Don't Panic: The Hitchhiker's Guide to Missing Import Price Changes

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This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Federal Reserve System or the BLS.

Introduction

- Are response of published import price indexes to exchange rate movements mismeasured because some price changes are missed when constructing the index?
- Using two popular price-setting models, we investigate selection biases that arise when items experiencing a price change are especially likely to exit or to enter the index.
- We derive empirical bounds on the magnitude of these biases.
- Our analysis suggests that the biases induced by selective exits and entries should not materially alter the literature's view that pass-through to prices of U.S. imported finished goods is low over typical forecast horizons.

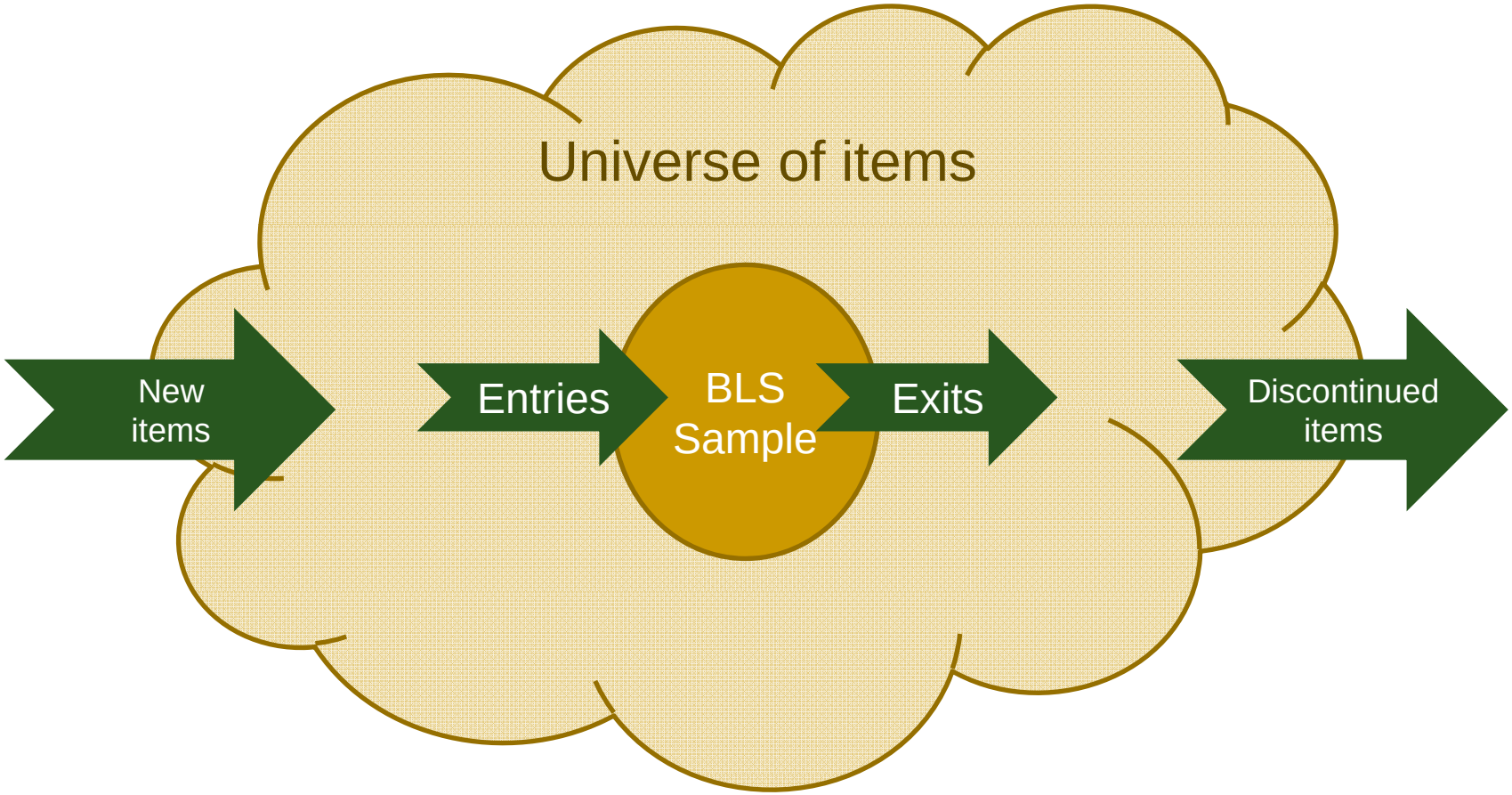
Related Literature

- Large empirical literature on estimating and modeling pass-through.

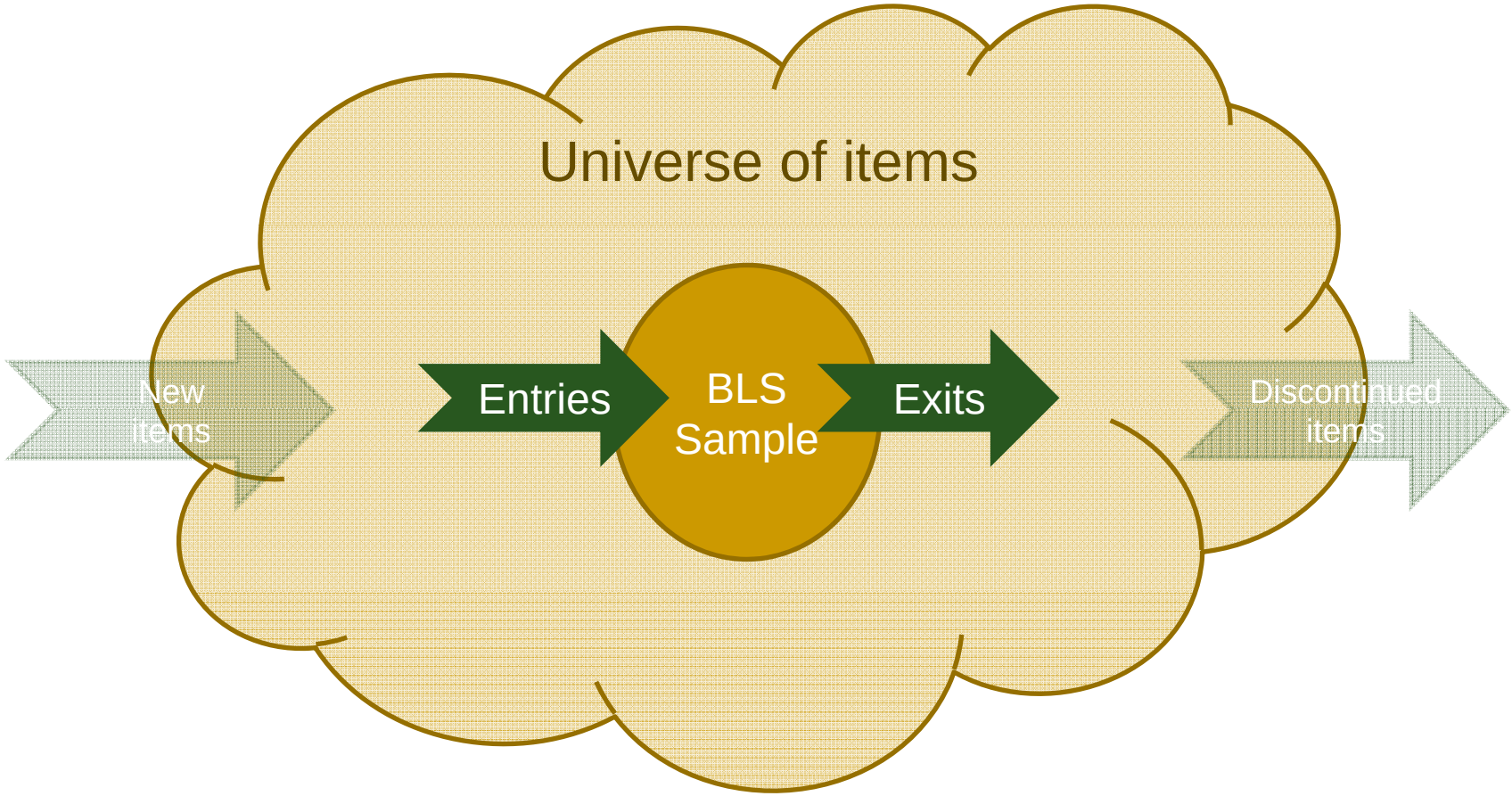
Most closely related paper .

- Nakamura and Steinsson (NS, 2009, now 2011) argue that standard estimates of exchange rate pass-through suffer from a *product replacement bias*.
- They claim that accounting for this bias would **double** estimates of exchange rate pass-through to non-oil U.S. imports (from an elasticity of *0.2-0.4 to 0.6-0.7).*
- We provide a more general analysis. Based on both theory and empirical work, we conclude that pass-through for imported finished goods is low over the two year horizon most relevant for policy makers and also economic modelers.

New and Discontinued Items



Entry and Exit from the price index sample.



A model of price setting where items exit and enter the price index.

- We consider a simple model of exchange rate pass-through with selection biases in item exit and entry in the BLS import sample.
- The universe of items is constant over time (i.e., no new or discontinued items). Item prices are set according to

$$\Delta p_{it} = \begin{cases} u_{it} + \beta \Delta x_t + \varepsilon_{it} & \text{if } \mathcal{I}_{it}^{f} = 1 \\ 0 & \text{if } \mathcal{I}_{it}^{f} = 0 \end{cases},$$

where I_{it}^{f} indicator of nominal price adjustment;

Δx_t exchange rate movement;

u_{it} price pressure inherited from the previous period.

Price-setting

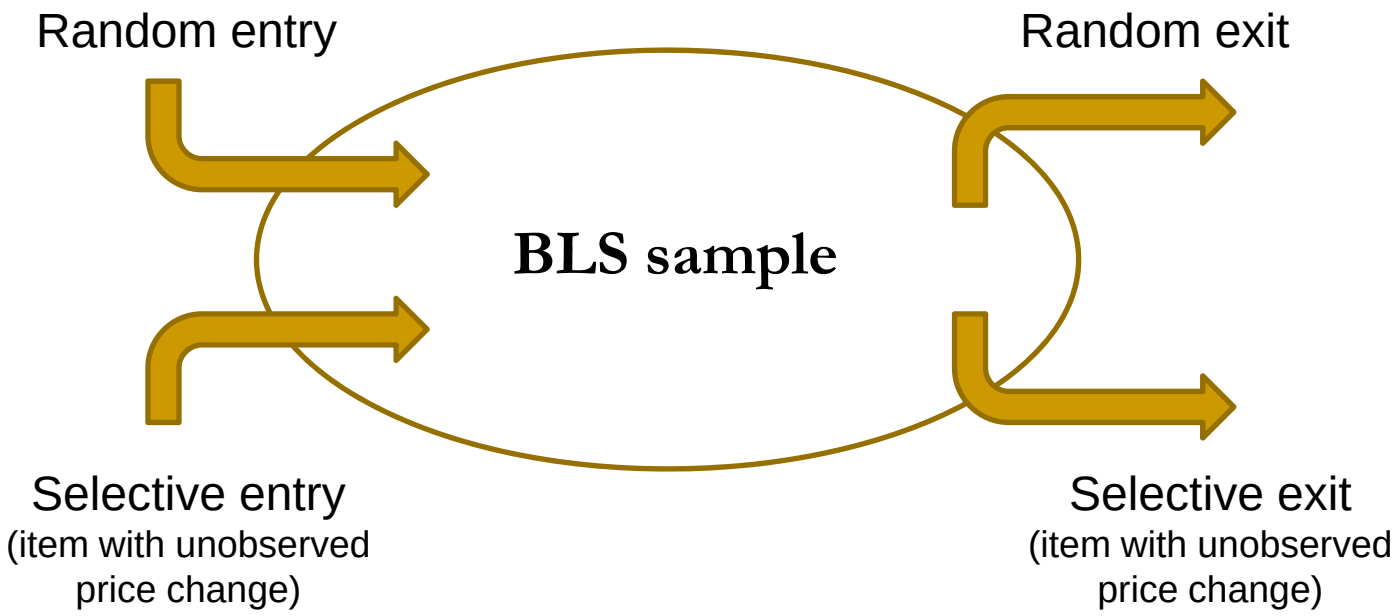
- The price pressure inherited from the previous period evolves according to

$$u_{it+1} = \begin{cases} 0 & \text{if } \mathcal{I}_{it}^{f} = 1 \\ u_{it} + \beta \Delta x_t + \varepsilon_{it} & \text{if } \mathcal{I}_{it}^{f} = 0 \end{cases}.$$

- We consider two price-setting mechanisms:
  - Calvo: constant probability of price change each period.
  - Menu costs: price is changed if and only if $|u_{it}+\beta\Delta x_t+\varepsilon_{it}|>K$.

A model of item exits and entries

- The BLS samples prices from the universe to estimate inflation. The sample is subject to selection biases in the exit and entry of items.



A model of item exits and entries

- Nature of exits and entries in the model:
  - Random exits: items face a constant exogenous probability d of exiting sample every period (akin to scheduled replacements).
  - Selective exits: items with a price change face a constant probability e of exiting the basket.
  - Random entries: a fraction $1\text{-}n$ of entering items are sampled randomly from the universe.
  - Selective entries: a fraction n of entering items are sampled from items in the universe with $u_{it}=0$.
- We assume that every exit triggers an entry to keep the sample size constant. In total, a fraction $s=d+(1-d)fe$ of items in the sample exits every period, where f is the frequency of price changes.

A model of item exits and entries

- Calibration
  - Δx_t is modeled as an AR(1) with Gaussian innovations matching the mean, variance, and persistence of U.S. nominal exchange rate innovations (broad dollar, end-of period).
  - Long-run exchange rate pass-through, β, is set to 0.3.
  - Conditional on n and e, the remaining parameters (K, f, σ_ε) are chosen to match the average frequency and absolute magnitude of individual price changes (about 6.5 percent).

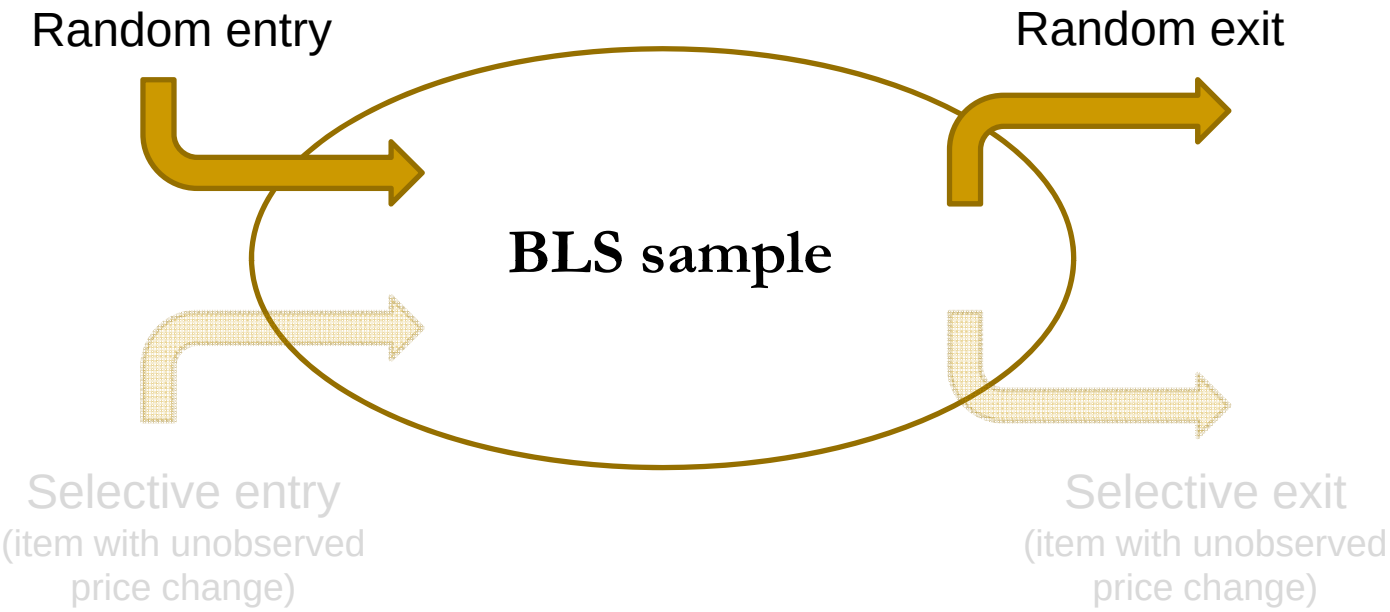
- After generating data from the model, we estimate the following regression:

$$\Delta p_t = \int \Delta p_{it} di = a + \sum_{l=0}^{L} b_l \Delta x_{t-l} + r_t .$$

Four canonical cases

- To gain some intuition, we consider four particular sets of assumptions about the selectivity of exits and entry:
  - All exits and entries are random ($s=d$, $n=0$)
  - All exits and entries are selective ($s=fe$, $n=1$)
  - All exits are selective and all entries are random ($s=fe$, $n=0$)
  - All exits are random and all entries are selective ($s=d$, $n=1$)

Case 1: All exits and entries are random



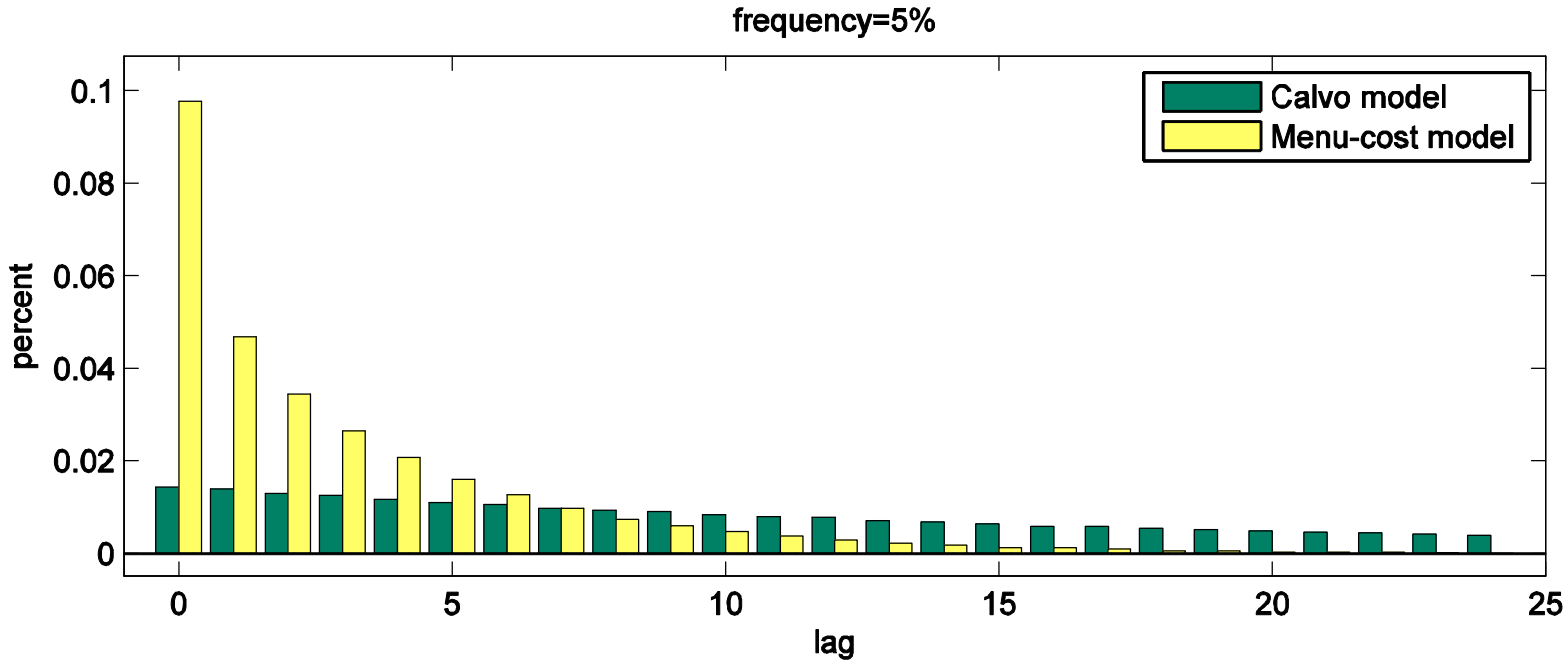
- As long as exits and entries occur randomly (i.e., $s=d$, $n=0$), there is no bias in standard pass-through regressions.

Case 1: All exits and entries are random

Under Calvo pricing, the (plim) coefficients in the pass-through regressions are

$$b_l = f(1-f)^l \beta.$$

Under menu costs, pass through is more rapid.

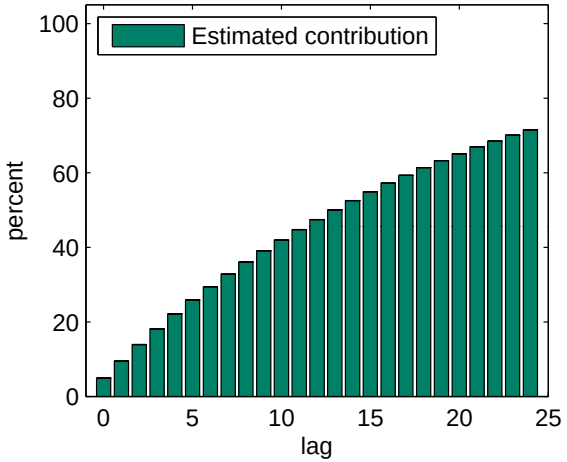


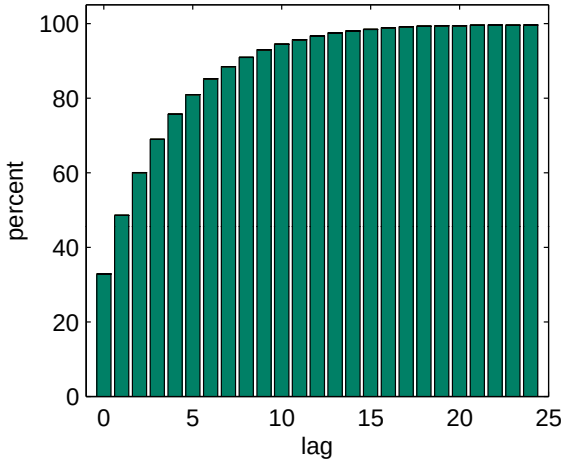
Case 1: All exits and entries are random

Calvo Model

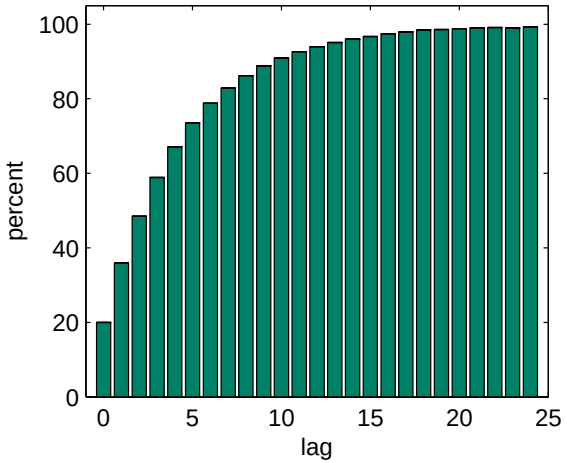
Menu-Cost Model

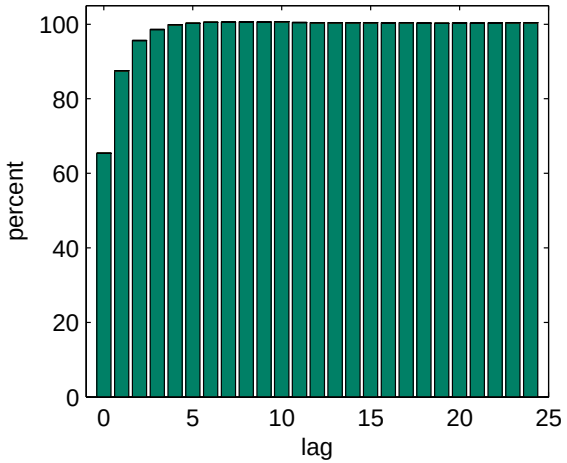
Frequency of Price Change = 5 percent



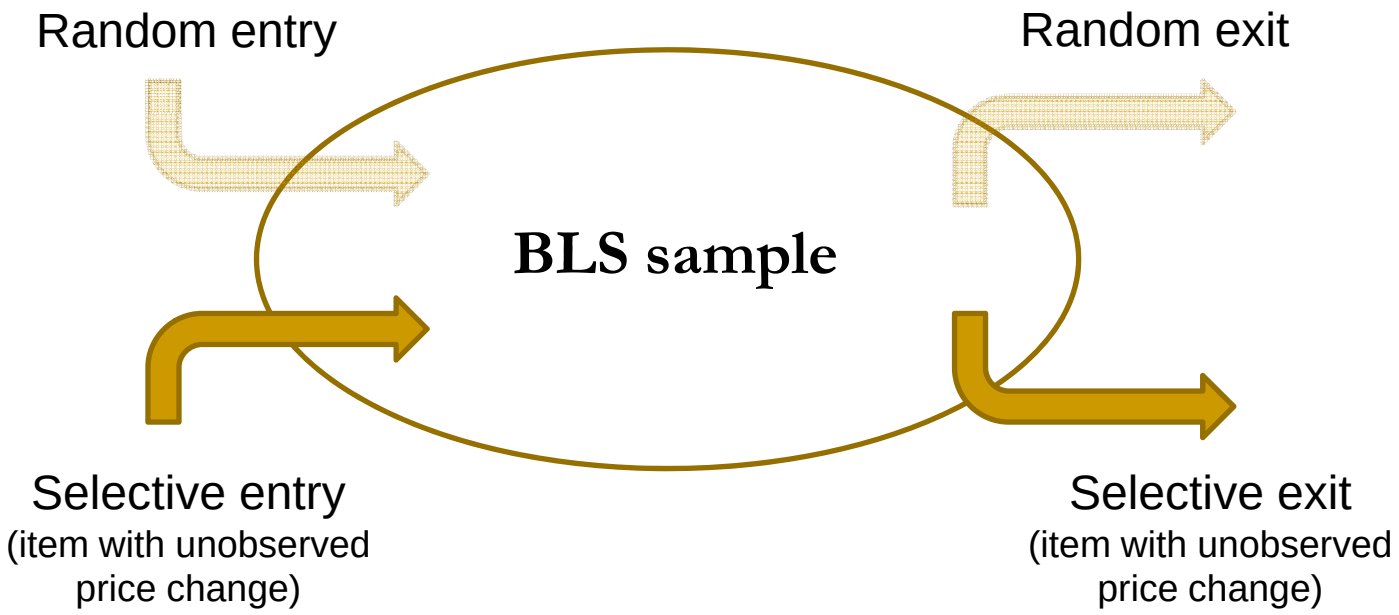


Frequency of Price Change = 20 percent





Case 2: All exits and entries are selective



- Intuitively, this case ($s=fe$, $n=1$) is akin to the censoring of some price changes, so that only a fraction of price changes taking place is observed.

Case 2: All exits and entries are selective

- Under Calvo, one can show that

$$b_l = f(1-f)^l \left(\frac{1-e}{1-fe} \right) \beta$$

- so that each coefficient is biased downwardly by the same factor.

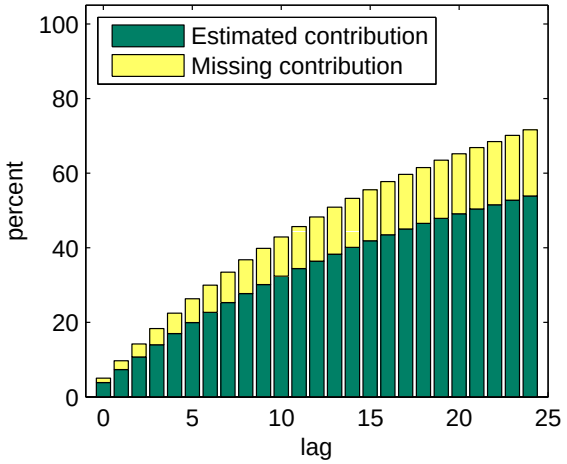
- The size of the bias is similar under Calvo and menu-cost pricing.

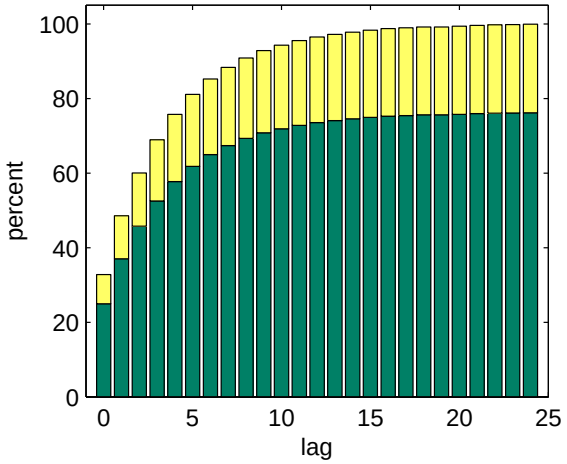
Case 2: All exits and entries are selective

Calvo Model

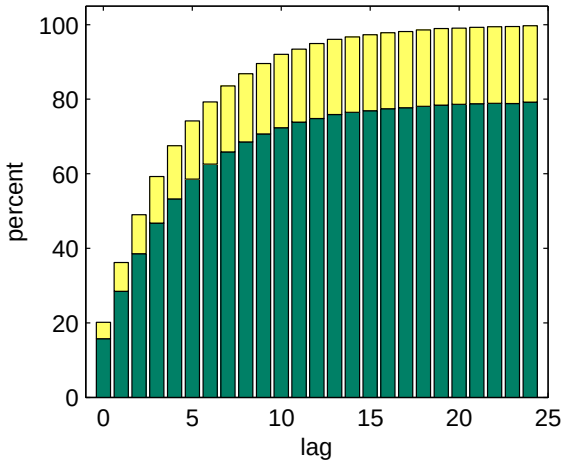
Menu-Cost Model

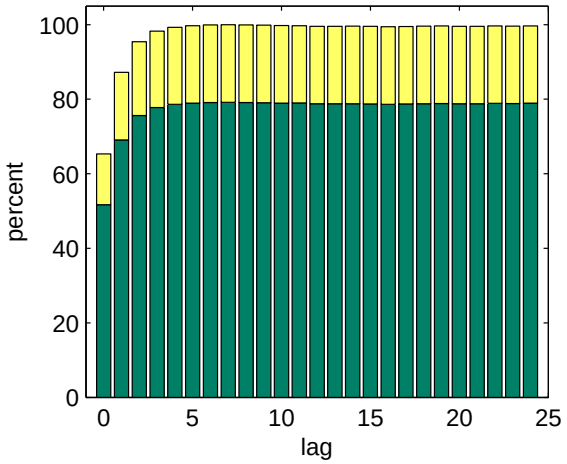
Frequency of Price Change = 5 percent





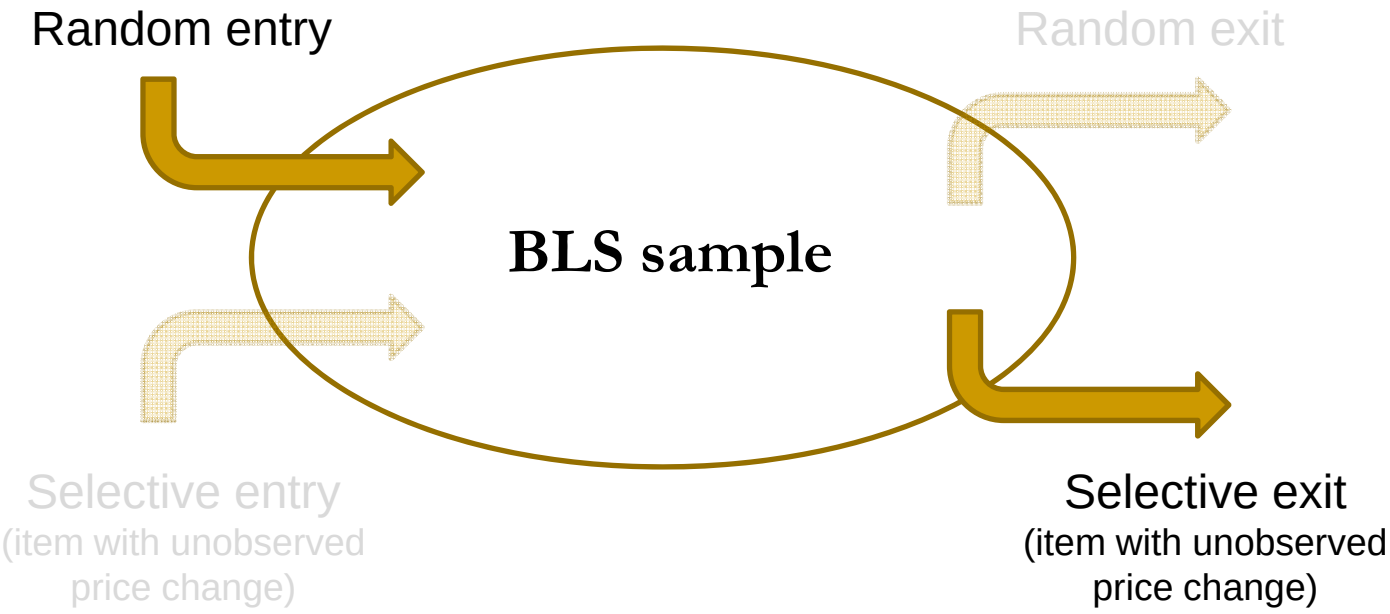
Frequency of Price Change = 20 percent





Case 3: Exits are selective and entries are random

- Under this case ($s=fe$, $n=0$), some items with a price change exit the sample and are replaced by sampling randomly from the universe of items.



Case 3: Exits are selective and entries are random

Under Calvo,

$$b_l = \left(\frac{1-e}{1-fe}\right)(1+lfe)(1-f)^l f\beta.$$

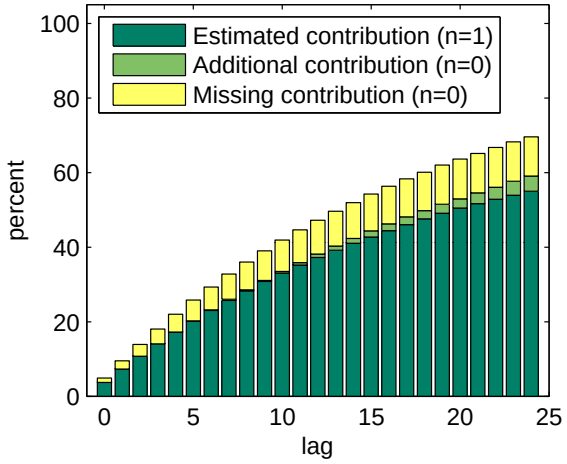
- One can show that cumulative pass-through remains downward biased, but less so than when entries are selective.
- Intuitively, prices of entering items may not have been adjusted in a while, making them responsive to past exchange rate movements.
- The bias reduction from resampling at random typically is larger in the Calvo model than the menu-cost model.

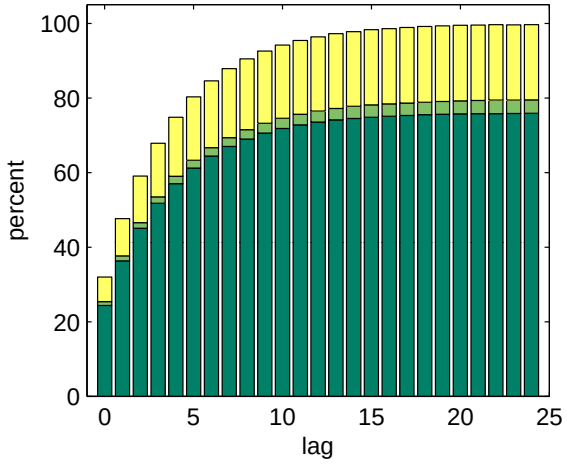
Case 3: Exits are selective and entries are random

Calvo Model

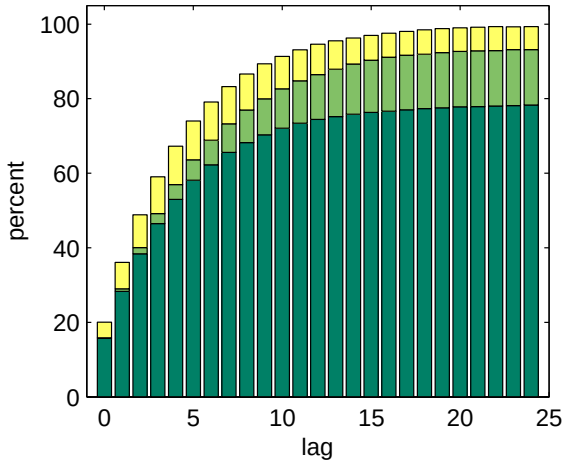
Menu-Cost Model

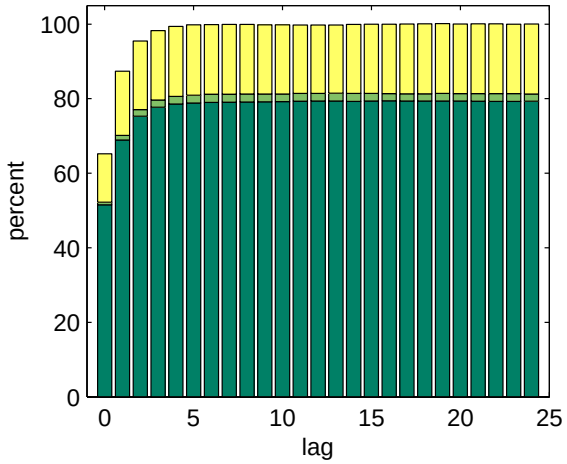
Frequency of Price Change = 5 percent





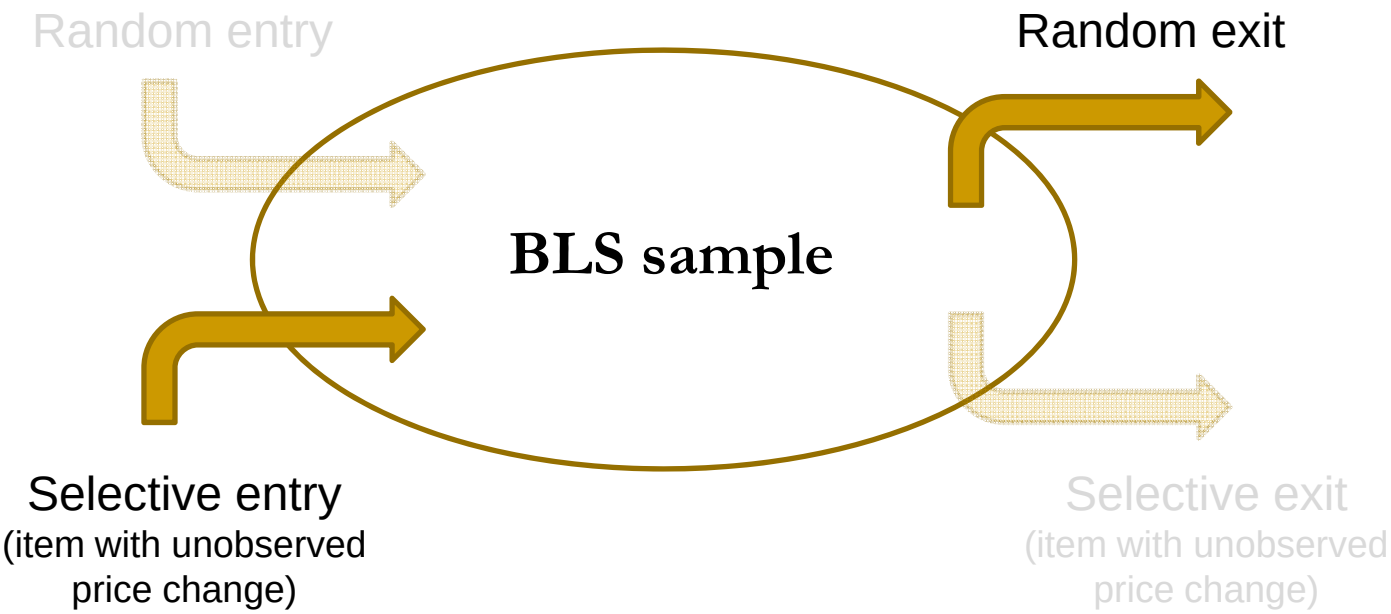
Frequency of Price Change = 20 percent





Case 4: Exits are random and entries are selective

- This special case ($s=d$, $n=1$) corresponds to the environment considered by Nakamura and Steinsson (NS, 2009).



Case 4: Exits are random and entries are selective

- A bias occurs because entering items *systematically* are less sensitive to past exchange rate movements than items in the universe. NS call this effect the *product replacement bias*.
- Under Calvo, one can show that

$$b_l = f(1-f)^l(1-s)^l\beta.$$

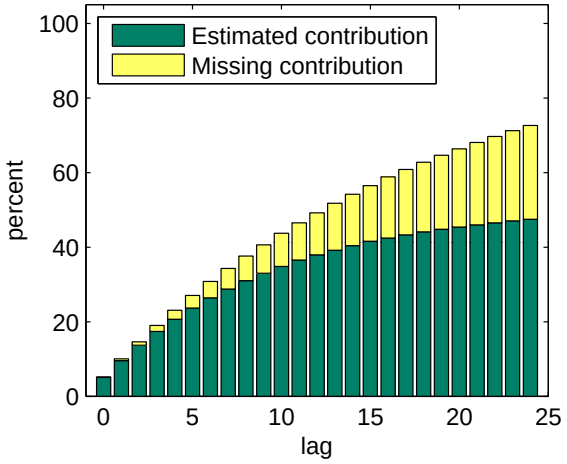
- Note that (a) the initial response is unbiased and (b) the accuracy decays exponentially with the number of lags, so that longer-run responses are more biased than short-run responses.
- The bias is smaller under menu-cost pricing because pass-through is relatively rapid.

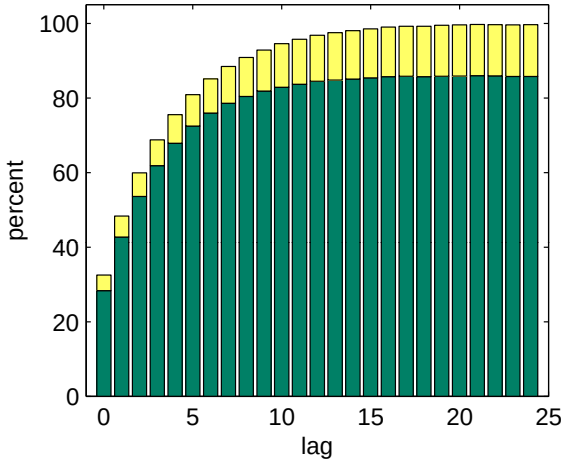
Case 4: Exits are random and entries are selective

Calvo Model

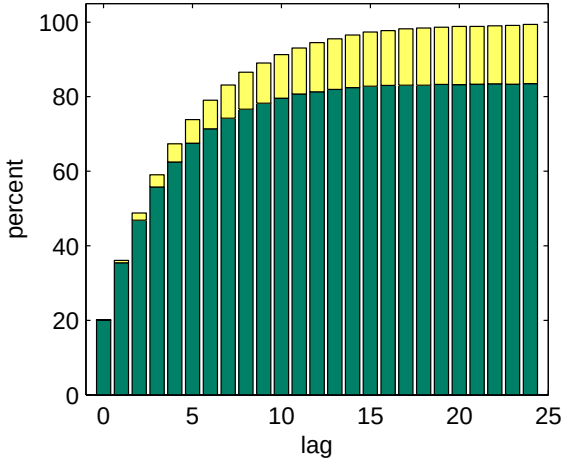
Menu-Cost Model

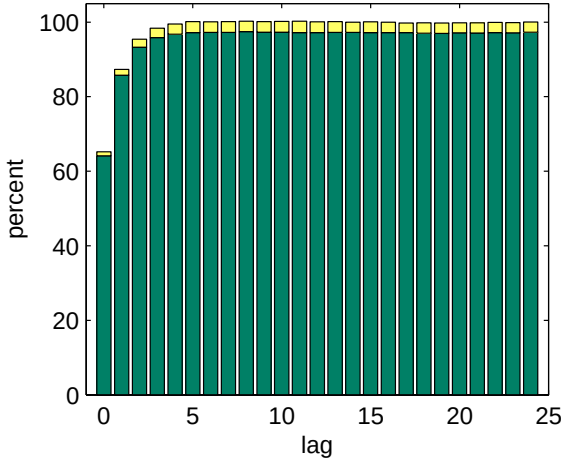
Frequency of Price Change = 5 percent





Frequency of Price Change = 20 percent





Some observations

- For selective exits to be empirically important…
  - A non-negligible share of price changes must trigger exits ($e>0$).
  - The number of selective exits does not have to be large relative to the total number of observations in the sample.
- For selective entries to be empirically important…
  - Pass-through must be slow (low f).
  - The horizon of interest must be the medium to long term.
  - A large proportion of entering item systematically must have had a recent (unobserved) price change ($n>>0$).

Empirical importance of selective exits and selective entries

- To assess biases in standard pass-through regressions and correct them, we must form a view on the value of e, n, and the right pricing model.

- We employ three approaches:
  - Review the BLS data and methodology.
  - Compute bounds on the impulse response to an exchange rate shock;
  - Construct an alternative index that should highlight the extent of the bias.

BLS Methods: International Price Program

- Same source as Gopinath & Rigobon (2008); Nakamura & Steinsson (2009); Neiman (2010).
- BLS collects prices through a monthly survey of U.S. establishments.
- Transaction prices for imported goods at a monthly frequency
- ~13,000 price observations per month for precisely defined items.
- Dates: September 1993 – July 2007.
  - All fields available: October 1995 – April 2005.
- Using the micro data, we compute statistics on average frequency of price updates, exit and entry rates.

Types of exit observed

BLS-induced exits. BLS resamples every two years and typically plans to retire items 5 years after entry.

- Regular phase-out
- Accelerated phase-out
- Sample dropped

Business-led exits

- Refusal
- Out of business
- Out of scope, replaced
- Out of scope, not replaced

Greatest likelihood of being a selective exit

Types of entry

Exits are not generally accompanied by simultaneous entry.

- Often, the BLS waits until the next biennial sample redrawing.
- When exits are *Out of Scope*, the BLS asks the reporting firm if another item could meet the sampling criterion.
  - Attempt to link the prices of the exiting and entering items.
  - Otherwise, the replacement enters as a new good.
  - These are the cases with the greatest likelihood of being a selective entry.

	Enduse	Relative Weight	Exit Rate			Entry Rate	Mean Freq. of Price Changes	Mean Absolute Size of Price Change
			all reasons	out-of-scope	Others reasons			
Capital Goods	210 Oil drilling, mining & const. machinery	1.9	2.5	0.9	1.6	2.9	6.9	6.6
	211 Industrial & service machinery, n.e.c.	10.6	2.5	0.8	1.7	2.5	6.3	6.7
	212 Agricultural machinery & equip.	0.7	2.7	1.2	1.5	3.1	8.9	5.3
	213 Computers, periph. & semiconductors	12.7	3.7	2.2	1.5	5.0	9.7	9.6
	214 Telecommunications equip.	4.0	3.4	1.8	1.6	3.6	5.8	8.9
	215 Business mach. & equip., ex. Computers	0.9	3.3	1.5	1.8	2.5	5.2	6.3
	216 Scientific, hospital & medical machinery	2.6	3.1	1.2	1.9	3.2	4.9	6.9
Auto-motive	300 Passenger cars, new & used	13.6	2.8	1.6	1.1	3.5	5.3	2.0
	301 Trucks, buses, & special-purp. vehicles	2.4	2.8	1.9	0.9	3.9	5.8	2.9
	302 Parts, engines, bodies, & chassis	9.3	2.8	1.2	1.6	3.0	8.0	7.1
Consumer Goods (Ex. Food & Auto.)	400 Apparel, footwear, & household goods	11.2	3.5	1.7	1.8	3.6	3.9	7.6
	401 Other consumer nondurables	8.6	2.4	0.8	1.5	2.7	6.0	7.7
	410 Household goods	10.4	2.9	1.2	1.7	3.0	4.6	6.2
	411 Recreational equip. & materials	3.9	3.2	1.8	1.5	3.1	4.8	5.7
	412 Home entertainment equip.	5.2	3.7	2.2	1.5	4.1	5.6	5.8
	413 Coins, gems, jewelry, & collectibles	2.2	3.1	1.1	1.9	3.1	6.9	5.9
	Total	100.0	3.0	1.5	1.5	3.4	6.2	6.7

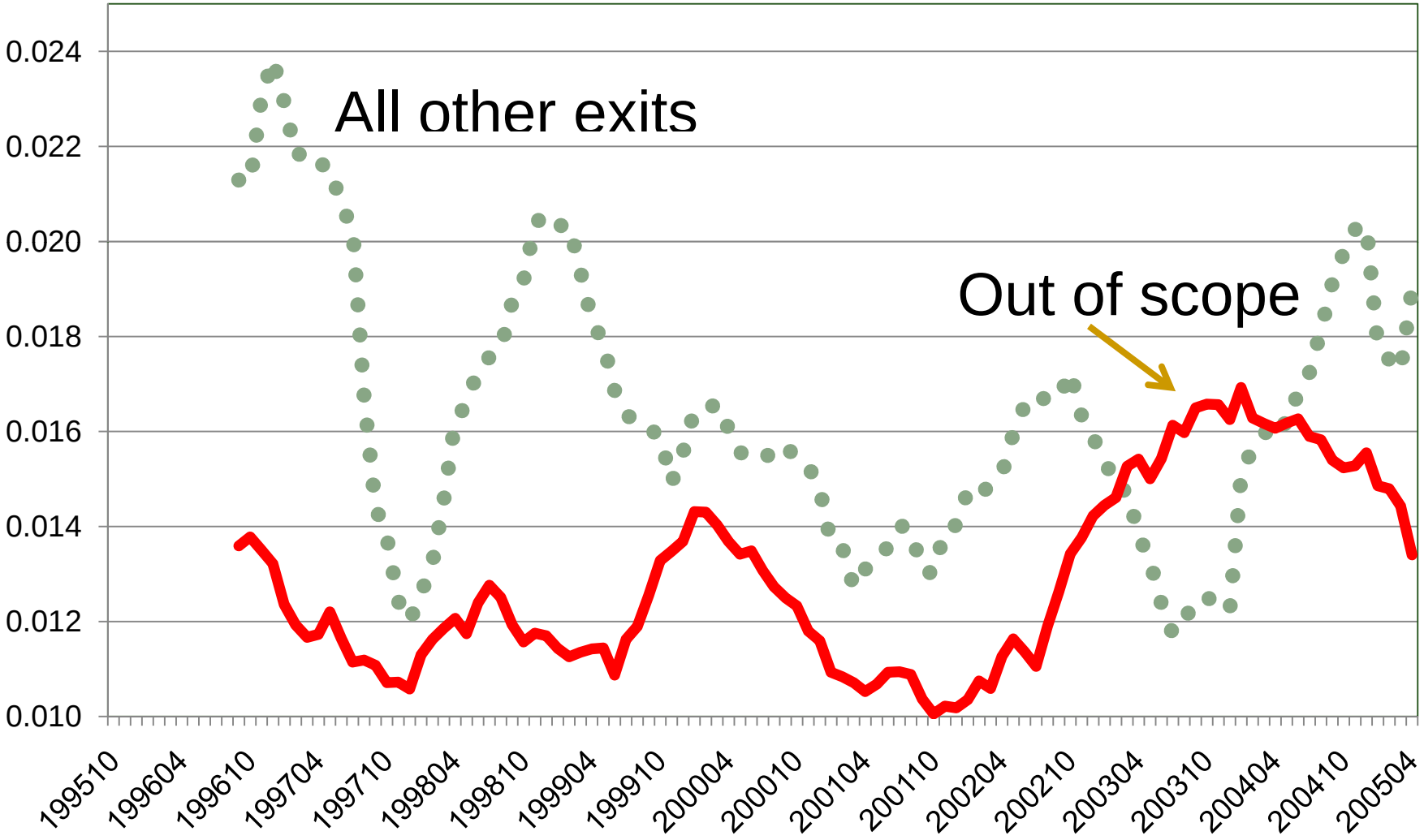
210. Exit Rate All reasons 2.5, Out-of-Scope 0.9

301 Exit Rate All Reasons 2.8, Out-of-Scope 1.9

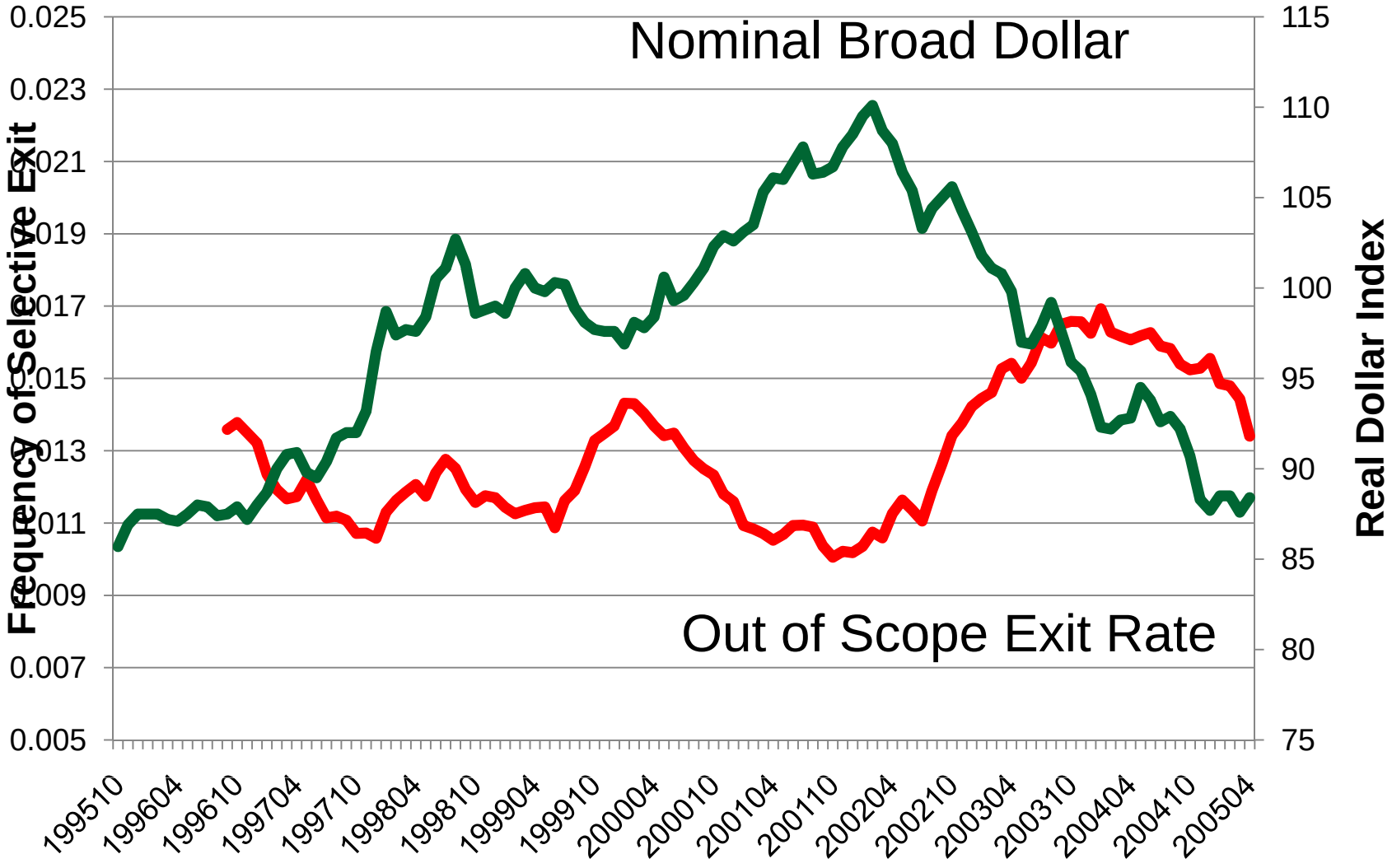
213 Freq of Price Changes 9.7

400 Freq of Price Changes 3.9

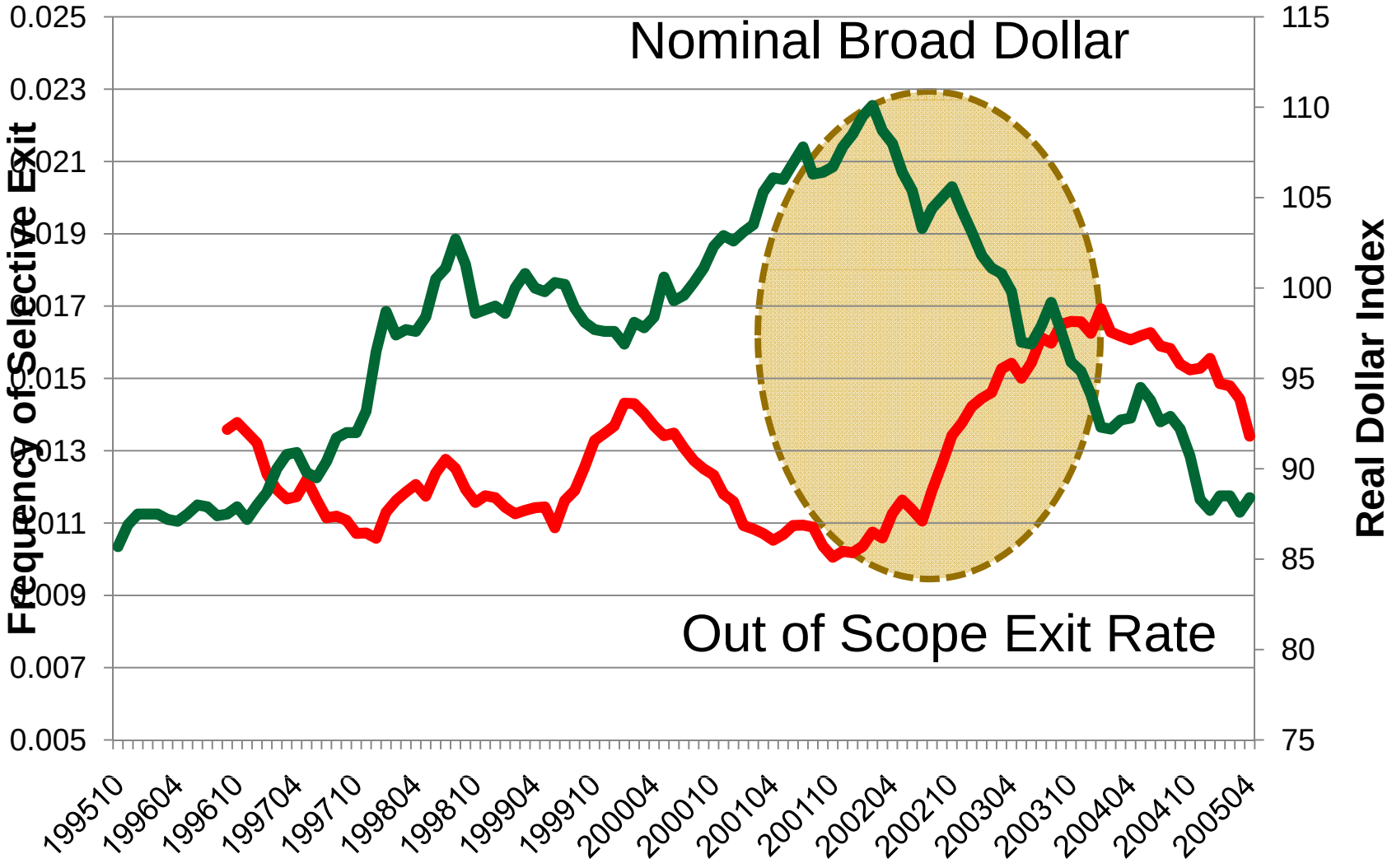
Frequency of item exit



Out of Scope Exit and the Dollar



Out of Scope Exit and the Dollar



Empirical Estimation

- Use the published monthly BLS price indexes at 3-digit end-use specification. (Report results for the finished goods sectors.)
- For each individual 3-digit end-use category, we construct time-varying trade-weighted exchange rates and foreign inflation series.
- Estimate a 24-lag regression of import price changes on lags of exchange rate and foreign inflation series.
- Construct trade-weighted estimates of these pass-through coefficients.

Why the emphasis on finished goods?

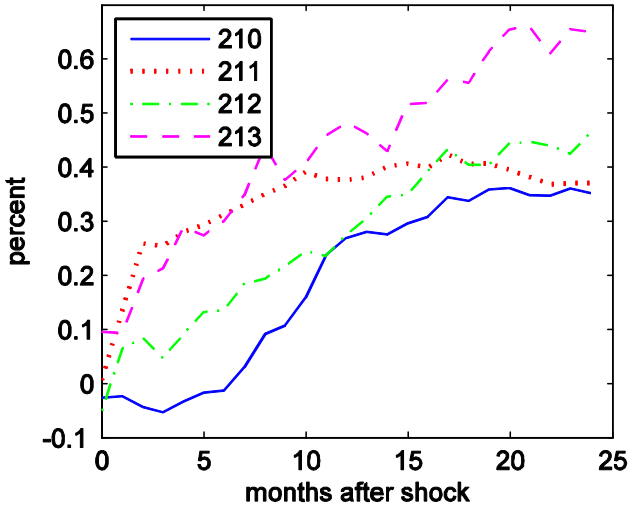
- Finished goods (capital goods, automotive products and consumer goods)
  - Make up a large share of nominal imports.
  - Have low estimated pass-through rates.
  - Have low frequency of updating.
- Material intensive goods (foods and industrial supplies (including oil)
  - Have higher frequency of updating.
  - Prices of commodities often have very high estimated pass-through rates.

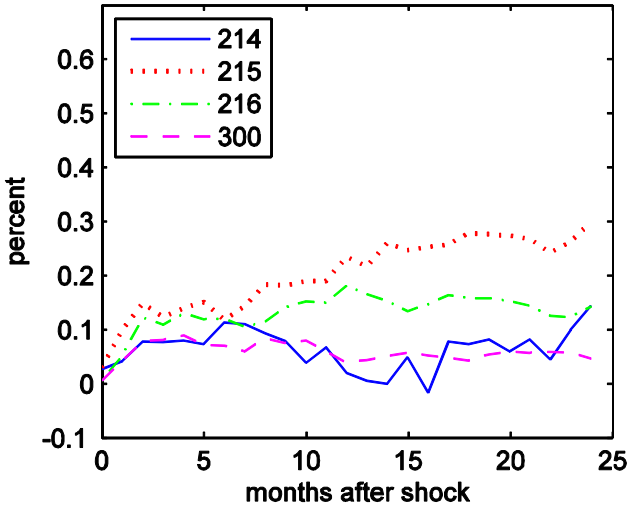
Why the emphasis on two year horizon?

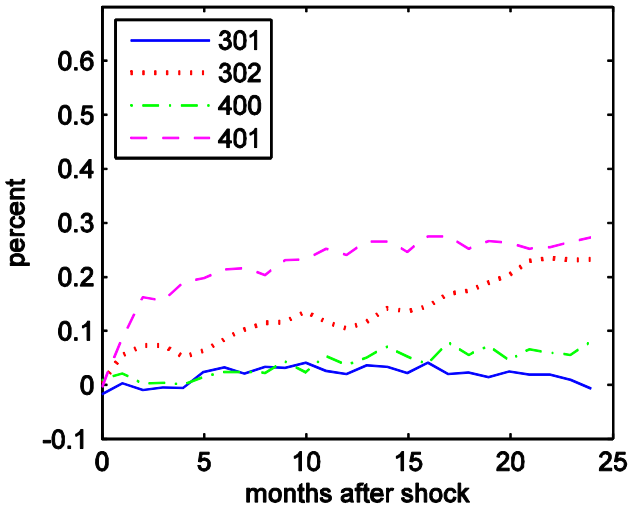
- Most central bank forecasters have two year horizons.

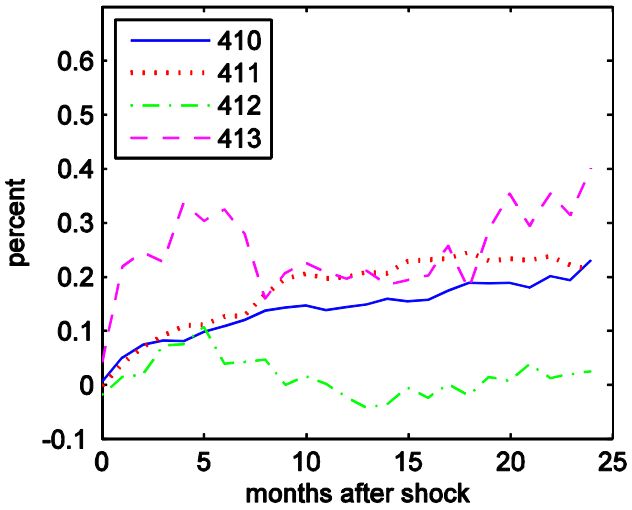
- Differences between macroeconomic models are most stark in the first couple of years following a shock.

End-Use Specific Pass-through Estimates

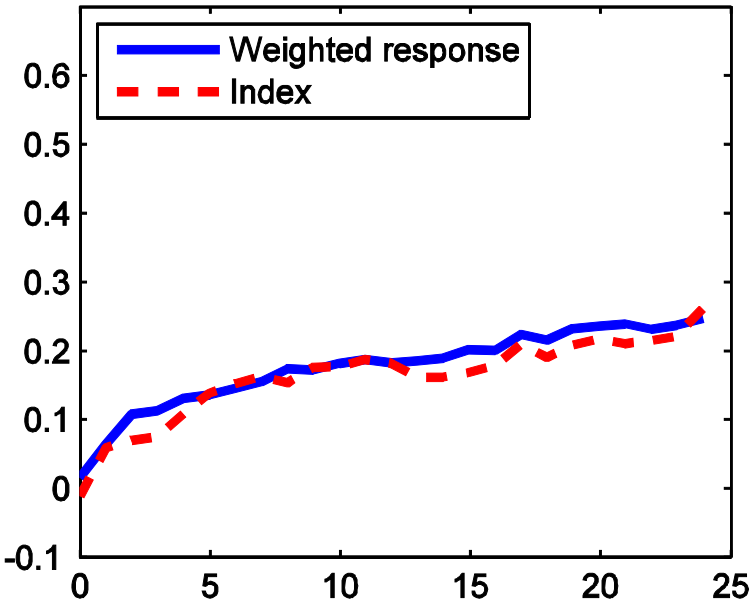








Aggregate Estimates

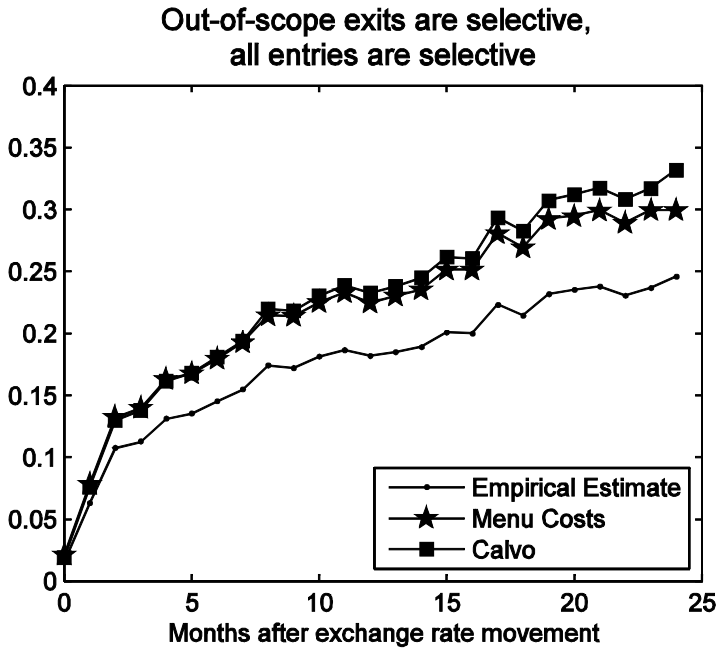


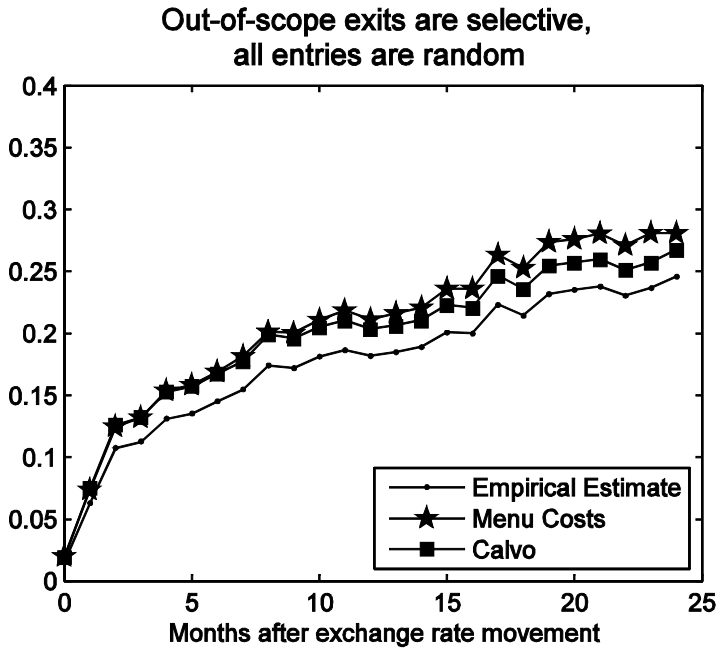
Enduse categories

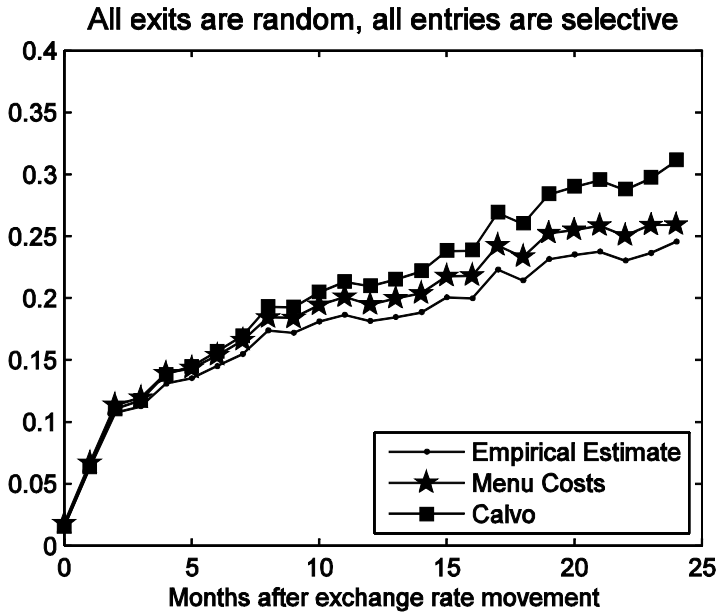
210 - Oil drilling mining and construction machinery and equipment
211 - Industrial and service machinery
212 - Agricultural machinery and equipment
213 - Computers peripherals and semiconductors
214 - Telecommunications equipment
215 - Business machinery and equipment except computers
216 - Scientific and medical machinery
300 - Passenger cars new and used
301 - Vehicles designed to transport goods
302 - Parts engines bodies and chassis
400 - Apparel footwear and household goods
401 - Other consumer nondurables
410 - Household goods
411 - Recreational equipment and materials
412 - Home entertainment equipment
413 - Coins gems jewelry and collectibles

Bounding standard estimates

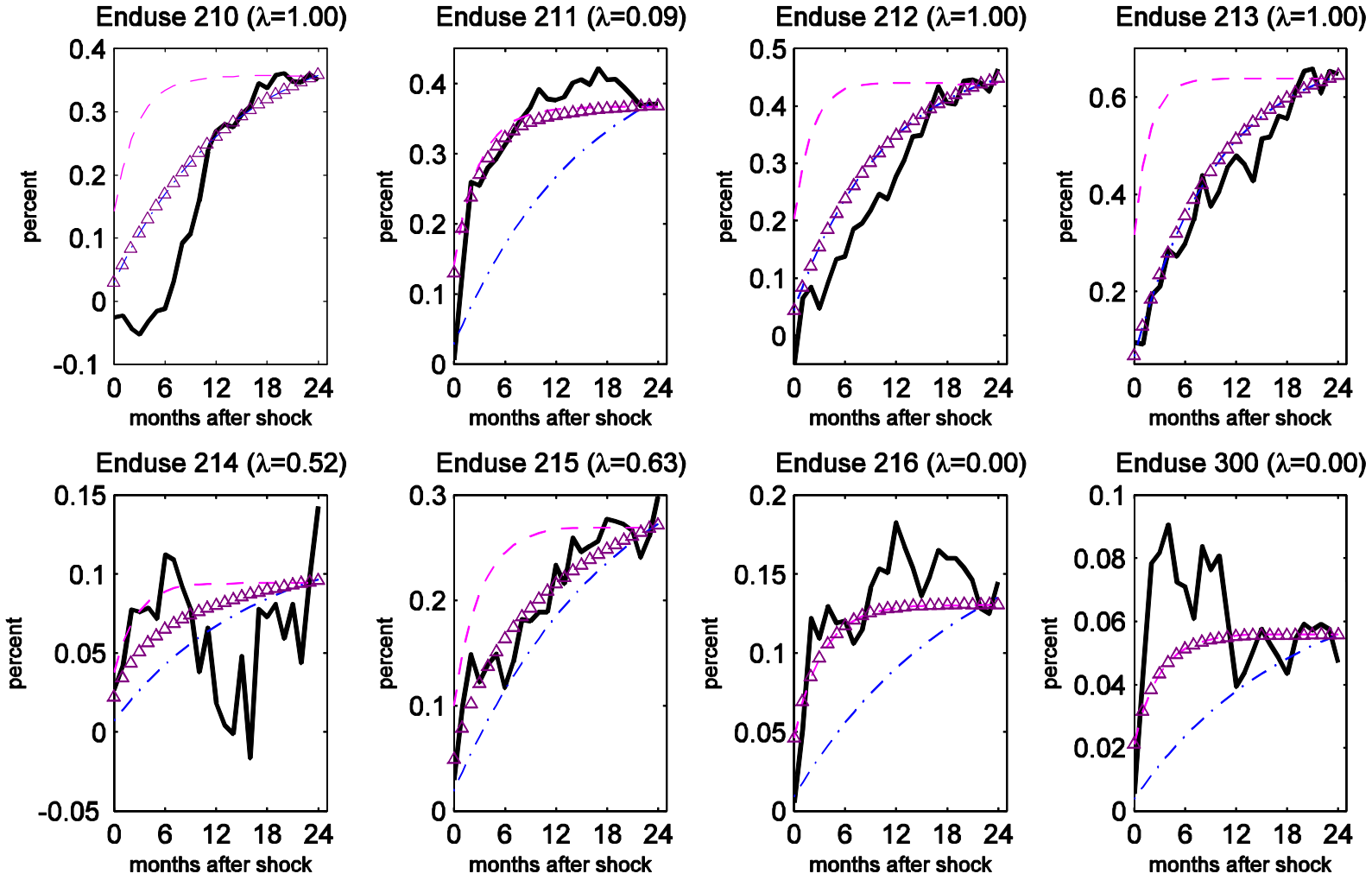
- From microdata on each 3-digit end-use category, we have reported estimates of how frequently items are repriced and how frequently they exit.
- Therefore, we can use the calculations in our theory section to derive bounds.

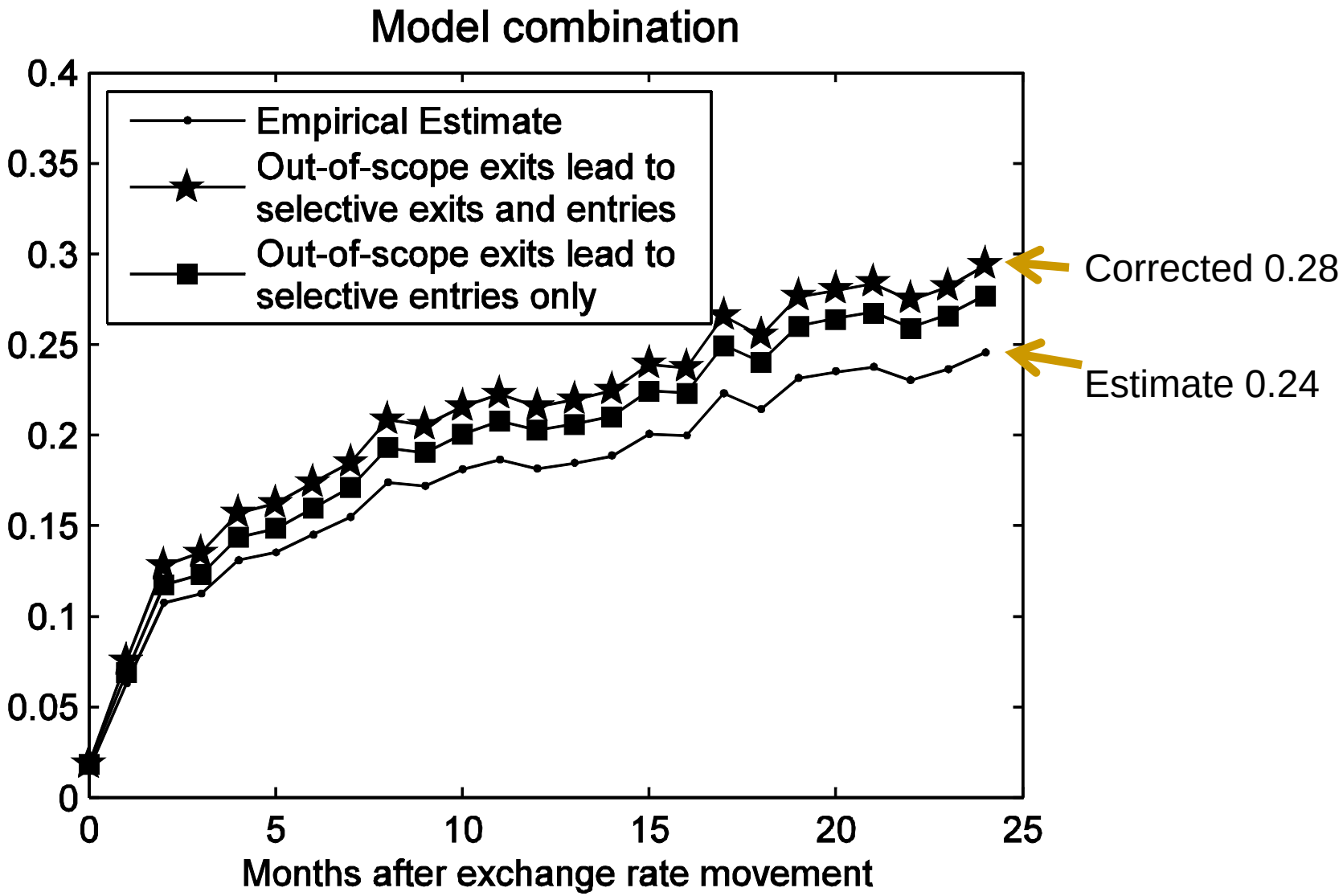

Out-of-scope exits are selective,
all entries are selective
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
Months after exchange rate movement
Empirical Estimate
Menu Costs
Calvo


Out-of-scope exits are selective,
all entries are random
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
Months after exchange rate movement
Empirical Estimate
Menu Costs
Calvo


All exits are random, all entries are selective
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
Months after exchange rate movement
Empirical Estimate
Menu Costs
Calvo

Do the responses look more like Calvo or Menu-Cost Pricing




Model combination
Empirical Estimate
Out-of-scope exits lead to selective exits and entries
Out-of-scope exits lead to selective entries only
Corrected 0.28
Estimate 0.24
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
Months after exchange rate movement

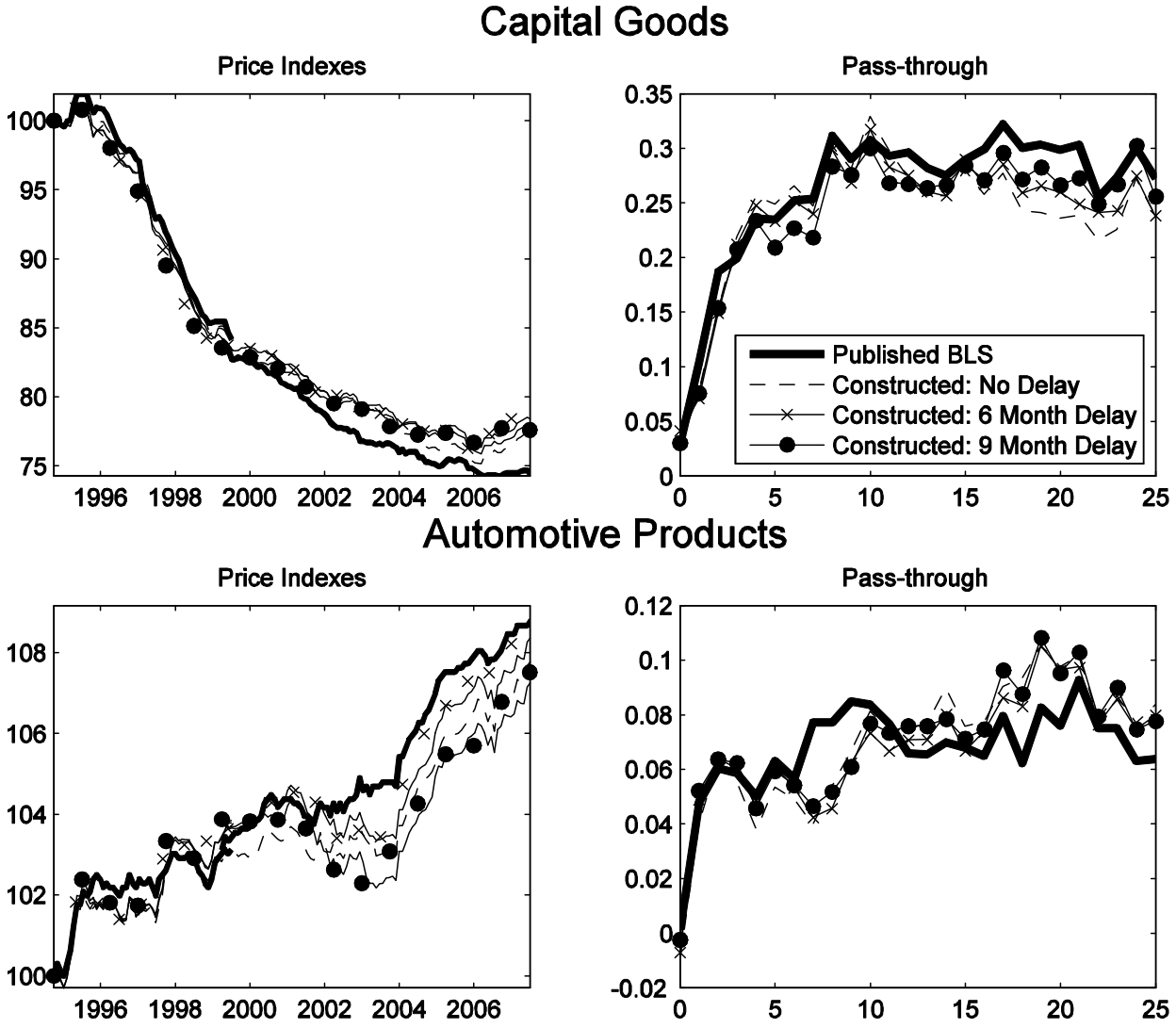
Robustness Exercise

- The fraction of entries that are selective is unobservable.
- We try to infer how big the problem is by constructing an alternative price index using the BLS micro-data.
- Whereas the standard BLS index adds items to the index the period after they are initially sampled, we delay the entry of items to the index.
- Delaying entries most effectively reduce selective entries. When exits are random and entries are selective (i.e., product replacement bias), one can show that, under an M-period delay in the Calvo model,

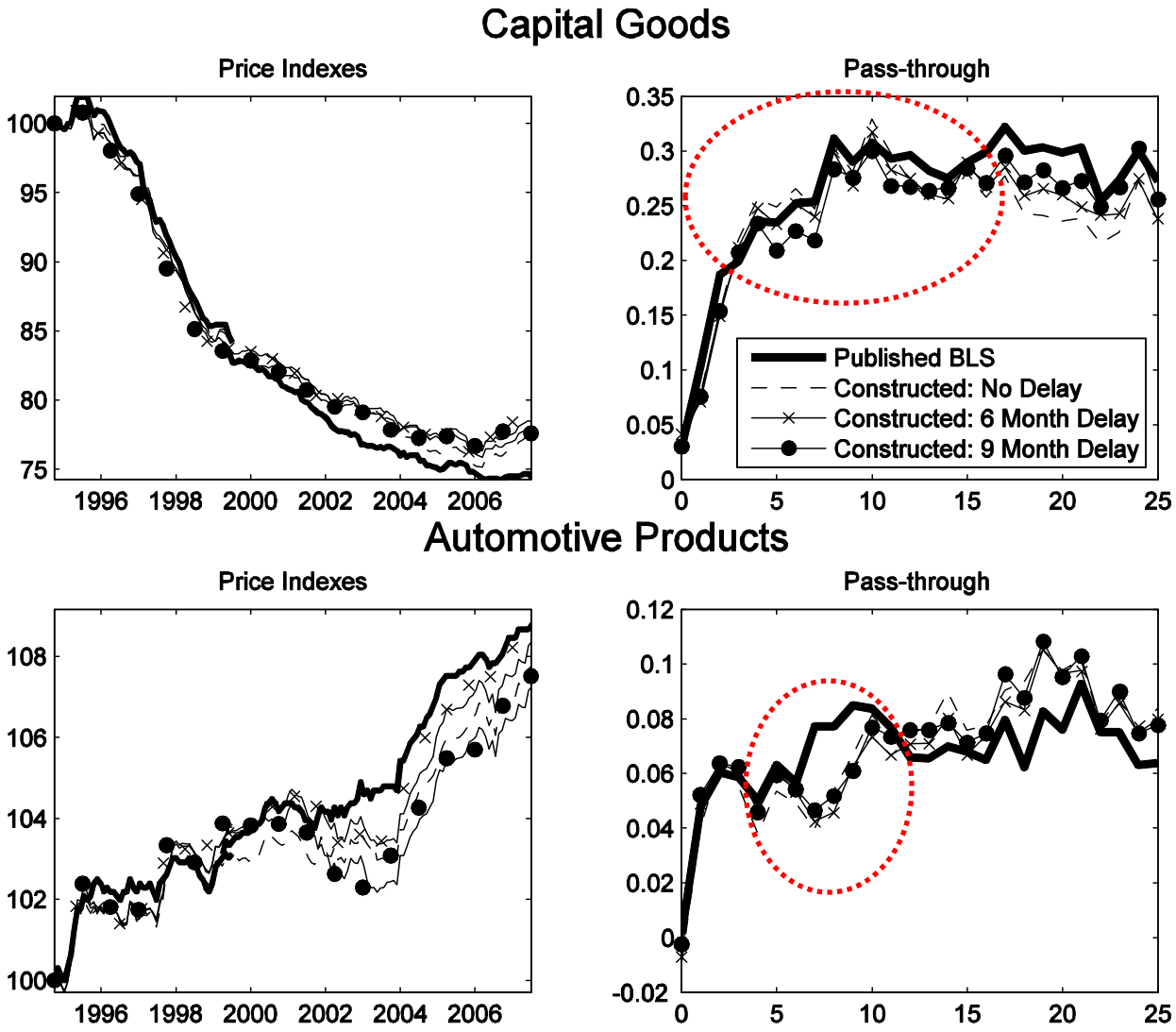
$$b_l = \begin{cases} f(1-f)^l\beta & \text{if } l \leq M \\ f(1-f)^l(1-s)^{l-M}\beta & \text{if } l > M \end{cases}.$$

- Our trick eliminates the product replacement bias from the coefficients on the current and first M lags of exchange rate movements, and lowers it by a factor of $(1\text{-}s)^M$ for subsequent lags.

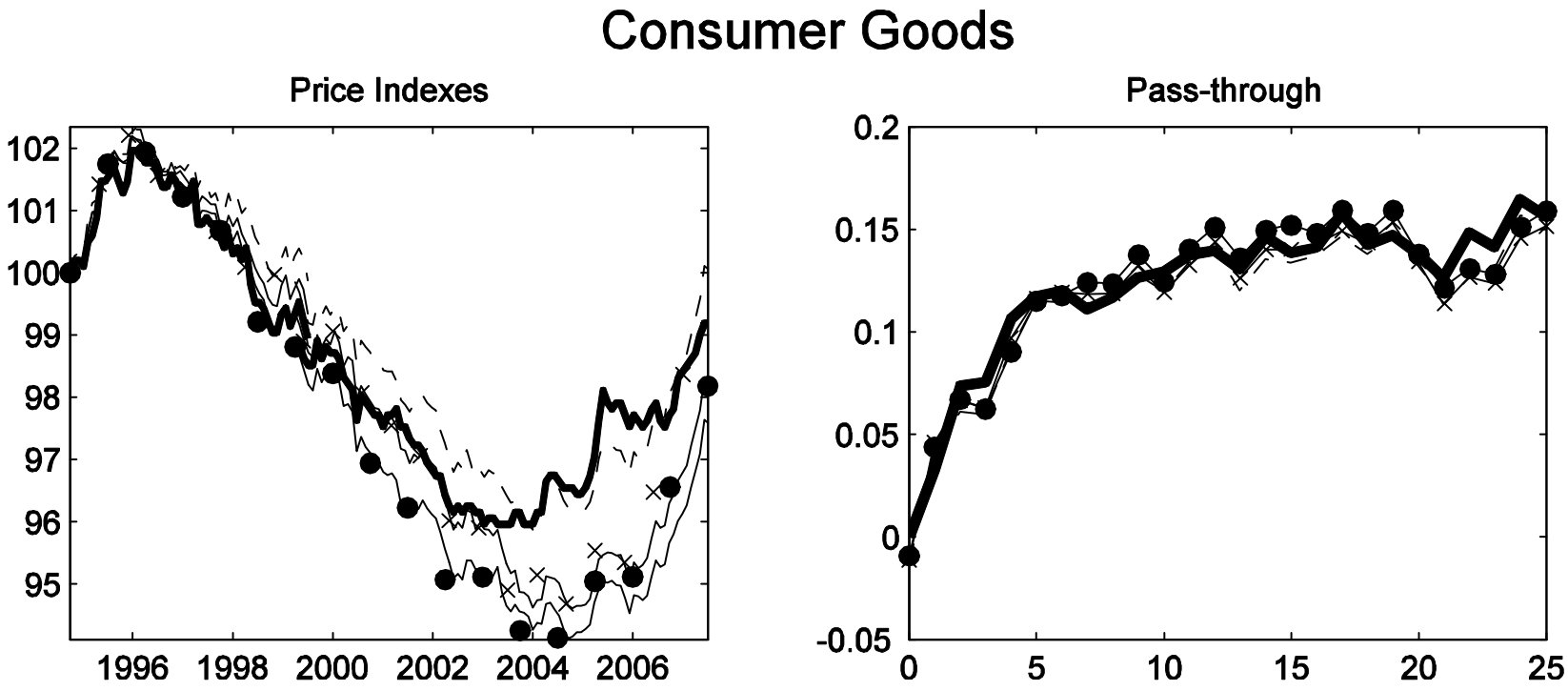
Results for Our Alternative Indexes



Results for Our Alternative Indexes



Results for Our Alternative Indexes



Concluding remarks

- Selection biases in the exit and entry of items in the import price index can downwardly bias the measured response of prices to an exchange rate movement (or any type of shock) over typical policy-relevant horizons.
- For policy purposes, biases induced by exit seem most concerning as they impact the short-term response of prices.
- Although biases associated with entry can potentially be important over long horizons, they have limited effects in the short-run.
- Future research should aim at better identifying the causes of item exits and the nature of entering items.

Additional slides

Exit, entry and price change in U.S. data

- Estimate frequency of price changes (for matched models) as:

$$frequency\,(t) = \frac{change(t)}{change(t) + no\_change(t)}$$

- Estimate exit and entry rates:

$$exit\_rate\,(t) = \frac{exit(t)}{entry(t-1) + change(t-1) + no\_change(t-1)}$$

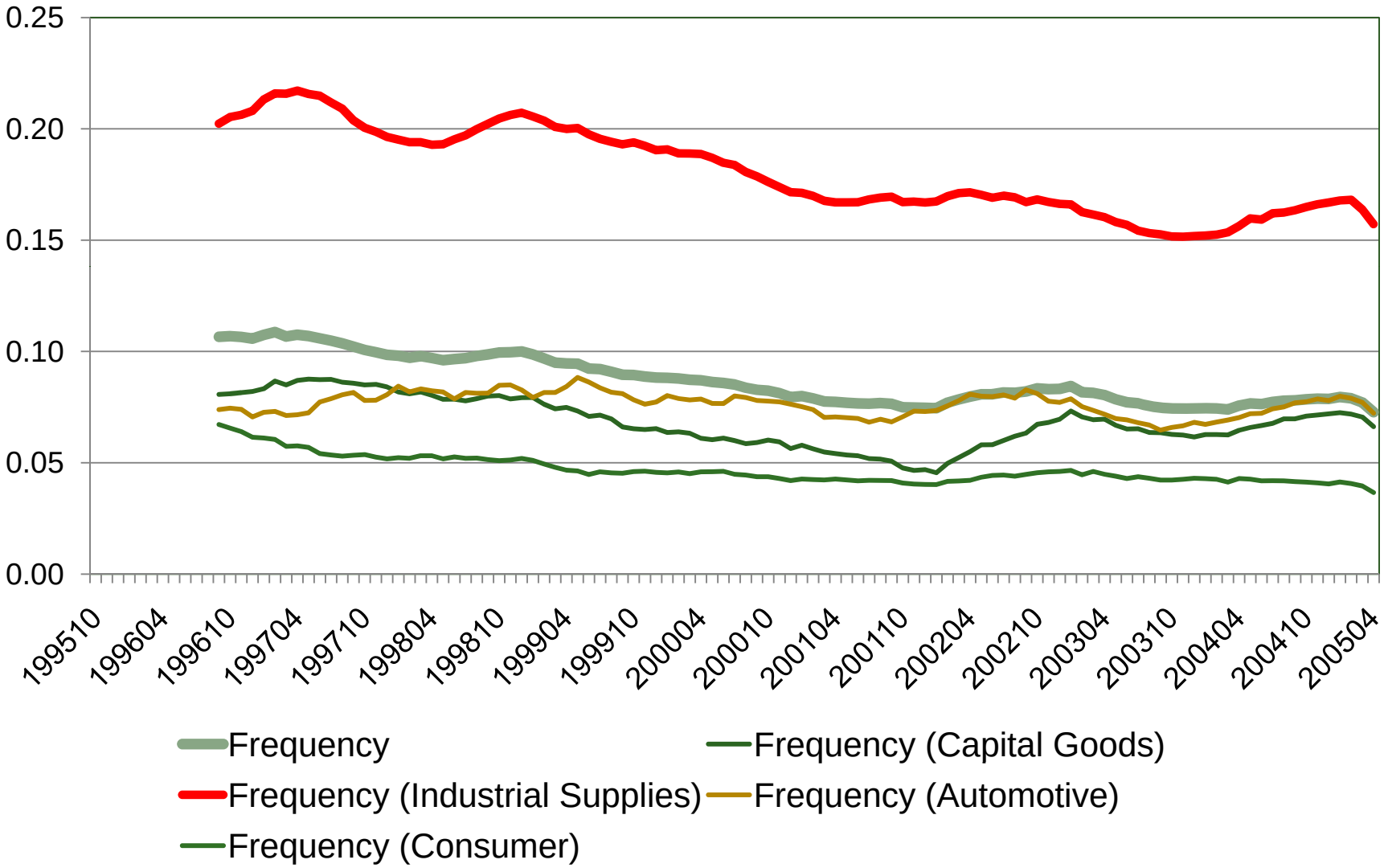
$$entry\_rate\,(t) = \frac{entry(t)}{entry(t-1) + change(t-1) + no\_change(t-1)}$$

Import price summary statistics

	Enduse		Weight	Freq.	Entry	Exit		Abs.
						All	Select.	Size
Capital Goods	210	Oil drilling, mining & const. machinery	1.0	6.9	2.9	2.5	0.9	6.6
	211	Industrial & service machinery, n.e.c.	5.8	6.3	2.5	2.5	0.8	6.7
	212	Agricultural machinery & equip.	0.4	8.9	3.1	2.7	1.2	5.3
	213	Computers, periph. & semiconductors	7.0	9.7	5.0	3.7	2.2	9.6
	214	Telecommunications equip.	2.2	5.8	3.6	3.4	1.8	8.9
	215	Business mach. & equip., ex. Computer	0.5	5.2	2.5	3.3	1.5	6.3
	216	Scientific, hospital & medical machinery	1.4	4.9	3.2	3.1	1.2	6.9
Auto-motive	300	Passenger cars, new & used	7.5	5.3	3.5	2.8	1.6	2.0
	301	Trucks, buses, & special-purp. vehicles	1.3	5.8	3.9	2.8	1.9	2.9
	302	Parts, engines, bodies, & chassis	5.1	8.0	3.0	2.8	1.2	7.1
Consumer Goods (Ex. Food & Auto.)	400	Apparel, footwear, & household goods	6.2	3.9	3.6	3.5	1.7	7.6
	401	Other consumer nondurables	4.7	6.0	2.7	2.4	0.8	7.7
	410	Household goods	5.7	4.6	3.0	2.9	1.2	6.2
	411	Recreational equip. & materials	2.1	4.8	3.1	3.2	1.8	5.7
	412	Home entertainment equip.	2.9	5.6	4.1	3.7	2.2	5.8
	413	Coins, gems, jewelry, & collectibles	1.2	6.9	3.1	3.1	1.1	5.9
	500	Imports, N.E.S.	3.3	5.2	1.8	2.7	0.6	12.5
		Total	58.2	6.1	3.3	3.0	1.4	6.8

Import price summary statistics

frequency of price changes (12 month MA; unweighted)



Inflation objectives and policy horizons

Economy	Target rate (%)	Target horizon	Forecast horizon
Australia	2-3	average over business cycle	2 years
Canada	1-3	6 to 8 quarters	2 to 3 years
Euro area	just below 2	medium term	current year and next
Japan	0-2[a]	medium to long term	current fiscal year and next
New Zealand	1-3	medium term	3 years
Norway	2.5	1 to 3 years ahead	3 to 4 years
Sweden	1-3	2-year ahead	3 to 4 years
Switzerland	less than 2	medium term	3 years
United Kingdom	2	informal 2-year	3 years
United States[b]	no target	n.a.	2 to 3 years

Notes: (a) 0-2% is consistent with the distribution of Board members' understanding of medium to long-term price stability. (b) Based on the forecasts released periodically by FOMC members. The staff's forecasts ("Greenbook") most recently made publicly available have horizons ranging from about 1 and half to 2 and half years.

Exit, entry and price change in U.S. data

- Estimate frequency of price changes as:

$$frequency\,(t) = \frac{change(t)}{change(t) + no\_change(t)}$$

- Estimate exit and entry rates:

$$exit\_rate\,(t) = \frac{exit(t)}{entry(t-1) + change(t-1) + no\_change(t-1)}$$

$$entry\_rate\,(t) = \frac{entry(t)}{entry(t-1) + change(t-1) + no\_change(t-1)}$$

$$frequency\_alt\,(t) = \frac{change(t) + forced\_exit\,(t)}{change(t) + no\_change(t) + forced\_exit\,(t)}$$

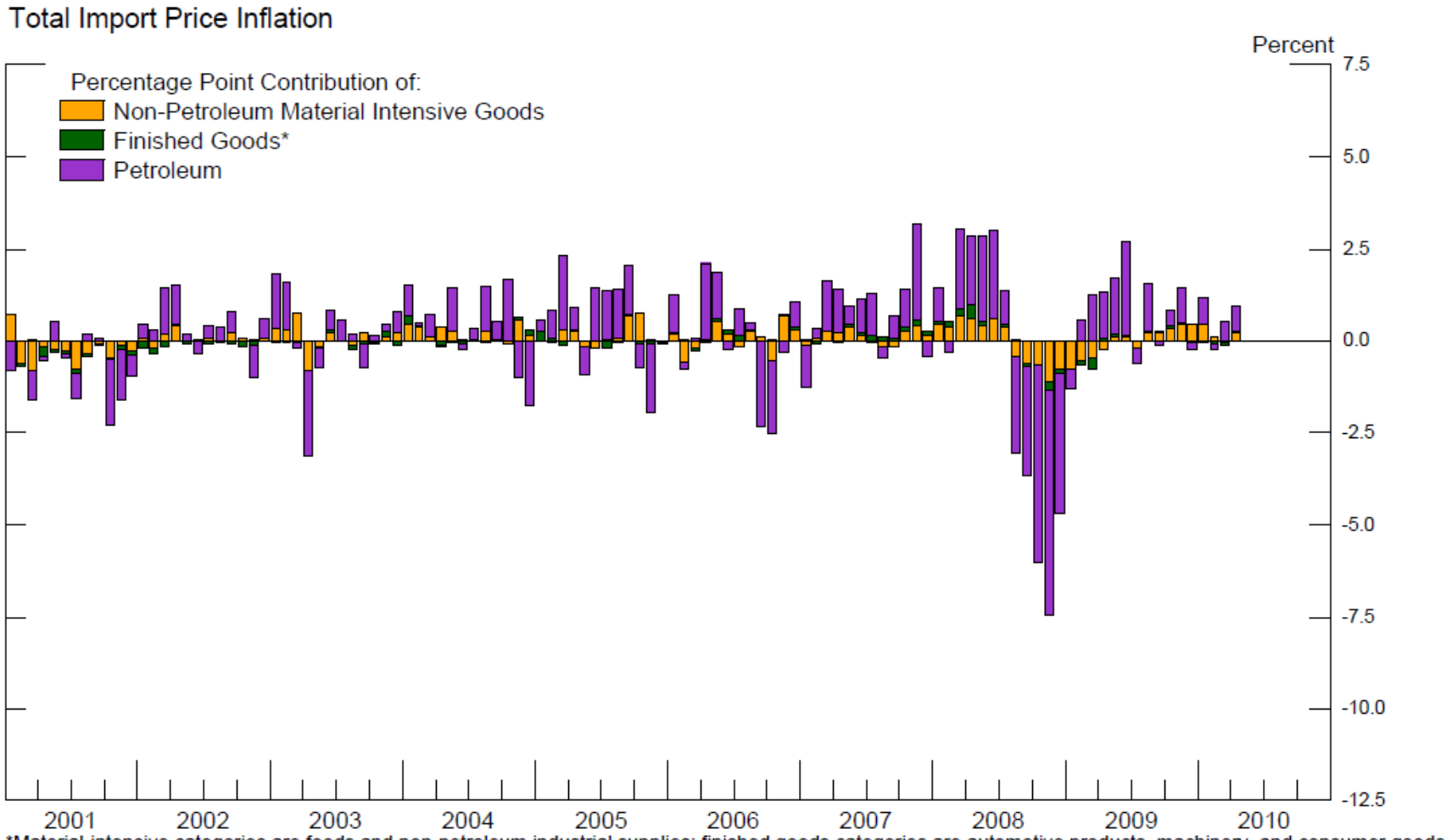
Import price summary statistics (1/2)

	Enduse		Enduse Weight	Freq. Change		Entry	Exit		Abs. Size
				Std.	Alt.		All	Select.	
Capital Goods	210	Oil drilling, mining & const. machinery	0.010	0.069	0.077	0.029	0.025	0.009	0.066
	211	Industrial & service machinery, n.e.c.	0.058	0.063	0.070	0.025	0.025	0.008	0.067
	212	Agricultural machinery & equip.	0.004	0.089	0.100	0.031	0.027	0.012	0.053
	213	Computers, periph. & semiconductors	0.070	0.097	0.117	0.050	0.037	0.022	0.096
	214	Telecommunications equip.	0.022	0.058	0.074	0.036	0.034	0.018	0.089
	215	Business mach. & equip., ex. Computer	0.005	0.052	0.066	0.025	0.033	0.015	0.063
	216	Scientific, hospital & medical machinery	0.014	0.049	0.060	0.032	0.031	0.012	0.069
Auto-motive	300	Passenger cars, new & used	0.075	0.053	0.069	0.035	0.028	0.016	0.020
	301	Trucks, buses, & special-purp. vehicles	0.013	0.058	0.076	0.039	0.028	0.019	0.029
	302	Parts, engines, bodies, & chassis	0.051	0.080	0.092	0.030	0.028	0.012	0.071
Consumer Goods (Ex. Food & Auto.)	400	Apparel, footwear, & household goods	0.062	0.039	0.056	0.036	0.035	0.017	0.076
	401	Other consumer nondurables	0.047	0.060	0.068	0.027	0.024	0.008	0.077
	410	Household goods	0.057	0.046	0.057	0.030	0.029	0.012	0.062
	411	Recreational equip. & materials	0.021	0.048	0.065	0.031	0.032	0.018	0.057
	412	Home entertainment equip.	0.029	0.056	0.077	0.041	0.037	0.022	0.058
	413	Coins, gems, jewelry, & collectibles	0.012	0.069	0.080	0.031	0.031	0.011	0.059
	500	Imports, N.E.S.	0.033	0.052	0.058	0.018	0.027	0.006	0.125
		Total	0.937	0.153	0.164	0.031	0.030	0.014	0.080

Import price summary statistics (2/2)

	Enduse	Enduse Weight	Freq. Change		Entry	Exit		Abs. Size
			Std.	Alt.		All	Select.	
Foods, Feeds & Beverage	000 Green coffee, cocoa beans, cane sugar	0.003	0.470	0.476	0.030	0.028	0.011	0.087
	001 Other agricultural foods	0.027	0.211	0.218	0.026	0.024	0.008	0.094
	010 Nonagricultural products	0.010	0.205	0.212	0.024	0.022	0.008	0.071
Industrial Supplies & Materials	100 Petroleum & products, excluding gas	0.156	0.380	0.391	0.025	0.036	0.019	0.117
	101 Fuels, n.e.s.-coal & gas	0.017	0.559	0.568	0.040	0.034	0.021	0.134
	110 Paper base stocks	0.002	0.365	0.377	0.032	0.036	0.016	0.061
	111 Newsprint & other paper products	0.006	0.196	0.207	0.025	0.033	0.012	0.050
	120 Agricultural products	0.004	0.284	0.288	0.021	0.022	0.006	0.074
	121 Textile supplies & related materials	0.007	0.080	0.087	0.025	0.026	0.008	0.068
	125 Chemicals, excl. meds., food additives	0.032	0.112	0.119	0.025	0.024	0.007	0.073
	130 Lumber & unfinished building materials	0.010	0.332	0.338	0.029	0.024	0.009	0.077
	131 Building materials, finished	0.009	0.104	0.111	0.029	0.026	0.008	0.057
	140 Steelmaking materials-unmanufactured	0.004	0.212	0.219	0.020	0.024	0.009	0.071
	141 Iron & steel mill products-semifinished	0.012	0.153	0.164	0.039	0.035	0.013	0.214
	142 Major non-Fe metals-crude & semifin.	0.025	0.434	0.442	0.025	0.030	0.014	0.058
	150 Iron & steel products, ex. advanced mfg	0.005	0.095	0.103	0.024	0.026	0.008	0.071
	151 Iron & steel mfg.-advanced	0.004	0.132	0.138	0.024	0.029	0.007	0.072
	152 Fin. metal shapes & adv. mfg., ex. steel	0.009	0.133	0.139	0.024	0.027	0.006	0.055
	161 Finished	0.014	0.071	0.081	0.028	0.027	0.011	0.079

Contribution to monthly import price inflation

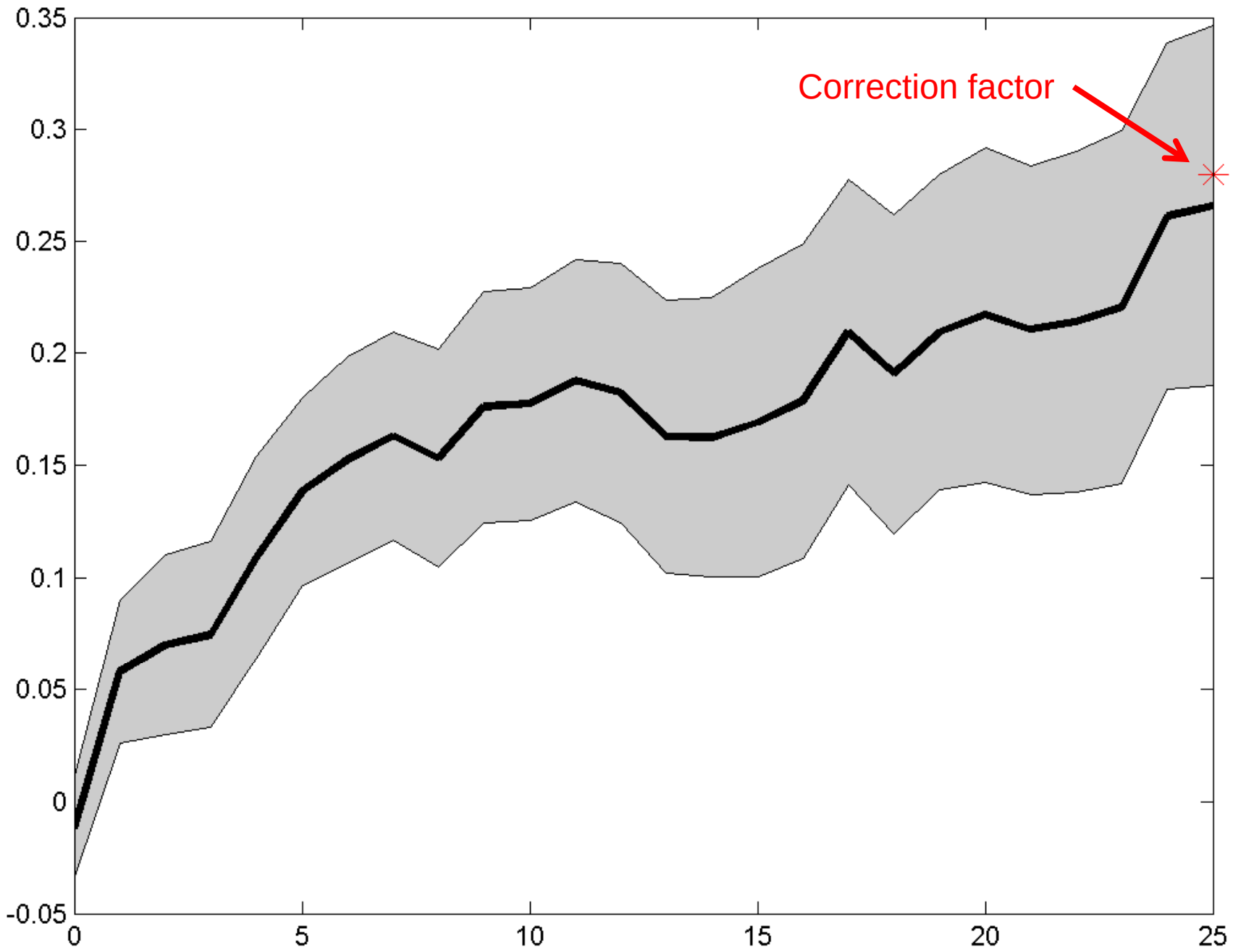


*Material-intensive categories are foods and non-petroleum industrial supplies; finished goods categories are automotive products, machinery, and consumer goods.

Pass-through estimates for the U.S.

(2-year horizon)

	All Imports	Oil Imports	Material Intensive	Finished Goods
Inflation Total	0.99	2.63	0.55	0.46
Exchange Rate Total	-0.32	-3.33	-0.53	-0.19
Nonfuel Commodity Price Total	0.41	0.26	0.35	0.01


Correction factor
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
0
5
10
15
20
25