Discussion of "The Inflation Accelerator" by Blanco, Boar, Jones, Midrigan

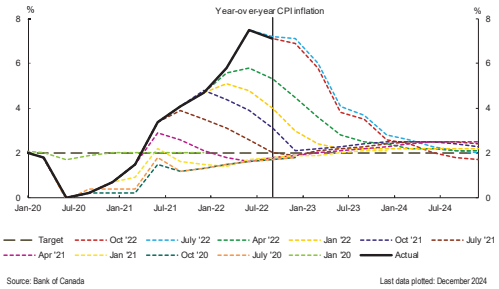
Oleksiy Kryvtsov
Bank of Canada

Cleveland Fed-ECB Conference "Inflation: Drivers and Dynamics", 25 October 2024

The views expressed here are ours, and they do not necessarily reflect the views of the Bank of Canada

Central banks underestimated the post-pandemic inflation surge

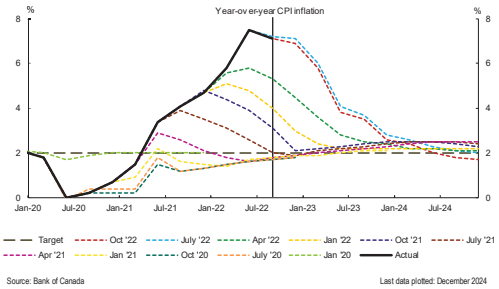
Evolution of BoC inflation projections



- Large and persistent forecast errors
- Projection models do not have "surge" mechanisms
- Linear NKPC was an OK approximation
- Constant frequency of price adj was OK
  - Data: Klenow-Kryvtsov (2008)
  - Theory: Auclert et al. (2024)

Central banks underestimated the post-pandemic inflation surge

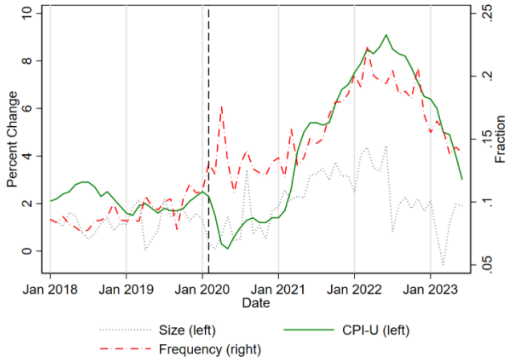
Evolution of BoC inflation projections



- Large and persistent forecast errors
- Projection models do not have "surge" mechanisms
- Linear NKPC was an OK approximation
- Constant frequency of price adj was OK
  - Data: Klenow-Kryvtsov (2008)
  - Theory: Auclert et al. (2024)

Not a good approximation post-2019 (or in 1970-80s)

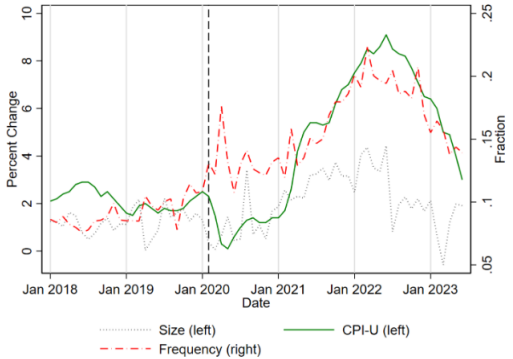
United States (Montag and Villar, 2023)



- Sharp and persistent inflation increase
- Frequency of p-changes increased
- CBs are revising projection models
- Challenge: incorporate price flexibility in policy models

Not a good approximation post-2019 (or in 1970-80s)

United States (Montag and Villar, 2023)



- Sharp and persistent inflation increase
- Frequency of p-changes increased
- CBs are revising projection models
- Challenge: incorporate price flexibility in policy models

Tight relationship between probability of adjustment and price gap

Inflation: $\pi = \int -x\Lambda(x)f(x)dx$

$x = p - p^*$ price gap

$\Lambda(x)$ probability of adjusting price

$f(x)$ distribution of price gaps

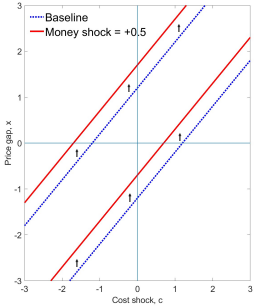
- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data
  - ongoing debate (Alvarez et al, 2024; Hong et al., 2024)

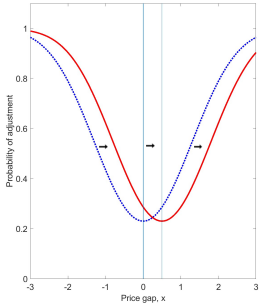
Tight relationship between probability of adjustment and price gap

Response to monetary shock

$$\frac{\partial \pi}{\partial m} = \underbrace{\int \Lambda(x) f(x) dx}_{\text{intensive}} + \underbrace{\int x \Lambda'(x) f(x) dx}_{\text{extensive (dominant)}}$$

determined by $\Lambda(x)$, $\Lambda'(x)$, $f(x)$





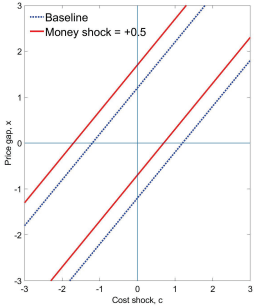
- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data
  - ongoing debate (Alvarez et al, 2024; Hong et al., 2024)

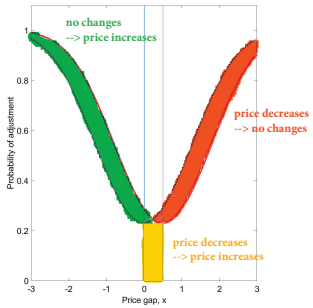
Tight relationship between probability of adjustment and price gap

Response to monetary shock

$$\frac{\partial \pi}{\partial m} = \underbrace{\int \Lambda(x) f(x) dx}_{\text{intensive}} + \underbrace{\int x \Lambda'(x) f(x) dx}_{\text{extensive (dominant)}}$$

determined by $\Lambda(x)$, $\Lambda'(x)$, $f(x)$





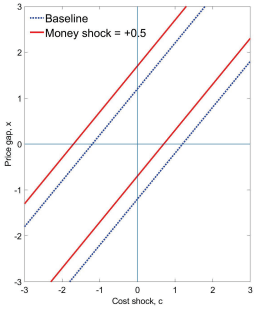
- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data
  - ongoing debate (Alvarez et al, 2024; Hong et al., 2024)

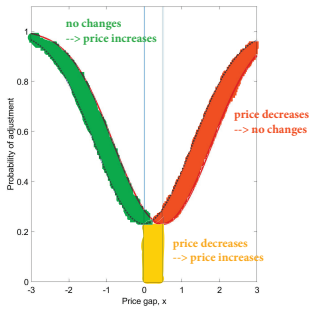
Tight relationship between probability of adjustment and price gap

Response to monetary shock

$$\frac{\partial \pi}{\partial m} = \underbrace{\int \Lambda(x) f(x) dx}_{\text{intensive}} + \underbrace{\int x \Lambda'(x) f(x) dx}_{\text{extensive (dominant)}}$$

determined by $\Lambda(x)$, $\Lambda'(x)$, $f(x)$





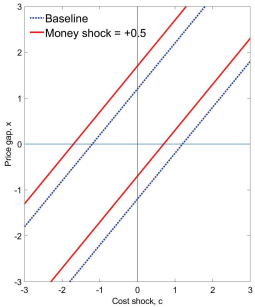
- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data
  - ongoing debate (Alvarez et al, 2024; Hong et al., 2024)

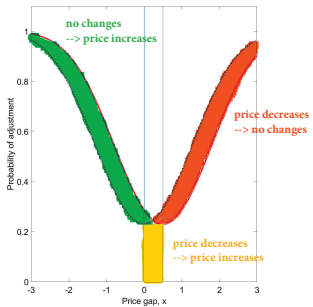
Tight relationship between probability of adjustment and price gap

Response to monetary shock

$$\frac{\partial \pi}{\partial m} = \underbrace{\int \Lambda(x) f(x) dx}_{\text{intensive}} + \underbrace{\int x \Lambda'(x) f(x) dx}_{\text{extensive (dominant)}}$$

determined by $\Lambda(x)$, $\Lambda'(x)$, $f(x)$





- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data
  - ongoing debate (Alvarez et al, 2024; Hong et al., 2024)

BBJM paper

Assumptions

- Multi-product firm
  - knows dist-n of price gaps, $f_{it}(x)$
  - but not individual gaps, $\Lambda_{it}(x) = \Lambda_{it}$
- Chooses number of adjustments, Λ_{it}
  - faces adjustment cost $\xi(\Lambda_{it} - \overline{\Lambda})^2$

Key features

- Analytic aggregation over $f_{it}(x)$
  - works like Calvo but within firm
- One extra equation for $\Lambda_{it} = \Lambda_t$
- Nonlinear dynamic system
- Trend
- Scalability

- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data

BBJM paper

Assumptions

- Multi-product firm
  - knows dist-n of price gaps, $f_{it}(x)$
  - but not individual gaps, $\Lambda_{it}(x) = \Lambda_{it}$
- Chooses number of adjustments, Λ_{it}
  - faces adjustment cost $\xi(\Lambda_{it} - \overline{\Lambda})^2$

Key features

- Analytic aggregation over $f_{it}(x)$
  - works like Calvo but within firm
- One extra equation for $\Lambda_{it} = \Lambda_t$
- Nonlinear dynamic system
- Trend
- Scalability

- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data

BBJM paper

Assumptions

- Multi-product firm
  - knows dist-n of price gaps, $f_{it}(x)$
  - but not individual gaps, $\Lambda_{it}(x) = \Lambda_{it}$
- Chooses number of adjustments, Λ_{it}
  - faces adjustment cost $\xi(\Lambda_{it} - \overline{\Lambda})^2$

Key features

- Analytic aggregation over $f_{it}(x)$
  - works like Calvo but within firm
- One extra equation for $\Lambda_{it} = \Lambda_t$
- Nonlinear dynamic system
- Trend
- Scalability

- Aggregation over x cannot be done analytically
- x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data

BBJM paper

Assumptions

- Multi-product firm
  - knows dist-n of price gaps, $f_{it}(x)$
  - but not individual gaps, $\Lambda_{it}(x) = \Lambda_{it}$
- Chooses number of adjustments, Λ_{it}
  - faces adjustment cost $\xi(\Lambda_{it} - \overline{\Lambda})^2$

Key features

- Analytic aggregation over $f_{it}(x)$
  - works like Calvo but within firm
- One extra equation for $\Lambda_{it} = \Lambda_t$
- Nonlinear dynamic system
- Trend
- Scalability

- ~~Aggregation over x cannot be done analytically~~
- ~~x is not observed: infer $\Lambda(x)$, $f(x)$ indirectly from micro data~~

Comment 1. Is BBJM an approximation of menu cost models?

- What drives inflation volatility: exogenous shocks vs endogenous responsiveness?
  - Cavallo-Lippi-Miyahara (2024): inflation surge and freq of adj are driven by large shocks
  - Blanco et al. (2024a): moderate shocks + inflation accelerator
- Misallocation: within-firm price dispersion is less costly for the firm
  - Different implications for optimal monetary policy? (e.g., Nakov et al., 2024)
- Do we need to match micro moments to answer macro questions?

Comment 1. Is BBJM an approximation of menu cost models?

- What drives inflation volatility: exogenous shocks vs endogenous responsiveness?
  - Cavallo-Lippi-Miyahara (2024): inflation surge and freq of adj are driven by large shocks
  - Blanco et al. (2024a): moderate shocks + inflation accelerator
- Misallocation: within-firm price dispersion is less costly for the firm
  - Different implications for optimal monetary policy? (e.g., Nakov et al., 2024)
- Do we need to match micro moments to answer macro questions?

Comment 1. Is BBJM an approximation of menu cost models?

- What drives inflation volatility: exogenous shocks vs endogenous responsiveness?
  - Cavallo-Lippi-Miyahara (2024): inflation surge and freq of adj are driven by large shocks
  - Blanco et al. (2024a): moderate shocks + inflation accelerator
- Misallocation: within-firm price dispersion is less costly for the firm
  - Different implications for optimal monetary policy? (e.g., Nakov et al., 2024)
- Do we need to match micro moments to answer macro questions?

Comment 2. How strong is the key assumption, $\Lambda_{it}(x) = \Lambda_{it}$?

Not much work on $\Lambda_{it}(x)$ within firm

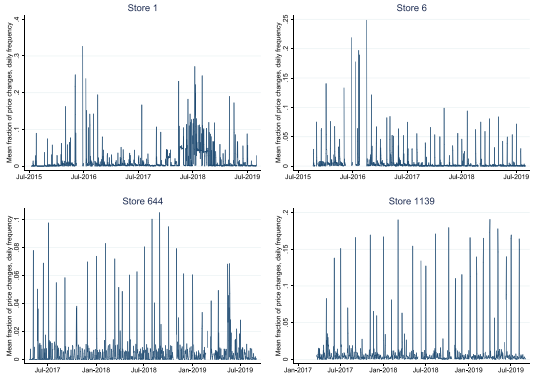
- Data: partial synchronization of p-ch
  - driven by store-specific fundamentals
- Model: economies of scope in p-adj
- Strong selection in calibrated model
  - close to Golosov-Lucas (2007)

Comment 2. How strong is the key assumption, $\Lambda_{it}(x) = \Lambda_{it}$?

Not much work on $\Lambda_{it}(x)$ within firm

- Data: partial synchronization of p-ch
  - driven by store-specific fundamentals
- Model: economies of scope in p-adj
- Strong selection in calibrated model
  - close to Golosov-Lucas (2007)

Israel (Bonomo et al., 2022)

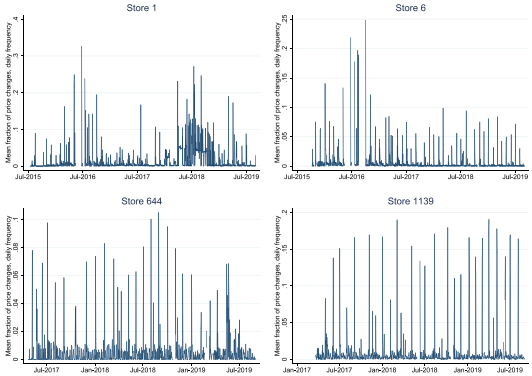


Comment 2. How strong is the key assumption, $\Lambda_{it}(x) = \Lambda_{it}$?

Not much work on $\Lambda_{it}(x)$ within firm

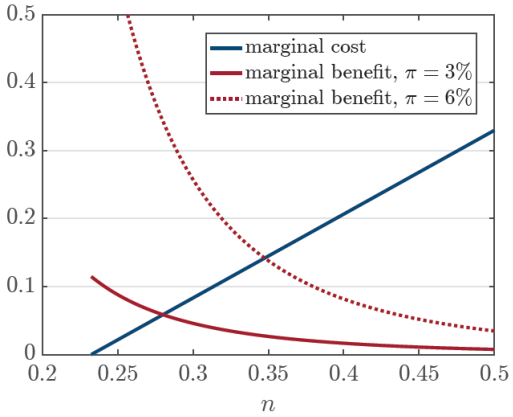
- Data: partial synchronization of p-ch
  - driven by store-specific fundamentals
- Model: economies of scope in p-adj
- Strong selection in calibrated model
  - close to Golosov-Lucas (2007)

Israel (Bonomo et al., 2022)



Comment 3. Robustness to assumptions on adjustment cost $\xi(\Lambda_{it} - \overline{\Lambda})^2$?

- Marginal adj cost linear in Λ_{it}
  - implied sacrifice ratio
- Lower bound $\Lambda_{it} > \overline{\Lambda}$:
  - asymmetry of business cycles (Gasteiger-Grimaud, 2023)
  - how to think about deflationary risks and ELB (Blanco, 2021)



Comment 4. Implications for DSGE models?

- Application to Christiano-Eichenbaum-Evans (2005) or Smets-Wouters (2007) model
- Endogenous inflation persistence too high in DSGE models (Bils-Klenow-Malin, 2012)
  - rely on sticky wages and strategic pricing complementarities
  - require ad hoc markup shocks to match inflation perisistence in the data
- Demonstrate scalability: helps CBs incorporate price flexibility in their models

Summary

- Important and timely paper!
  - Analytic solution will help CBs incorporate price flexibility in their models
  - Inflation accelerator: endogenous inflation volatility when away from inflation target
- Suggestions:
  - Clarify implications for menu cost models, e.g., large shocks vs endogenous volatility
  - Clarify implications for DSGE models, e.g., inflation persistence vs NKPC slope
  - Robustness to assumptions about the adjustment costs

Summary

- Important and timely paper!
  - Analytic solution will help CBs incorporate price flexibility in their models
  - Inflation accelerator: endogenous inflation volatility when away from inflation target
- Suggestions:
  - Clarify implications for menu cost models, e.g., large shocks vs endogenous volatility
  - Clarify implications for DSGE models, e.g., inflation persistence vs NKPC slope
  - Robustness to assumptions about the adjustment costs