

A New Reason to Hate Grocery Inflation

Measuring and Interpreting Inflation Heterogeneity

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Researcher's own analyses and calculations based in part on NielsenIQ Retail Measurement Service and Consumer Panel Service data for the Total US. The conclusions drawn from the NielsenIQ data are those of the researcher and do not reflect the views of NielsenIQ. NielsenIQ is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein or in developing, reviewing, or confirming the research approaches used in connection with this report.

This paper documents three facts about 2022 inflation dynamics

1. price change dispersion within product categories doubled
2. many households fail to substitute away from high-inflation goods
3. household grocery inflation became much more dispersed

motivating a model of consumption where idiosyncratic preferences

- connect these facts and offer new lens on inflation disparities
- highlight why inflation heterogeneity matters for welfare

Today's presentation

Briefly discuss I) literature and II) NielsenIQ data

III) This paper documents three facts about 2022 inflation dynamics

1. price change dispersion within product categories doubled
2. many households fail to substitute away from high-inflation goods
3. household grocery inflation became much more dispersed

IV) Briefly: how do idiosyncratic preferences

- connect these facts and offer new lens on inflation disparities
- highlight why inflation heterogeneity matters for welfare

An aggregate view of inflation misses...

- Differences in inflation by income, geography, age, etc.
 - Jaravel (2024, 2021), Argente & Lee (2021)
 - Scale: 0.3 to 0.5 percentage points annually
- Enormous variation in realized prices across households
 - Kaplan & Schulhofer-Wohl (2017)
 - Scale: interquartile range is 6-9 percentage points
- People buy different goods within category
 - Scale: 1.4-4.0 percentage points
 - Household-level inflation matters for welfare

Findings interact importantly with other literatures

NielsenIQ: a comprehensive view

Matched sample of retailers and households recording barcode-level transactions. Ideal to track price changes and how households respond.

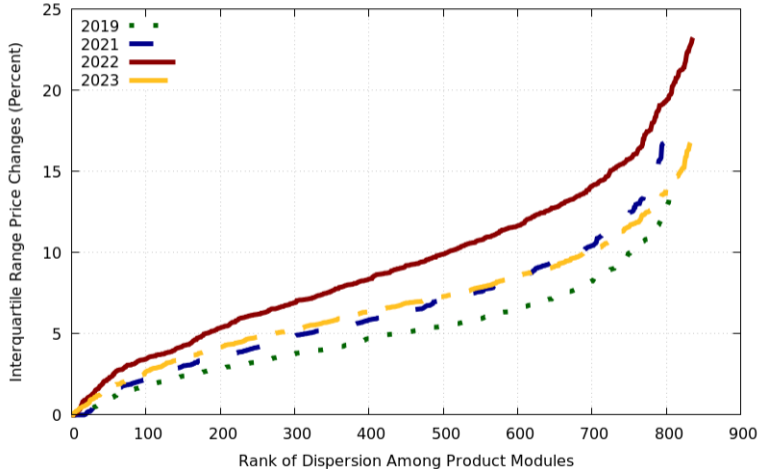
NielsenIQ Data Properties

	2019Q4	2020Q4	2021Q4	2022Q4	2023Q4
Retailers	48,903	47,532	54,093	53,620	52,459
Households	61,483	60,101	58,226	56,795	55,733
... in sample	45,010	44,518	44,162	43,463	42,445
Average spending	\$1,427	\$1,645	\$1,644	\$1,777	\$1,776
... excl. general merch.	\$1,140	\$1,350	\$1,291	\$1,418	\$1,430
... with price changes	\$1,058	\$1,248	\$1,171	\$1,322	\$1,371

Household sample criteria: must be member of NielsenIQ Magnet sample, record at least \$150 in spending on non-general merchandise products, and purchase at least five matched goods (items with the same barcode purchased in Q and Q-4).

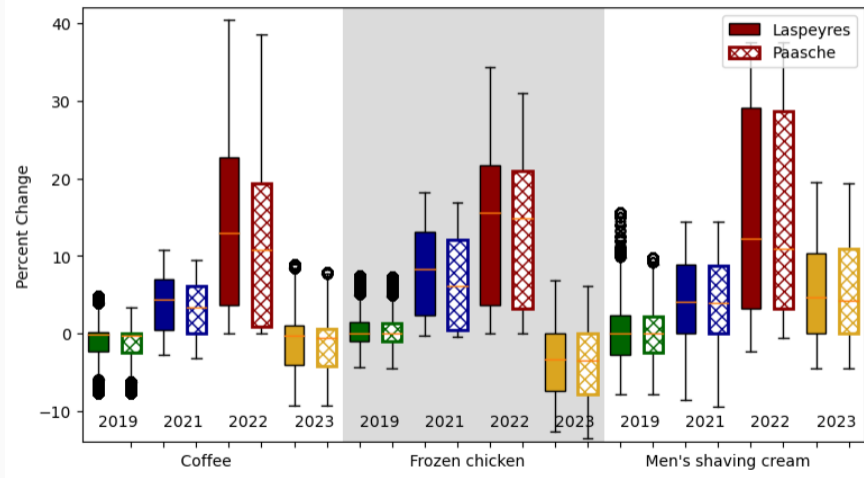
Price changes grew more disparate in 2022

Price Change Dispersion Across Items Within Product Modules



Category inflation grew more disparate

Spread of Module Inflation Rates



Household-level grocery inflation

Tornqvist grocery inflation at a household level:

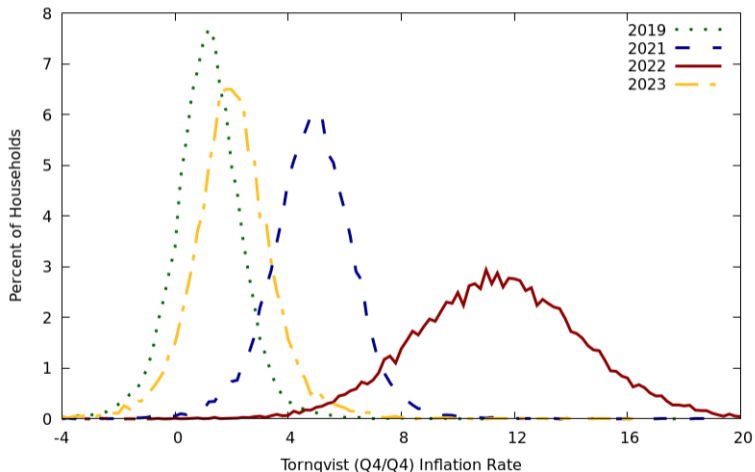
$$\Psi_{h,t-j,t} = \prod_{k \in \{\Omega_{h,t-j} \cup \Omega_{h,t}\}} \left(\frac{p_{k,t}}{p_{k,t-1}} \right)^{\frac{1}{2}(s_{h,k,t} + s_{h,k,t-j})} \quad (1)$$

where $s_{h,k,t} = p_{k,h,t}q_{k,h,t} / \sum_{\Omega_{h,t}} p_{k,h,t}q_{k,h,t}$ is the expenditure share for household h among goods purchased in t , denoted $\Omega_{h,t}$. Use of average price differs from **KSW** and overcomes "matched goods problem."

Key insight: k is an item (Peet's Medium Roast) not a category (coffee).

Household inflation rates grew more disparate

Distribution of Household Grocery Inflation Experiences



A model with idiosyncratic preferences

The typical CES consumer cannot generate these patterns.

Households with **heterogeneous preferences** can (*à la* McFadden, 1974).

Incorporating attachments to particular goods means

- households are exposed to item-level price shocks
- reveal their own costs of substitution

Changing costs of actual grocery baskets capture *real budget shocks*

- moderately persistent: cost of living **does not quickly mean revert**
- those with larger shocks **reduce real consumption**

Findings raise important questions

- why were price changes so much more dispersed in 2022?
- why didn't households respond more strongly to those changes?

and affect the real and perceived costs of inflation

- does higher inflation generally bring more dispersed budget shocks?
- what if households perceive these shocks asymmetrically?

Thank you!

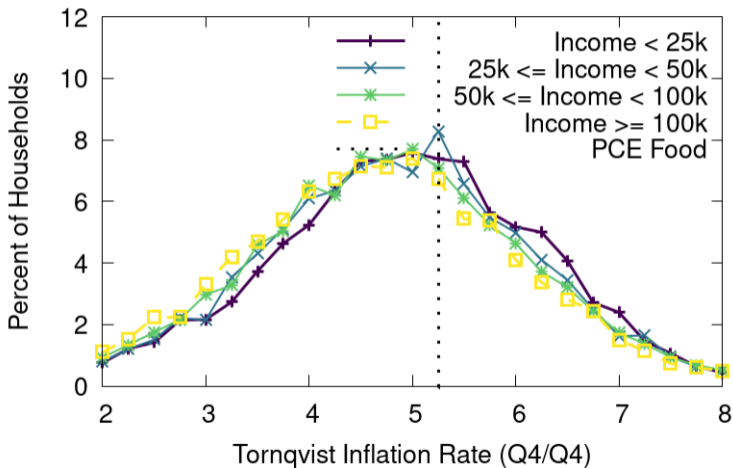
Looking forward to your feedback

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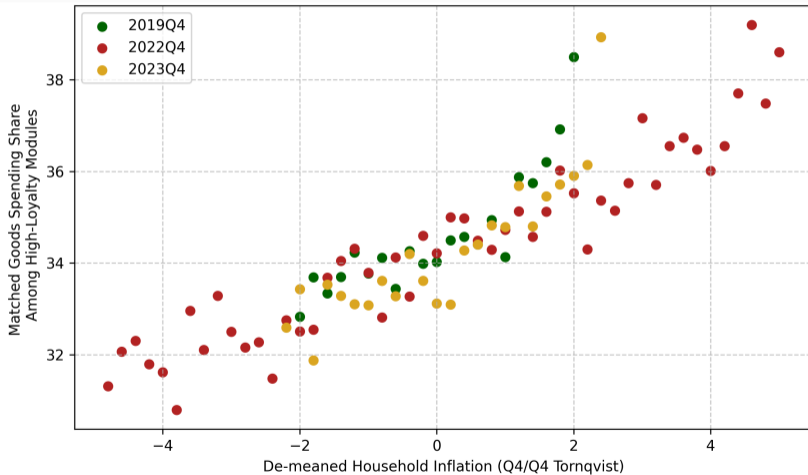
Inflation by income group

Grocery Inflation Distribution 2020q4-2021q4 by Income Group



Inflation by substitution behavior

Strength of Matched Spending by Relative Inflation



Important difference from seminal approach for computing household-level inflation laid out by Kaplan & Schulhofer-Wohl (2017)

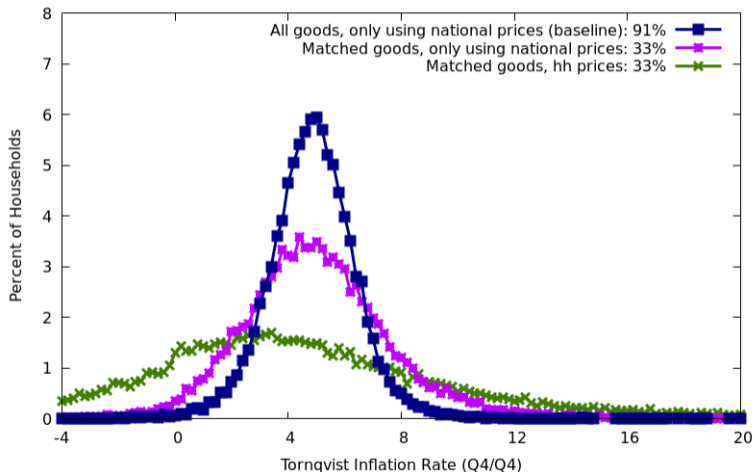
$$\psi_{h,t-j,t}^{KSW} = \prod_{k \in \{\Omega_{h,t-j} \cap \Omega_{h,t}\}} \left(\frac{p_{h,k,t}}{p_{h,k,t-1}} \right)^{\frac{1}{2}(s_{h,k,t} + s_{h,k,t-j})} \quad (2)$$

Applying household-specific prices

1. restricts attention to matched goods
 - dramatically reduces sample and eliminates substitution
2. incorporates variation due to temporary promotions
 - interesting, but not driving persistent cost of living gaps

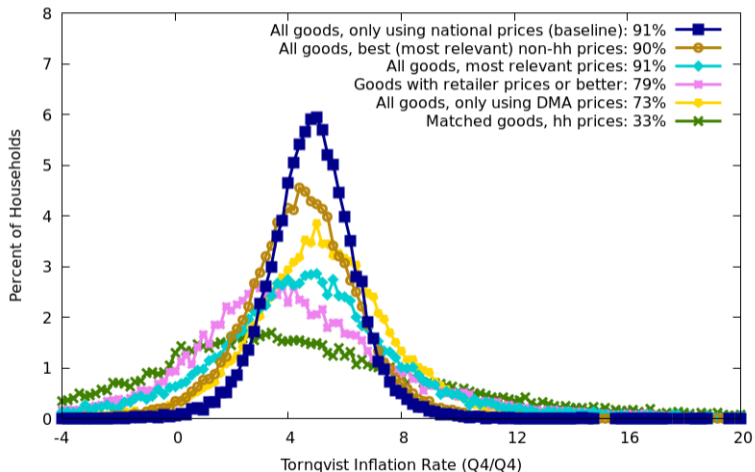
Methodology: the matched goods problem (back)

Household-Level Inflation Distribution 2020q4-2021q4

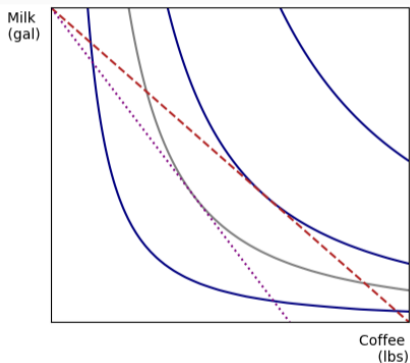


Methodology: household-specific prices

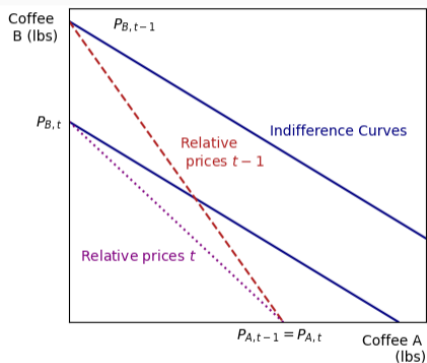
Household Inflation 2020q4-2021q4 by Price Change Source



Across Product Groups



Within Product Group



Idiosyncratic Values of Favorite Goods Implied by CES Elasticity σ_m

Percentile of σ_m among modules	σ_m	Percentile of $\max(\varepsilon_{mhk})$ among households			
		50th %ile	75th %ile	90th %ile	95th %ile
5th	5	104%	135%	180%	215%
25th	10	48%	59%	75%	87%
50th	20	23%	28%	34%	39%
75th	40	11%	13%	16%	18%
95th	120	4%	4%	5%	6%

Values represent $100[\max(e^{\varepsilon_{mhk}}) - 1]$ where ε_{mhk} are simulated for 10,000 households making 50 draws each from a Type I extreme value distribution with mean 0 and shape parameter $1/(\sigma_m - 1)$. Supposing elasticity of demand $\sigma_m = 20$, a 90th percentile value of 34% means that 10% of households value a unit of their favorite good in this product group at least 34% more than the average good of the same quality. Range of elasticities as estimated by Argente & Lee (2021).

Cost of living does not quickly mean revert (back)

Autoregressive/Moving Average model of households inflation:

$$\tilde{\Psi}_{h,t-1,t} \equiv \Psi_{h,t-1,t} - \bar{\Psi}_{t-1,t} = \sum_{\ell=1}^{L_{AR}} \phi_{-\ell} \tilde{\Psi}_{h,t-\ell-1,t-\ell} + \sum_{\ell=1}^{L_{MA}} \delta_{-\ell} \epsilon_{h,t-\ell-1,t-\ell} + \epsilon_{h,t-1,t}$$

	MA(1)	AR(1)
Lagged inflation $\tilde{\Psi}_{h,t-2,t-1} = \epsilon_{h,t-1,t}$	-0.088	-0.093 (0.001)
Observations	1305202	1305202
Adjusted R^2		0.009

Model estimated using one-quarter household inflation rates computed applying national average price changes using all NielsenIQ spending categories except general merchandise. Estimation window includes 2012-2023 (excluding 2020Q1-Q2 and 2021Q1-Q2). Included households must be in sample continuously for at least 3 years.

Coefficients from Regressions on Idiosyncratic Inflation

	$\ln(X_t/X_{t-4})$	$\ln(C_t/C_{t-4})$	# Stores	# Trips
Hh. infl. x (Inc. < \$25k)	0.57 (0.013)	-0.43 (0.013)	-0.01 (0.002)	0.06 (0.005)
Hh. infl. x (Inc. \$25-50k)	0.58 (0.007)	-0.42 (0.007)	0.02 (0.001)	0.23 (0.003)
Hh. infl. x (Inc. \$50-100k)	0.65 (0.015)	-0.35 (0.015)	0.02 (0.002)	0.12 (0.006)
Hh. infl. x (Inc. > \$100k)	0.50 (0.007)	-0.50 (0.007)	-0.03 (0.001)	-0.04 (0.003)

Each column represents the dependent variable of a regression on household characteristics and lagged inflation. Rows display the coefficients (standard errors) of each interaction separately.

See paper for details on sample, controls, and variable definitions.