paper does
 - ▶ Investigate producer price adjustment in Danish microdata from 1993 to 2017
 - in multiproduct firms
 - in response to firm-level import price and energy cost shocks
 - along intensive and extensive margin
 - in a two-step estimation taking into account selection bias

Key contribution

- Cost shock measure
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 - ▶ Firm-specific cost measures through exposure to energy and imported inputs

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- Cost shock measure
 - ▶ Exogenous source of cost shocks: energy and import prices (direct or through exchange rate)
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- Model extensive and intensive price setting decision in two-step estimation (Heckman, Bourguignon et al.)
 - ▶ First stage: Extensive margin, multinomial probit

$$P(\Delta p_{i,j,t} \begin{matrix} \leq \\ \geq \end{matrix} 0 | Z_{i,j,t}) = \Phi(\gamma Z_{i,j,t})$$

$Z_{i,j,t}$ includes costs and satisfies exclusion restrictions

- ▶ Second stage: Estimate cost pass-through

$$E(\Delta p_{i,j,t} | X_{i,j,t}) = \beta X_{i,j,t} + \text{selection bias}$$

Illustration in menu cost model

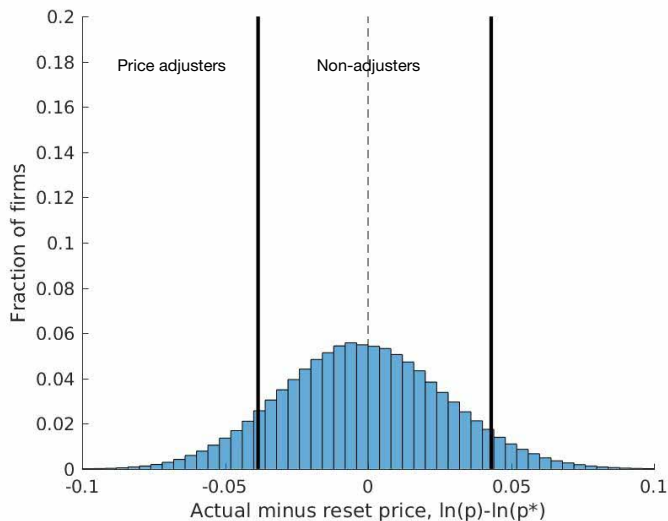
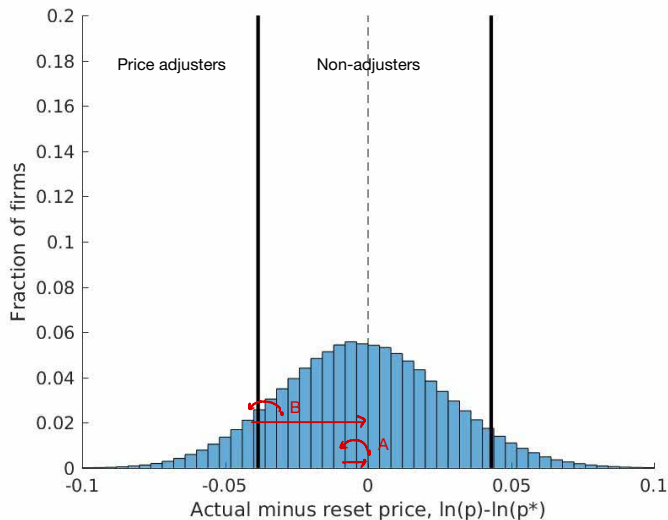


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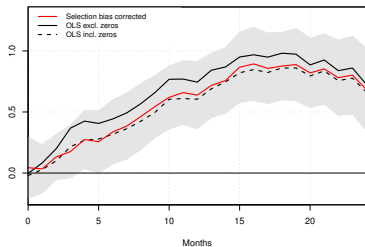


Key findings

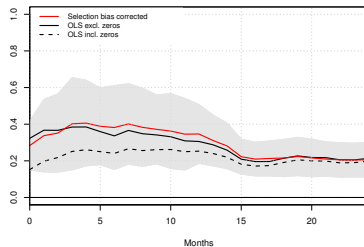
- First stage: extensive margin decision
 - ▶ Extensive margin of price adjustment moves after cost shocks and when aggregate inflation and exchange rate change:
In line with state-dependent models of price setting
 - ▶ Multiproduct firms synchronize price adjustments:
In line with menu cost models with multiproduct firms
- Second-stage: cost pass-through to prices
 - ▶ Taking into account selection bias of moderate importance: Time-dependence matters for price setting
 - ▶ Substantial heterogeneity in pass-through by type of cost shock, by shock exposure, by firm size

Key findings

(a) Energy cost shock



(b) Import cost shock



Comment I: Focus of the paper

- What is the pass-through of costs to prices?
 - ▶ Great data, interesting results!!!
- Why not stick to this first question and explore more?
 - ▶ What explains differences in pass-through?
 - ▶ How does this relate to empirical and theoretical literature on markups?
 - ▶ What is the role of type and asymmetry of cost shocks for aggregate inflation?
 - How does this matter along the way out of the Covid-induced recession and inflation fears?

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 - ▶ Great data, interesting results!!!
- Is this not almost completely a separate second question: How do results inform menu cost models with multiproduct firms?
 - ▶ More discipline on the calibration?
 - price synchronization
 - various moments on the cost distribution
 - ▶ News on the real effects of monetary policy?

Comment II: Interpretation of small selection bias

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- Heckman:
If selection bias small, this means that nonlinearity of two-step decision not crucial to estimate unconditional expectation (cost pass-through)

Comment II: Interpretation of small selection bias

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- Heckman:
If selection bias small, this means that nonlinearity of two-step decision not crucial to estimate unconditional expectation (cost pass-through)
- Here: If selection bias is small, time-dependent pricing is important
- This conclusion relates
 - ▶ to results on aggregate nominal demand (monetary policy) shocks
 - ▶ to results on aggregate cumulative price changes
 - ▶ to models with varying degrees of time/state-dependence

Comment IIa: Interpretation of small selection bias

- Interpretation of small selection bias relates to results on aggregate nominal demand shocks
- How to think about the estimated cost shocks in a corresponding model?
 - ▶ Idiosyncratic shocks or idiosyncratic variation of an aggregate shock?
 - ▶ Constant or shifting cost shock distribution?
 - ▶ Import costs move with exchange rate: cost or demand shock?

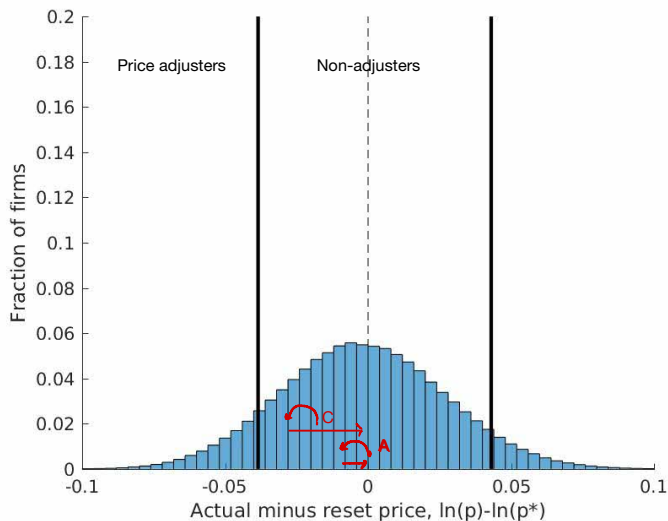
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- Suggestion:
 - ▶ Interpret estimated cost shock in model with state- and time-dependent pricing
 - ▶ Work out explicitly implications for individual (average) pricing decisions

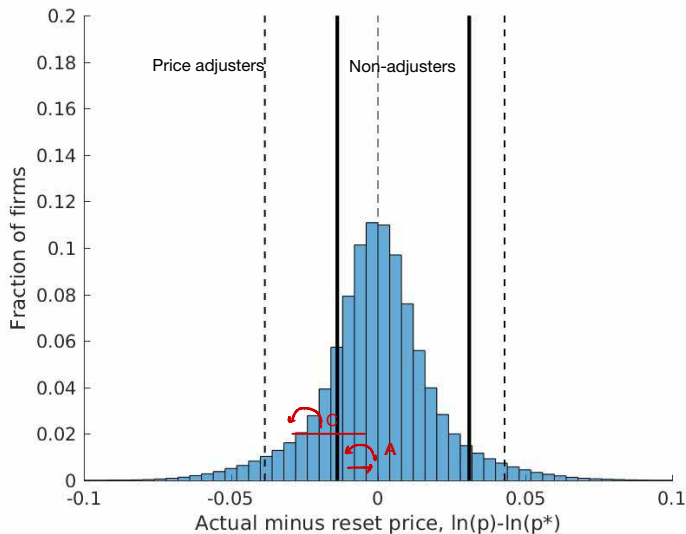
Comment IIb: Interpretation of small selection bias

- Interpretation of small selection bias relates to results in models with varying degrees of time/state-dependence
- Result conditions on a particular state-dependent pricing decision
- But:
 - ▶ selection bias can be small or large within state-dependent pricing, even for same level of rigidity
 - ▶ selection bias depends on
 - shape of price distribution,
 - idiosyncratic or aggregate shocks,
 - conditioning on initial prices, ...

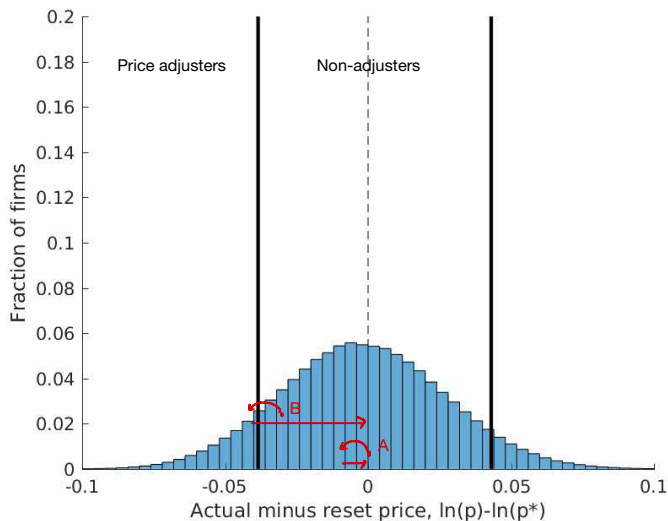
Comment IIb: Illustration



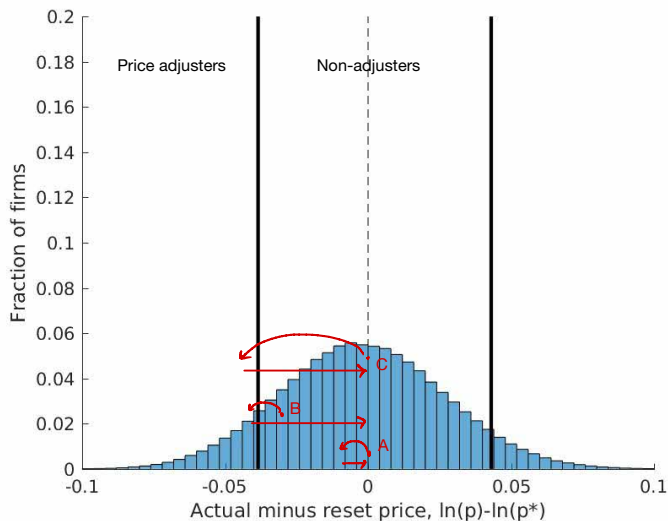
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Comment IIc: Interpretation

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- Interpretation of small selection bias equates intensive vs. extensive margin decomposition with time-dependent vs. state-dependent decomposition
- But:
 - ▶ While extensive margin is zero in the Calvo model, it does not follow that entire measured intensive margin is driven by time-dependent pricing decisions
 - ▶ The intensive margin substantially moves in response to shocks in state-dependent models, also for a given average price change frequency
- Also: A Heckman selection model is not a proper decomposition into intensive and extensive margin
- Suggestion: Work out explicitly in model and connect more closely to estimation model

Comment III: Estimation

- Is the sample selected?
 - ▶ In Heckman: Some outcomes cannot be observed (wage offers of those not working), use latent variable that detects selection (labor force participation)
 - ▶ Here, no price changes correctly measured: Why not estimate two-step decision with Tobit?
- How do the exclusion restrictions work?
 - ▶ Why do multiproduct decisions, fraction of price changes in industry, and age of price affect whether and in what direction to change price, but not by how much?