New Facts on Consumer Price Rigidity in the Euro Area

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New Facts on EA Price Rigidity

Knowledge Gaps on Euro Area Price Rigidity:

- Existing literature:
  - EA Dhyne et al. (2006) (50 products about 10% of CPI)
  - Country-specific studies: IPN country-specific studies in the early 2000s, Berardi et al. (2015), Fabiani & Porqueddu (2017) Blanas & Zimmer (2020)...

- How do sales contribute to price rigidity in the EA?

- What about the distribution of price changes?

- Was the low inflation period different?

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- How do sales contribute to price rigidity in the EA?
- What about the distribution of price changes?
- Was the low inflation period different?

Our Contribution:

- Providing more price rigidity facts at the euro area level
    - 135 millions of price quotes collected in 11 EA countries
    - More than 160 COICOP5 common products covering 60% of HICP
    - Over the period 2010-2019 (more for AT, FR, GR)

> ▸ Data
>
> ▸ Common Sample

- More precise and harmonized measures of sales (flag, filter) and more evidence on the distribution of size
- Document price adjustment patterns behind inflation time variation
- Link product-level frequency and size to economic shocks (MP, demand, VAT...)

Fact 1: 12% (8% excl. sales) of price changes in a given month

Euro Area Price Rigidity: Frequency of Price Changes (in %)

	Including sales		Excluding sales (NSI sales flag if available)		Excluding sales (Sales filter)		% of sales	
	Freq. price changes	% price increases	Freq. price changes	% price increases	Freq. price changes	% price increases	NSI Flag	Sales Filter
EURO AREA	**12.0**	**65.3**	**8.2**	**70.7**	**7.5**	**67.6**	**4.7**	**4.8**
by Sector								
Unprocessed Food	31.2	54.5	23.2	58.4	18.3	57.3	7.6	10.4
Processed Food	14.9	57.7	10.1	63.1	8.9	62.4	4.9	5.5
NEIG	12.5	48.6	6.2	61.3	6.4	55.3	8.6	7.2
Services	5.7	85.5	5.4	85.2	5.1	83.1	0.8	1.1

Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag (if available, and sales filter otherwise) or 2) common sales filter for all countries.

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▶ Small country heterogeneity (in particular when excl. sales) ▶ Country

▶ About the same frequency as in the US once we exclude sales ▶ USvsEA

▶ Frequency is somewhat higher than in Dhyne et al. (2006) ▶ Dhyne

▶ Labour/input shares explain some cross sectoral differences ▶ Correlations

Fact 2(a): Large median size of price changes

Euro Area Price Rigidity: Size of Price Changes (in %)

	Including sales		Excluding sales (NSI sales flag if available)		Excluding sales (Sales filter)	
	Median		Median		Median	
	Increase	Decrease	Increase	Decrease	Increase	Decrease
EURO AREA	**8.9**	**11.8**	**6.3**	**7.9**	**6.3**	**9.7**
by Sector						
Unprocessed Food	12.3	14.5	10.0	10.7	9.0	10.4
Processed Food	8.3	10.5	5.7	6.0	5.5	6.3
NEIG	13.2	18.2	7.5	9.9	7.7	12.6
Services	4.9	6.0	4.8	6.6	4.9	8.9

*Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on **1)** NSI sales flag (if available, and sales filter otherwise) or **2)** common sales filter for all countries.*

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	Increase	Decrease	Increase	Decrease	Increase	Decrease
EURO AREA	**8.9**	**11.8**	**6.3**	**7.9**	**6.3**	**9.7**
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Unprocessed Food	12.3	14.5	10.0	10.7	9.0	10.4
Processed Food	8.3	10.5	5.7	6.0	5.5	6.3
NEIG	13.2	18.2	7.5	9.9	7.7	12.6
Services	4.9	6.0	4.8	6.6	4.9	8.9

Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag (if available, and sales filter otherwise) or 2) common sales filter for all countries.

► Small country heterogeneity (in particular once we exclude sales)

► Price changes are quite larger in the US than in the EA

► Country

► USvsEA

Fact 2(b): Dispersion in the price change distribution

Euro Area Price Rigidity: Distribution of (Non-Zero) Price Changes

| | Absolute size of price changes (in %) | | | | | | | |
| | Including sales | | | | Excluding sales[1] | | | |
	10th	25th	75th	90th	10th	25th	75th	90th
EURO AREA	**2.9**	**5.7**	**17.2**	**26.0**	**1.9**	**3.6**	**11.4**	**18.1**
by Sector								
Unprocessed Food	3.5	6.8	24.6	36.9	3.0	5.7	17.8	27.0
Processed Food	2.3	4.3	17.1	25.9	1.9	3.3	9.7	15.7
NEIG	4.4	9.5	26.1	38.2	1.9	4.3	14.6	23.5
Services	1.7	3.0	8.5	13.6	1.7	2.9	8.2	12.8

Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag, if available, or common sales filter.

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| | Including sales | | | | Excluding sales[1] | | | |
	10th	25th	75th	90th	10th	25th	75th	90th
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Unprocessed Food	3.5	6.8	24.6	36.9	3.0	5.7	17.8	27.0
Processed Food	2.3	4.3	17.1	25.9	1.9	3.3	9.7	15.7
NEIG	4.4	9.5	26.1	38.2	1.9	4.3	14.6	23.5
Services	1.7	3.0	8.5	13.6	1.7	2.9	8.2	12.8

Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag, if available, or common sales filter.

► Small price changes are not rare

► Large price changes too (even when we exclude sales)

Fact 3: Frequency is quite stable over time

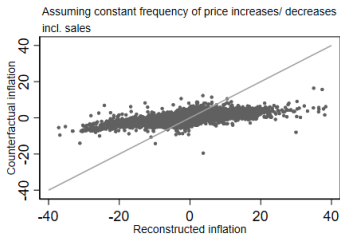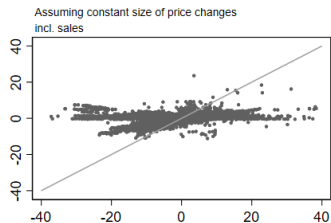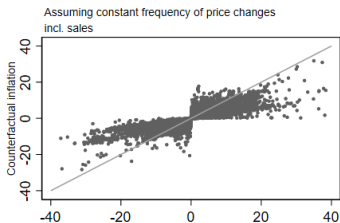Frequency of Price Change in the Euro Area Over Time
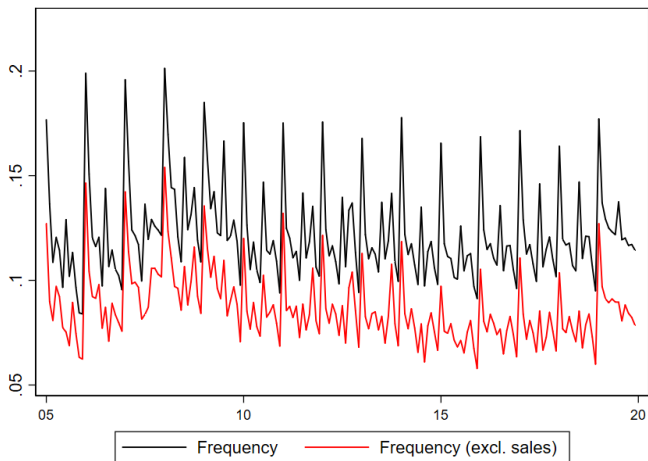
Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries and calculated using euro area product weights at the COICOP-5 level (2017-2020 average) and country weights in euro area HICP (2017-2020 average). Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag if available or 2) common sales filter. Outliers adjusted beforehand.

▶ Freq. increases decreases   ▶ Size increases decreases

Fact 4: Inflation variations come from changes in the size
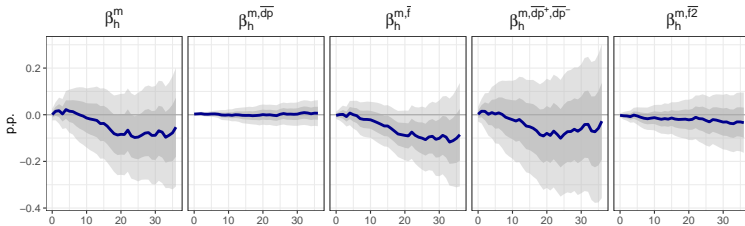
"Recomposed" and "counterfactual" inflation
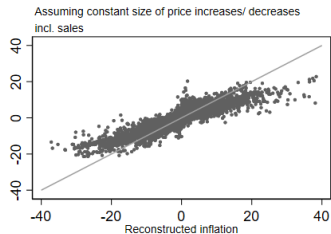
Notes: The figure shows scatter plots between recomposed inflation, as in Equation 2 and counterfactual inflation as in Equation 3 and 4, 5 and 6. Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Outliers adjusted beforehand.
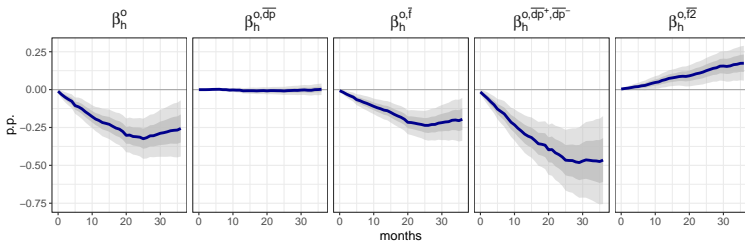
A: Monetary policy shocks

β_h^m $\beta_h^{m,\overline{dp}}$ $\beta_h^{m,\bar{f}}$ $\beta_h^{m,\overline{dp}^+,\overline{dp}^-}$ $\beta_h^{m,\overline{f2}}$

B: Oil supply shocks

β_h^o $\beta_h^{o,\overline{dp}}$ $\beta_h^{o,\bar{f}}$ $\beta_h^{o,\overline{dp}^+,\overline{dp}^-}$ $\beta_h^{o,\overline{f2}}$

Notes: Local projections are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Superscripts $x \in \{m, o\}$ represent the monetary and oil shocks respectively. The models are specified in equation (7). In the order of the panels, the coefficients correspond to: The recomposed inflation β_h^x, counterfactual inflation assuming constant sizes of price changes $\beta_h^{x,\overline{dp}}$, counterfactual inflation assuming constant frequency of price changes $\beta_h^{x,\bar{f}}$, counterfactual inflation assuming constant sizes of price increases and decreases $\beta_h^{x,\overline{dp}^+,\overline{dp}^-}$ and counterfactual inflation assuming constant frequencies of price increases and decreases $\beta_h^{x,\bar{f}^+,\bar{f}^-}$. The light and dark gray areas correspond to one and two standard error bands, assuming calendar-based clusters.

Conclusion

Facts on Euro Area Price Rigidity:

- ▶ 12% of price changes in a given month, 8% when excl. sales
- ▶ Median size 6% for increases / 8% for decreases
- ▶ Once we exclude price changes due to sales, prices are as flexible in the EA as in the US
- ▶ Frequency quite flat over time
- ▶ Inflation driven by size and in particular the share of increases
- ▶ Frequency does not react to shocks

Potential implications

- ▶ Evidence consistent with Calvo model predictions
- ▶ but also with predictions of a menu cost with small shocks
- ▶ Time variation in the frequency of price increases and decreases are more difficult to rationalize

Appendix SLIDES

Micro Price Data Sets

CPI Micro Database with country-specific periods

Country	Source	Period	% of EA products[1]	% of EA HICP[2]	Sales flag	OBS
AT	Statistik Austria	2000M1-2017M12	89.2	3.4	yes	10.98M
BE	Statbel	2007M1-2015M12	42.6	3.8	yes	8.50M
DE	Statistisches Bundesamt (Destatis)	2010M1-2019M12	87.3	27.9	yes	49.60M
ES	Instituto Nacional de Estadística (INE)	2008M1-2018M2	52.4	11.5	no	1.36M
FR	Institut National de la Statistique et des Études Économiques (Insee)	2003M4-2019M9	83.2	20.3	yes	17.05M
GR	Ελληνική Στατιστική Αρχή	2002M1-2019M12	64.0	2.2	no	7.68M
IT	Istituto Nazionale di Statistica (IS-TAT)	2011M1-2018M12	61.1	17.3	yes	22.74M
LT	Lietuvos Statistikos Departamentas	2010M1-2018M12	82.3	0.5	yes	5.35M
LU	Institut national de la statistique et des etudes economiques (Le Statec)	2005M1-2017M12	97.0	0.3	no	1.15M
LV	Centrala Statistikas Parvalde	2017M1-2019M12	92.5	0.3	yes	0.66M
SK	Statisticky Urad Slovenskej Republiky	2011M1-2019M12	94.1	0.8	no	9.02M
Total		2000M1-2019M12	58.9	88.3		134.03M

*Notes: **1):** In terms of euro area product weights at the COICOP-5 level (2017-2020 average). **2):** Country weight in euro area HICP (2017-2020 average). OBS denotes the total number of monthly observations (in millions).*

A Common Product Sample

CPI Coverage of the Common Product Sample

Special aggregate (SA)	Expenditure share in % (EA 2017-2020)	Relative share in %	Missing share of SA in %	No. of COICOP-5s covered
Food	16.8	28.5	13.1	59
Processed food	12.3	20.8	17.0	49
Unprocessed food	4.5	7.7	0.5	10
NEIG	18.4	31.2	30.3	66
Durables	4.1	6.9	55.8	23
Semi-durables	9.7	16.4	6.8	30
Non-durables	4.6	7.8	31.5	13
Services	23.7	40.3	46.7	41
Housing services	1.1	1.8	90.0	5
Transport services	5.8	9.9	20.0	9
Recreational services rel. to accommodation	1.6	2.7	56.3	2
Recreational services (others)	11.1	18.8	5.3	14
Miscellaneous services	4.2	7.1	50.5	11
Total	**58.9**	**100.0**	**41.1**	**166**

Notes: The micro data set covers the country-specific periods as indicated in Table **??** and is set up such that 166 COICOP-5 products are available at least in 3 out of the 4 largest countries Germany, France, Italy and Spain. 'Relative share' denotes the the weight of the corresponding product group in the common product sample.

Frequency of price change: country heterogeneity

Euro Area Price Rigidity: Frequency of Price Changes (in %)

	Including sales		Excluding sales (NSI sales flag if available)		Excluding sales (Sales filter)		% of sales	
	Freq. price changes	% price increases	Freq. price changes	% price increases	Freq. price changes	% price increases	NSI Flag	Sales Filter
EURO AREA	**12.0**	**65.3**	**8.2**	**70.7**	**7.5**	**67.6**	**4.7**	**4.8**
COUNTRY								
Austria	11.1	64.5	7.2	71.8	7.0	70.6	5.9	4.2
Belgium	14.5	68.9	13.3	69.6	10.9	70.9	1.1	3.8
France	12.7	60.8	9.8	66.9	8.1	64.8	5.5	5.1
Germany	11.5	66.2	8.2	73.1	6.7	70.4	3.6	4.3
Greece	11.3	61.3	7.3	63.9	7.3	63.9	.	3.8
Italy	10.3	69.9	4.8	75.6	6.1	67.0	4.3	5.4
Latvia	18.6	60.0	7.9	71.1	11.1	62.7	10.7	7.5
Lithuania	12.8	62.3	9.7	68.4	9.3	65.5	2.3	5.3
Luxembourg	14.1	73.4	8.8	78.4	8.8	78.4	.	4.6
Slovakia	14.3	64.7	9.3	66.6	9.3	66.6	.	4.9
Spain	13.5	64.0	9.0	65.3	9.0	65.3	.	5.1

Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag (if available, and sales filter otherwise) or 2) common sales filter for all countries.

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Sectoral Heterogeneity in the Frequency of Price Changes: Some Determinants

	I	II	III	IV
Share of labour costs	-0.169**	-0.391***	-0.246***	-0.085*
Share of imported energy and raw material inputs	0.445***	0.445***	0.960***	-0.065
Share of all imported inputs	-0.128	-0.187	-0.109	-0.062
% of online consumers	0.000	0.000	0.001***	0.000
Regulated price dummy	-0.007		-0.024	0.006
Retail market concentration (HHI)		0.004***		
Unprocessed food dummy				0.132***
Processed food dummy				0.036***
Services dummy				-0.024
Constant	0.169***	0.248***	0.184***	0.139***
Country dummies	✓	✓	✓	✓
Number of observations	1,461	1,172	1,626	1,461
R^2	0.194	0.347	0.219	0.359

Notes: All regressions are estimated using OLS and are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Standard errors are clustered at the product level. *, **, and *** denote significance at respectively 10%, 5%, and 1%. The reference country is France. The dependent variable in Column I is the frequency of price changes excluding sales and excluding product replacements (for Greece, Slovakia, and Spain sales are excluded via the sales filter, Greece includes product replacements). Column II adds the Herfindahl–Hirschman Index (HHI) of the retail sector as explanatory variable. This regression uses fewer observations as the HHI is not available for all products (e.g., non-retail products). The regulated price dummy cannot be included in this regression as there are no regulated products in this sample. In Column III the dependent variable is the frequency of price changes including sales and excluding product replacements (instead of excluding sales and excluding product replacements). Column IV adds sector dummies to the regression in Column I. The reference sector is NEIG.

Comparison with Dhyne et al. (2006)

	Dhyne et al. (2006) (1996-2001): core items (43 products)				2011-2017: core items of available products			
Average frequency of price changes								
	Proc. Food	NEIG	Services	Total Core	Proc. Food	NEIG	Services	Total Core
Euro area-5	13.6	9.4	5.0	7.8	15.0	12.7	5.7	9.4
Austria*	17.0	8.5	8.8	9.7	21.1	19.7	11.8	15.7
Belgium**	18.3	3.5	2.6	5.5	22.1	6.6	4.1	8.0
France*	20.2	16.8	6.4	12.0	24.6	18.6	5.3	12.7
Germany**	9.7	7.1	4.8	6.2	9.5	12.2	5.6	8.3
Italy**	10.6	5.9	3.6	5.4	9.9	6.4	5.5	6.5
Median size of price increases								
	Proc. Food	NEIG	Services	Total Core	Proc. Food	NEIG	Services	Total Core
Euro area-5	6.6	8.5	6.3	7.1	7.1	9.3	5.2	6.8
Austria*	12.1	10.2	5.9	8.2	17.3	11.8	5.2	9.0
Belgium**	6.7	6.4	7.0	6.8	4.6	11.3	4.6	6.9
France*	3.9	8.7	4.3	5.7	2.8	15.6	4.4	7.8
Germany**	7.7	9.4	5.1	6.8	11.3	7.0	4.7	6.3
Italy**	6.8	7.1	10.5	8.8	4.3	4.7	7.1	5.9
Median size of price decreases								
	Proc. Food	NEIG	Services	Total Core	Proc. Food	NEIG	Services	Total Core
Euro area-5	7.4	11.7	10.4	10.4	8.5	12.5	6.2	8.6
Austria*	12.7	13.2	9.0	10.9	20.6	15.8	7.2	11.8
Belgium**	7.0	8.0	6.7	7.2	3.9	14.3	4.7	7.8
France*	4.5	14.3	6.3	8.7	2.7	21.1	8.0	11.5
Germany**	9.4	12.7	13.5	12.7	14.2	8.6	3.4	6.5
Italy**	6.6	7.6	11.3	9.4	5.1	7.7	8.7	7.8

Notes: *: Price changes including sales; **: Price changes excluding sales (except for Processed Food in Germany). Price changes include substitutions (except for Belgium). Euro area-5 refers to Austria, Belgium, Germany, France and Italy. Only products available in both sample periods are included in the comparison and results are aggregated using country-specific product weights to product groups and then product-group weights (average of 2011-17) to the "Total core".

Comparison with Dhyne et al. (2006)

Frequency and size of price changes at the product level – Period 2011-2017 vs. Dhyne et al. (2006)
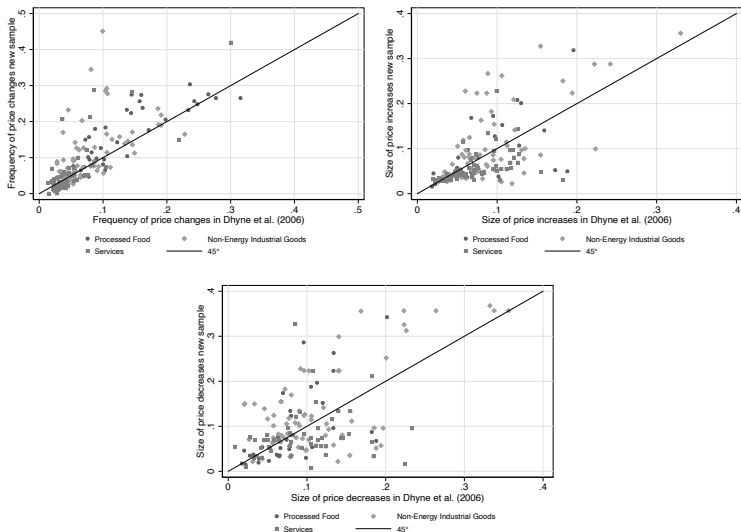
Notes: Frequencies and size of price changes at the product level for Processed Food, NEIG and Services items (at most 43 products depending on availability). Countries covered are Austria, Belgium, France, Germany and Italy.

Size of price change: country heterogeneity

Euro Area Price Rigidity: Median Size of Price Changes (in %)

	Including sales		Excluding sales (NSI sales flag if available)		Excluding sales (Sales filter)	
	Median		Median		Median	
	Increase	Decrease	Increase	Decrease	Increase	Decrease
EURO AREA	**8.9**	**11.8**	**6.3**	**7.9**	**6.3**	**9.7**
COUNTRY						
Austria	10.4	14.6	6.9	8.8	7.3	10.8
Belgium	7.0	8.2	6.6	7.5	6.6	7.3
France	7.8	12.0	5.1	7.3	5.6	10.0
Germany	9.4	12.2	7.1	8.2	6.1	9.1
Greece	9.6	12.8	8.0	11.4	8.0	11.4
Italy	9.1	11.4	4.4	5.5	5.4	10.0
Latvia	15.9	14.8	7.9	6.2	11.5	11.8
Lithuania	13.5	17.2	11.8	12.8	10.6	12.1
Luxembourg	7.5	10.7	5.5	7.8	5.5	7.8
Slovakia	10.5	11.1	9.2	8.5	9.2	8.5
Spain	8.9	11.1	8.1	10.4	8.1	10.4

*Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on **1)** NSI sales flag (if available, and sales filter otherwise) or **2)** common sales filter for all countries.*

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Note: US product results are taken from Nakamura & Steinsson (2008). Euro area statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries and calculated using euro area product weights at the COICOP-5 level (2017-2020 average) and country weights in euro area HICP (2017-2020 average). Total COICOP-5 categories: 164. Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag if available or 2) common sales filter.

Are price more flexible in the United States than in the EA?

|	Frequency		Share of increases		Average size price changes Increases		Decreases	
	Incl. sales	Excl. sales[1]	Incl. sales	Excl. sales[1]	Incl. sales	Excl. sales[1]	Incl. sales	Excl. sales[1]
Aggregate								
United States	19.3	10.0	62.0	71.2	17.8	10.6	21.6	13.4
Euro Area	12.3	8.4	64.3	69.8	11.3	8.3	14.5	10.1
by Sector								
Unprocessed Food								
United States	42.8	29.3	53.1	58.4	27.5	18.9	30.0	20.6
Euro Area	31.2	23.2	54.5	58.4	16.1	12.5	18.1	13.1
Processed Food								
United States	26.3	12.0	55.3	66.3	24.4	11.5	28.1	15.8
Euro Area	14.9	10.1	57.7	63.1	10.9	7.4	12.6	7.8
NEIG								
United States	22.0	5.7	46.9	66.0	21.5	9.8	26.4	12.2
Euro Area	12.5	6.2	48.6	61.1	15.7	9.8	20.4	12.5
Services								
United States	8.9	8.6	78.9	80.1	9.5	9.1	12.8	11.7
Euro Area	6.2	5.8	84.7	84.4	6.4	6.3	9.1	8.2

Size of Price Changes Over Time
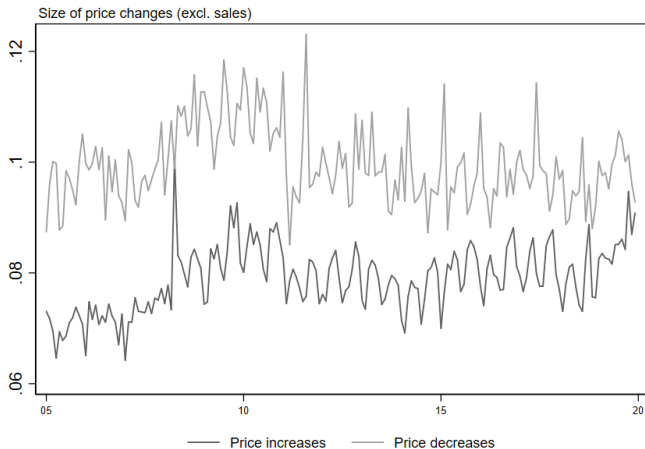
Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries and calculated using euro area product weights at the COICOP-5 level (2017-2020 average) and country weights in euro area HICP (2017-2020 average). Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag if available or 2) common sales filter. Outliers adjusted beforehand.

Freq of Price Increases and Decreases Over Time
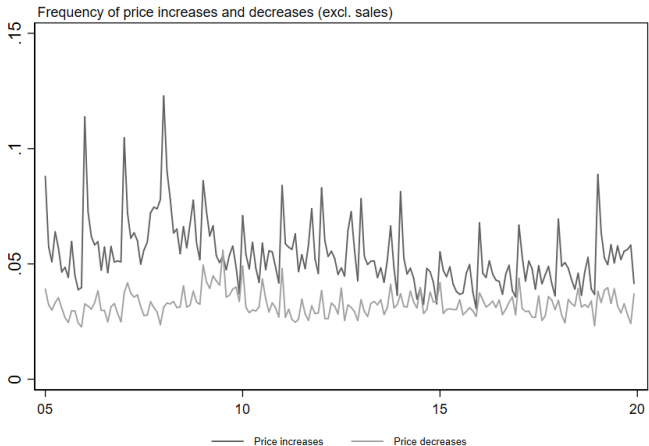
Notes: Statistics are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries and calculated using euro area product weights at the COICOP-5 level (2017-2020 average) and country weights in euro area HICP (2017-2020 average). Price changes due to replacement are excluded beforehand (except Greece). Results excluding sales are based on 1) NSI sales flag if available or 2) common sales filter. Outliers adjusted beforehand.

Fact 5: The frequency of price changes does not react to shocks ▶ Back

A: VAT shocks
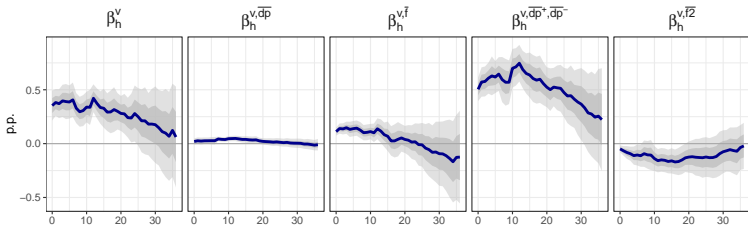
B: Global demand shocks
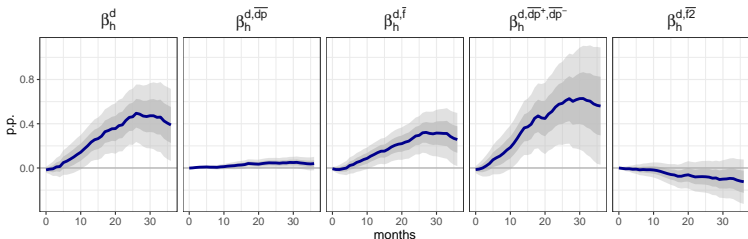
Notes: Local projections are based on the country-specific period and on products that are common to at least 3 of the 4 largest countries. Price changes due to replacement are excluded beforehand (except Greece). Superscripts $x \in \{v, d\}$ represent the VAT and global demand shocks respectively. The models are specified in equation (7). In the order of the panels, the coefficients correspond to: The recomposed inflation β_h^{x}, counterfactual inflation assuming constant sizes of price changes $\beta_h^{x,\overline{dp}}$, counterfactual inflation assuming constant frequency of price changes $\beta_h^{x,\overline{f}}$, counterfactual inflation assuming constant sizes of price increases and decreases $\beta_h^{x,\overline{dp}^+,\overline{dp}^-}$ and counterfactual inflation assuming constant frequencies of price increases and decreases $\beta_h^{x,\overline{f}^+,\overline{f}^-}$. The light and dark gray areas correspond to one and two standard error bands, assuming calendar-based clusters

Decomposition of Monthly Inflation

Following Klenow & Kryvtsov (2008), we decompose

$$\pi_{jt} = f_{jt} \times dp_{jt} \tag{1}$$

with COICOP5 product-category j,

f_{jt}: frequency of price changes at date t,

dp_{jt}: average of non-zero price changes of group j at date t.

Distinguishing between prices increases $(+)$ and price decreases (-), we have

$$\pi_{jt} = f_{jt}^+ \times dp_{jt}^+ - f_{jt}^- \times dp_{jt}^- \tag{2}$$

with f_{jt}^+: frequency of price increases,

f_{jt}^-: frequency of price decreases,

dp_{jt}^+: average of non-zero price increases,

dp_{jt}^-: average of non-zero price decreases (in absolute values) of group j at date t.

Counterfactual Inflation

Counterfactual inflation with constant frequency:

$$\pi_{jt}^{\bar{f}} = f_{j.} \times dp_{jt} \tag{3}$$

Counterfactual inflation with constant size:

$$\pi_{jt}^{\bar{dp}} = f_{jt} \times dp_{j.} \tag{4}$$

Counterfactual inflation with constant frequency of price increases and decreases:

$$\pi_{jt}^{\bar{f}^+,\bar{f}^-} = f_{j.}^+ \times dp_{jt}^+ - f_{j.}^- \times dp_{jt}^- \tag{5}$$

Counterfactual inflation with constant size of price increases and decreases:

$$\pi_{jt}^{\bar{dp}^-,\bar{dp}^+} = f_{jt}^+ \times dp_{t.}^+ - f_{jt}^- \times dp_{j.}^- \tag{6}$$

Local projections

Local projection, Jorda (2005):

$$\pi^*_{j,t-1,t+h} = \alpha_{j,h} + \alpha_{m,h} + \beta_h S_t + \gamma_h X_{c,t} + \epsilon_{j,t_h} \tag{7}$$

with $\pi^*_{j,t+h}$: cumulated inflation rate for product j (product- and country-specific) between period $t-1$ and t+h.

Same equations run on different counterfactual inflation rates.

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