Discussion of Household Inventory, Temporary Sales, and Price Indices by Ueda, Watanabe and Watanabe

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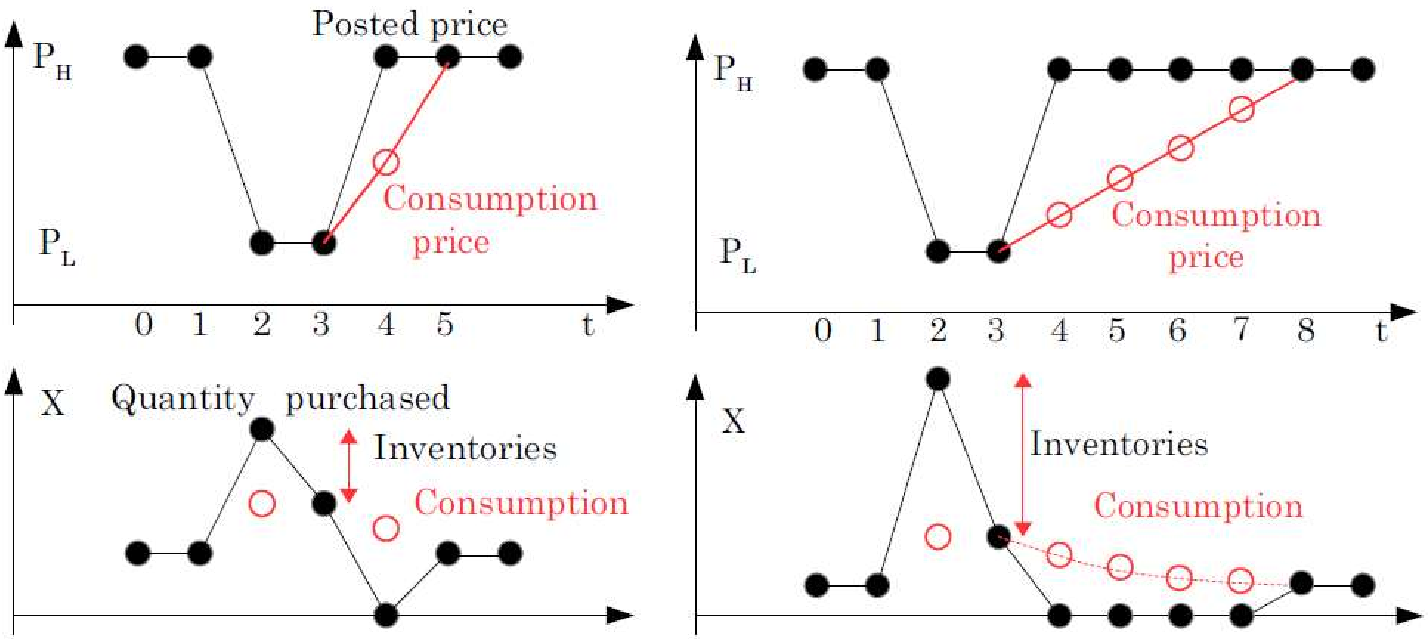
What the paper does

- Construct model of household inventory decisions
  - differentiate household purchasing and consumption decisions
- Use model & scanner (purchasing) data to estimate consumption quantities and prices under temporary sales
  - induce consumers to purchase more than they consume initially → stockpiling
- Main application to intertemporal bias in chained superlative price indices
  - Result with estimated consumption data the chain bias is lower, even at low frequencies
- Other applications: price elasticity, inference on stockpiling behaviors

Intuition

Figure 1: Pattern of Price and Quantity Changes during a Sales Event



Note: The solid dots represent observable posted prices (top) and quantities purchased (bottom). The circles represent unobservable consumption prices (top) and quantities consumed (bottom).

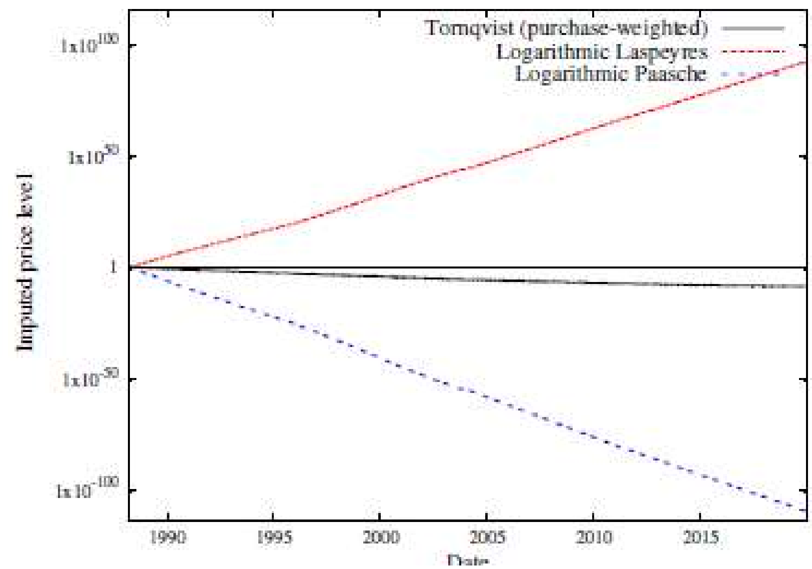
Application: Intertemporal bias in chained superlative indices

- Price indices constructed as weighted average of price relatives
- Chain drift occurs whenever prices bounce around and quantities adjust (temporary sales, seasonal products, product turnover with clearance sales)

Reason for the Intertemporal Substitution Bias

- $\pi^P < \pi^T < 0 < \pi^L$.
- Suggestive thought experiment (Haan and van der Grient 2011)
  - Natural to observe $W_1 < W_2$ and $W_3 < W_1 \rightarrow \pi^P < \pi^T < 0 < \pi^L$.

		$t=1$	$t=2$	$t=3$
Product A	Price	p_A	$(1-r)p_A$	p_A
	Share	W_1	W_2	W_3
Product B	Price	p_B	p_B	p_B
	Share	$1-W_1$	$1-W_2$	$1-W_3$



Hypothetical 3-period example

		Period		
		1	2	3
product1	period			
	Price	10	5	10
	Quantity	10	20	0
	delta p logs		0.69897	1.430677
Product2				
	Price	10	10	10
	Quantity	10	10	10
	delta p logs		1	1
Total Quantiy		20	30	10

- CPIs tend to use fixed weights = average quantities
  - →similar to what the stockpiling model is doing in practice
  - →chain bias should tend to disappear at lower frequencies (eg. if temporary sales last few days, and data is monthly)

Measuring Chain drift

- Ivancic, Diewert, and Fox (2011) → chained price index should take same value if prices and quantities for all products are equal at the beginning (0) and the end (tau)

$$d^X_{0,\tau,dt} = \sum_{s=1}^{(\tau-1)/dt} \pi^X_{(s-1)dt,sdt} - \pi^X_{0,\tau-1},$$

- Difference between calculating chained vs directly is the chain bias
- As dt increases, chain bias tends to 0

- If you have the P and Q at all time periods, then why use a chained index at all?

  → chaining has many practical advantages, including the ability to account for changes in product mix

In Japan, the chain bias is still significant at monthly frequency

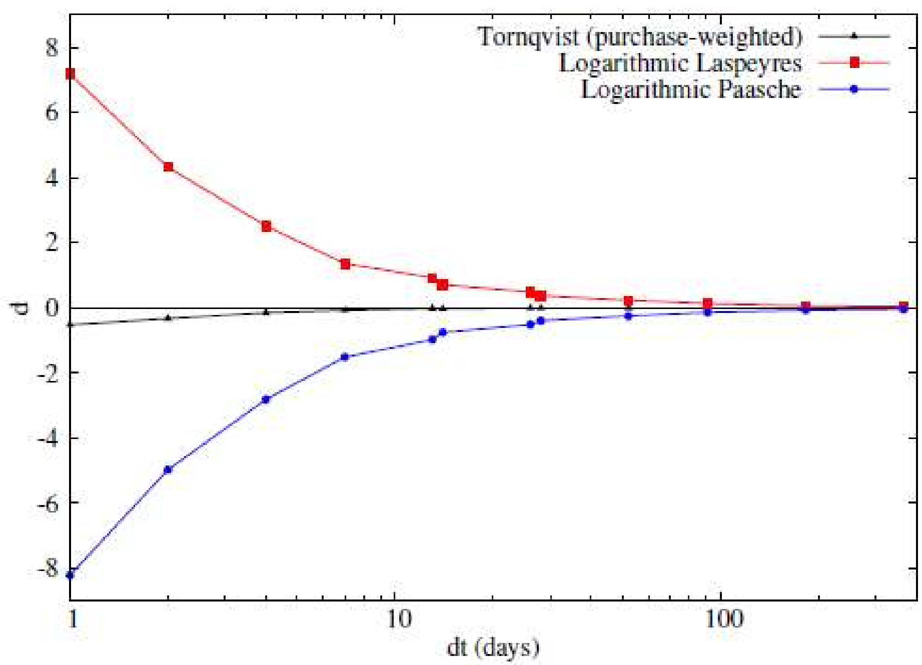
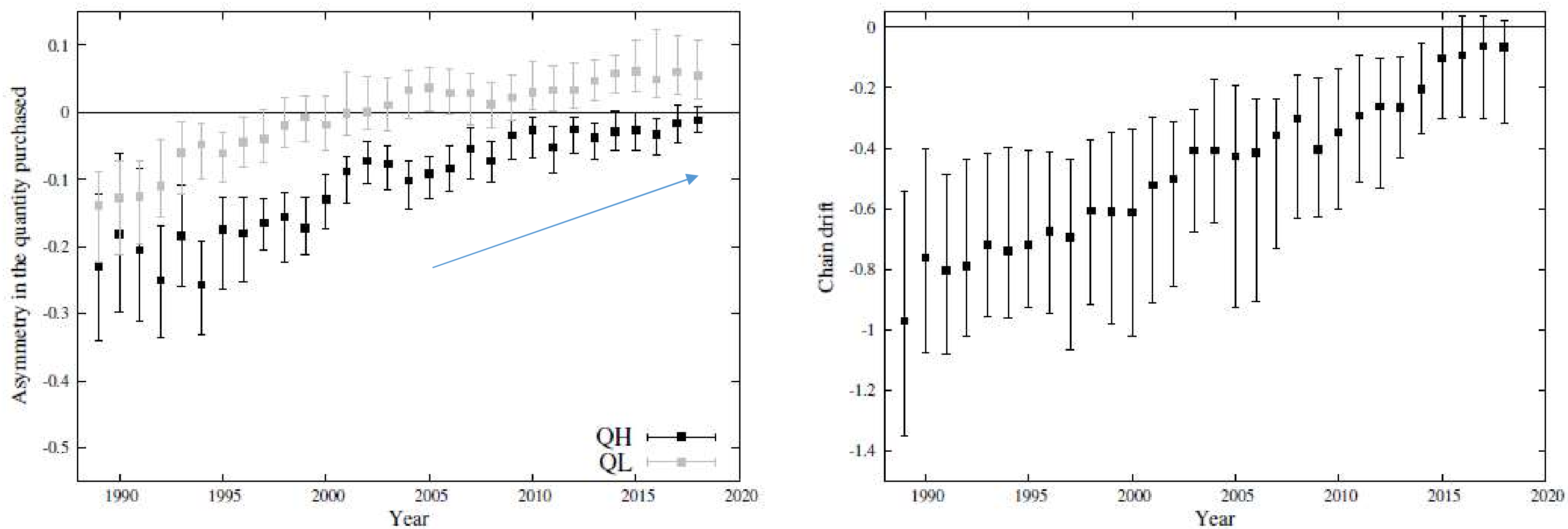


Table 1: Chain Drift and Inflation Rate

	Price indices		
dt	Törnqvist (purchase-weighted)	Törnqvist (consumption-weighted)	Order r superlative (consumption-weighted)
	Annual chain drift		
1	-40.44^{***}	-5.69^{***}	-1.20
7	-7.24^{***}	-2.28^{***}	-1.23^{***}
14	-2.43^{***}	-1.10^{***}	-0.59^{***}
28	-0.97^{***}	-0.46^{***}	-0.04
52	-0.66^{***}	-0.20^{**}	0.23
91	-0.61^{***}	0.06	0.17
182	-0.49^{***}	0.01	0.14
	Annualized inflation rate		
1	-46.34	-13.06	-10.71

But the importance of stockpiling around sales fell dramatically over time

Figure 3: Asymmetry in the Quantity Purchased When the Price Increases and When It Decreases



- The numbers in the previous slide are an average for the chain drift over the 1990-2020 period
- What is the chain drift at monthly frequency if we only look at the recent period?

Comments

- What is driving the decrease in stockpiling over time?
  - Predictability or size of sales?
  - Increase in cost of stockpiling?
  - Lower inflation?

- Is Japan the best environment to look at this?
  - Yes: detailed and long data, change over time
  - But low inflation & low panic/volatility

Covid stockouts (shortages) were relatively low in Japan

- Cavallo & Kryvtsov (2021) What can stockouts tell us about Inflation?

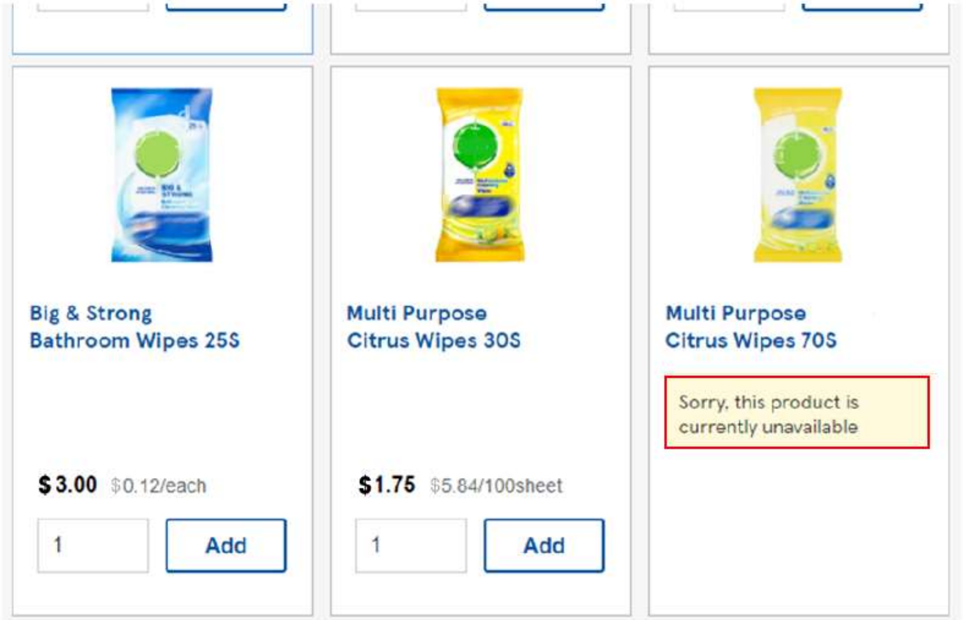


Figure 1: Identifying Stockouts on a Retailer's Website

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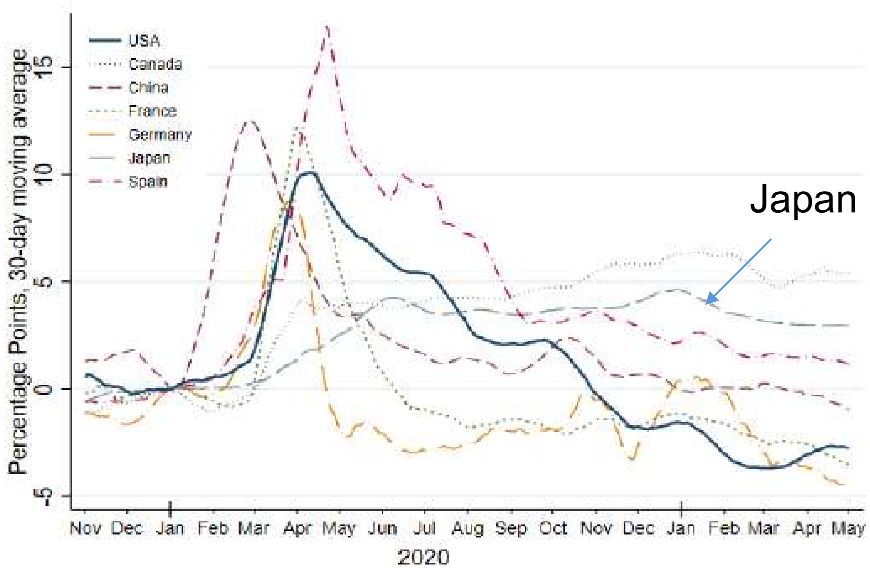
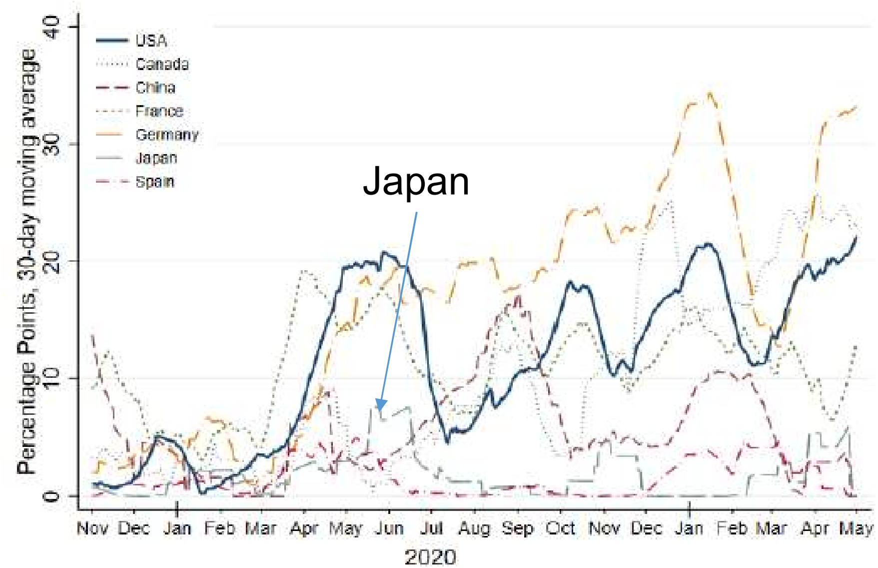


(a) Temporary Stockouts

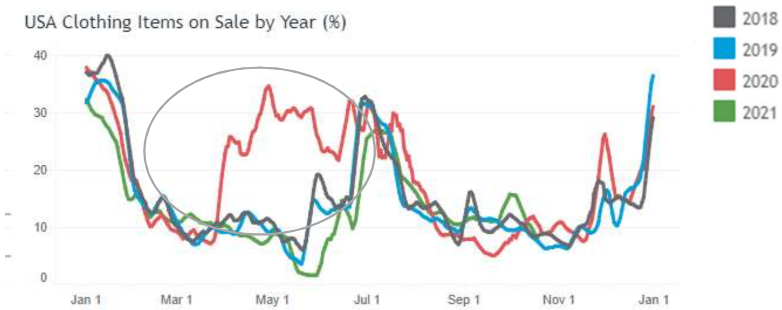
More connected to "Stockpiling" behaviors



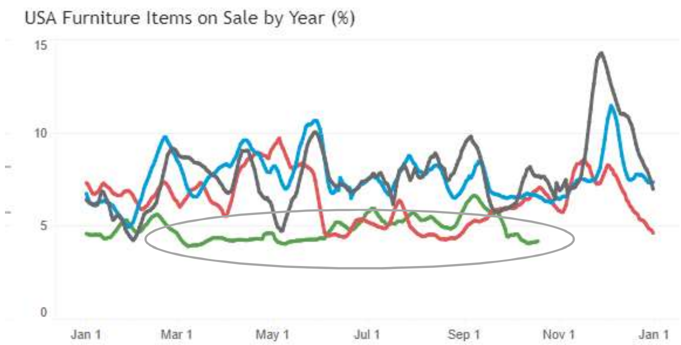
(b) Permanent Stockouts

Net discontinued goods
More connected to supply disruptions

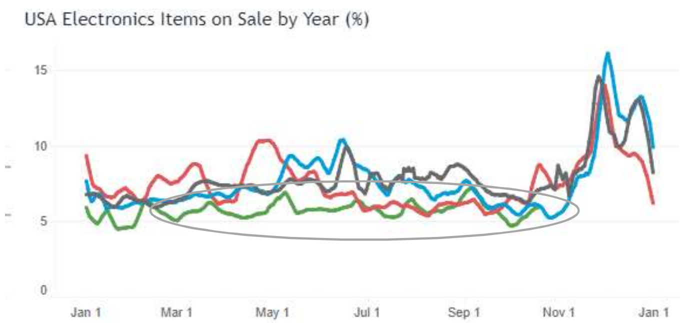
In the US, temporary sales were countercyclical during Covid



Clothing: back to normal

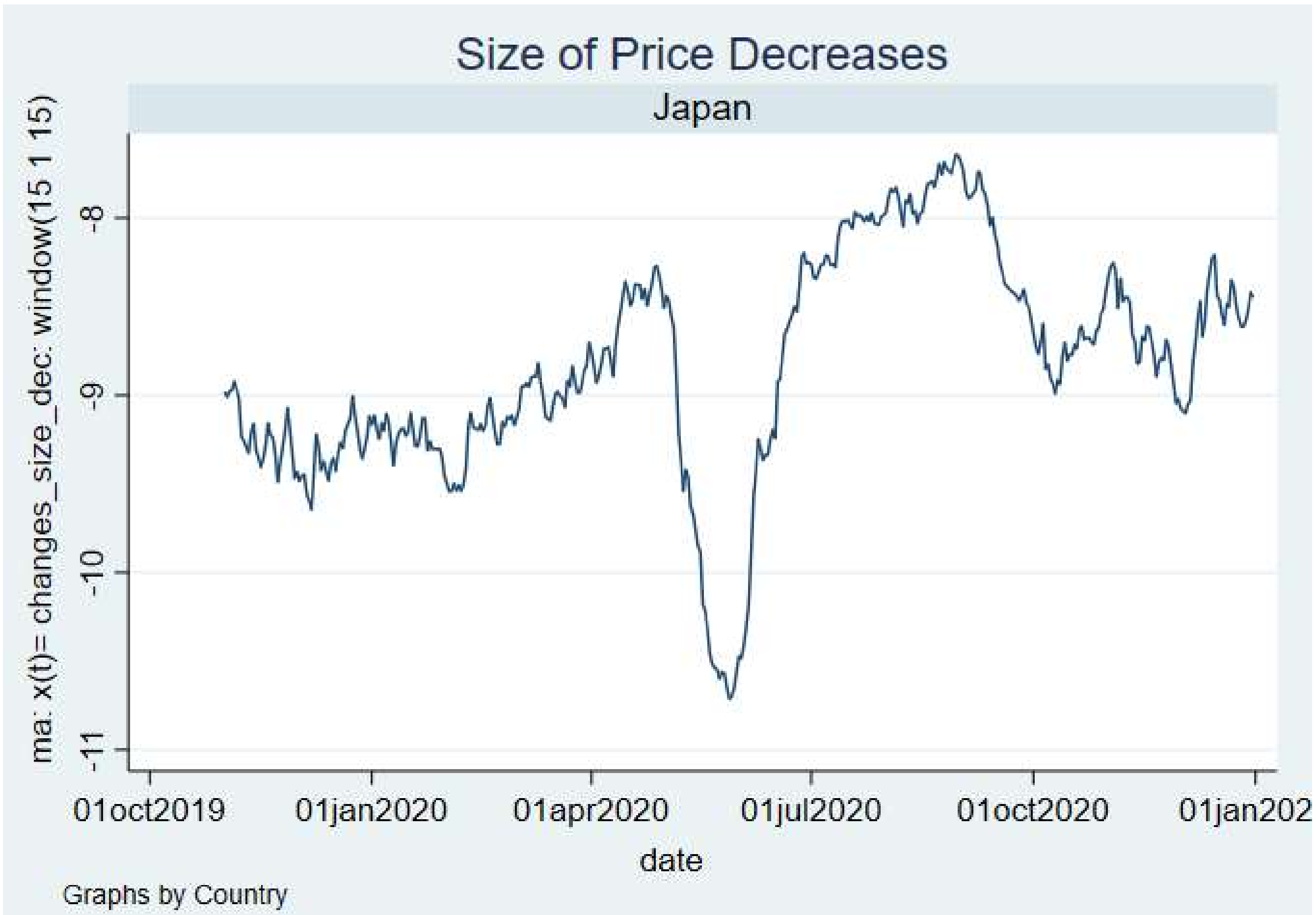


Furniture: low sales



Electronics: low sales

In Japan, some evidence of large price discounts when Covid hit



Summary

- Great paper → simple method, great data, important applications
- Suggestions:
  - What drives changes over time in the degree of stockpiling?
  - Event studies around big shocks (earthquake, covid)
- Extensions: results may be even larger in countries with volatile sales and higher inflation