A Temporary VAT Cut in Three Acts: Announcement, Implementation and Reversal

Exchange seminar | March 7, 2024

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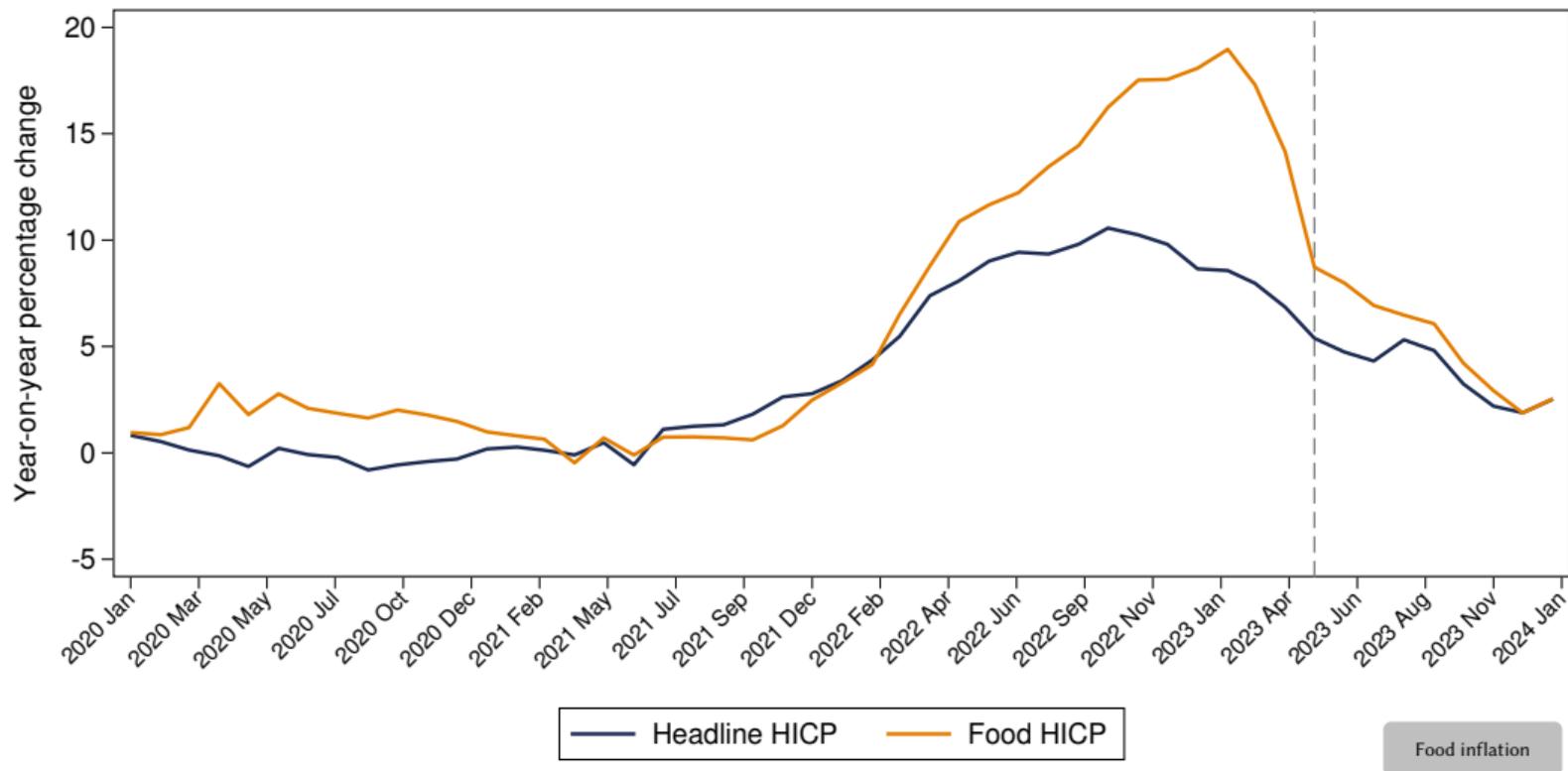
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[3] Banco de Portugal

[4] Nova SBE

Motivation

- **High inflation rates** in 2022 and 2023 across euro area countries
    - $\rightarrow$ Several governments decided to **reduce consumption taxes** as a response
    - $\rightarrow$ Consumption taxes are the largest tax revenue category in most European countries

- In this paper, we revisit a classical question in Economics:
    - $\rightarrow$ What is the **price pass-through of a VAT cut**?

- Using Portugal's temporary VAT cut in 2023 as a laboratory:
    - $\rightarrow$ Look at the **complete policy lifetime**: announcement, implementation and reversal

Inflation in Portugal

- Using a novel **high-frequency online retail prices dataset (by BPLIM):**
  - $\rightarrow$ Compare the price evolution of **food items affected vs. non-affected** by the VAT cut
  - $\rightarrow$ Estimate **pass-through of the VAT cut** into prices during the complete policy lifetime
  - $\rightarrow$ Study the **heterogeneity of the pass-through** across different food categories

- Using Portuguese and Spanish **HICP data (5 digits COICOP):**
  - $\rightarrow$ Estimate the impact of the VAT cut on the **inflation rate**

- Investigate the **mechanism** of the price pass-through:
  - $\rightarrow$ Look at **producer prices** as a potential mechanism

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Preview of the results

- We estimate the price **pass-through** of the VAT cut to food prices in three different acts:
    - → **Announcement**: relative prices of treated items increased by 1.27% vs. non-treated
    - → **Implementation**: relative prices fell 5.56% $\implies$ **pass-through $\approx$ 99%**
    - → **Reversal**: relative prices increased by 4.18% $\implies$ **pass-through $\approx$ 70%**

- The pass-through was **heterogeneous across goods** in the three acts

- The VAT cut had a direct effect on **headline inflation** of approximately 0.7 p.p.

- We find evidence of **disinflation in producer prices** when the policy was in action
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Related literature

- Pass-through of consumption tax cuts
  - ▶ Restaurants (Harju and Kosonen, 2014); Cinema (Arce and de Antonio, 2020); Hairdressers (Benzarti et al., 2020); Gas (Gautier et al., 2023); Food (Benzarti et al., 2023 and De Amores et al., 2023)
  - ▶ Average pass-through estimate around 60%
- → **Contribution:** evidence of the full dynamics of the pass-through throughout policy lifetime

- Macroeconomic consequences of consumption taxes
  - ▶ Real exchange rates (Freund and Gagnon, 2017); Trade (Benzarti and Tazhitdinova, 2021); Inflation (Benzarti et al., 2022)
- → **Contribution:** estimate the effect of consumption tax changes on inflation

Background & Data

Consumer Prices

Contribution to inflation

Inspecting the mechanism

Conclusion

Background & Data

Medina rejeita taxa zero de IVA nos alimentos por temer oportunismo

Flávio Nunes
11 Outubro 2022

Governo optou por não descer o IVA dos produtos alimentares para "taxa zero" por entender que a borla poderia ser aproveitada "oportunisticamente" para subidas de preços.

Rejection (Oct 11, 2022)

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Medina insiste que IVA zero não resolve inflação nos bens alimentares

Fernando Medina considera que o Governo português tem vindo a tomar decisões para combater a inflação nos produtos alimentares, mas a iniciativa IVA zero não faz parte dos planos.

Lusa e SIC Notícias
12:09, 14 mar.2023

IVA Zero. Medina passou a acreditar em medida que criticava há 10 dias

24-03-2023 - 13:30 • João Carlos Malta

Rejection (Oct 11, 2022) → Denial (Mar 14, 2023) → Announcement (Mar 24, 2023)

Timeline of a surprising policy

- Mar 14, 2023: Minister of Finance rejects any reduction on VAT for food items

- Mar 24, 2023: A VAT cut is announced for "essential products" **(Act I)**

- Mar 27, 2023: Official announcement of the list of products covered by the measure

- Apr 18, 2023: Implementation of the policy **(Act II)**

- Sep 6, 2023: Announcement of an extension until the end of 2023

- Oct 27, 2023: Announcement of the official ending date of the policy

- Jan 5, 2024: Reversal of the VAT cut on all the products included **(Act III)**

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Data: Consumer Prices

Supermarket Daily Prices collected by Banco de Portugal Microdata Research Laboratory

- High-frequency data from **online stores** of 5 supermarkets ($\approx 60\%$ of retail market in 2022)
  - $\rightarrow$ collected through **automated web scraping algorithms**

- The dataset covers the products sold on each website **since mid-2021**

- Variables: day, the product's name, brand, COICOP code, capacity, and **prices**
  - $\rightarrow$ BPLIM identifies the **list of the products** covered by the VAT cut

- We include only **food items**:
  - $\rightarrow$ **27 795 items** (product $\times$ supermarket), from which **12% are treated items**

<div align="right">

Data treatments   List of treated items

</div>

Data: Producer Prices

Weekly wholesale prices from the Agricultural Markets Information System of the Planning, Policy and General Administration Office

- Publicly available prices for **selected product categories**
    - $\rightarrow$ Granular data for different species, regions, and local markets

- We select 13 product categories based on the **existence of a COICOP 5 match**
    - $\rightarrow$ We include both treated and non-treated categories

- Proxy for the **cost changes faced by supermarkets**

List of selected product categories

Consumer price index by treatment assignment
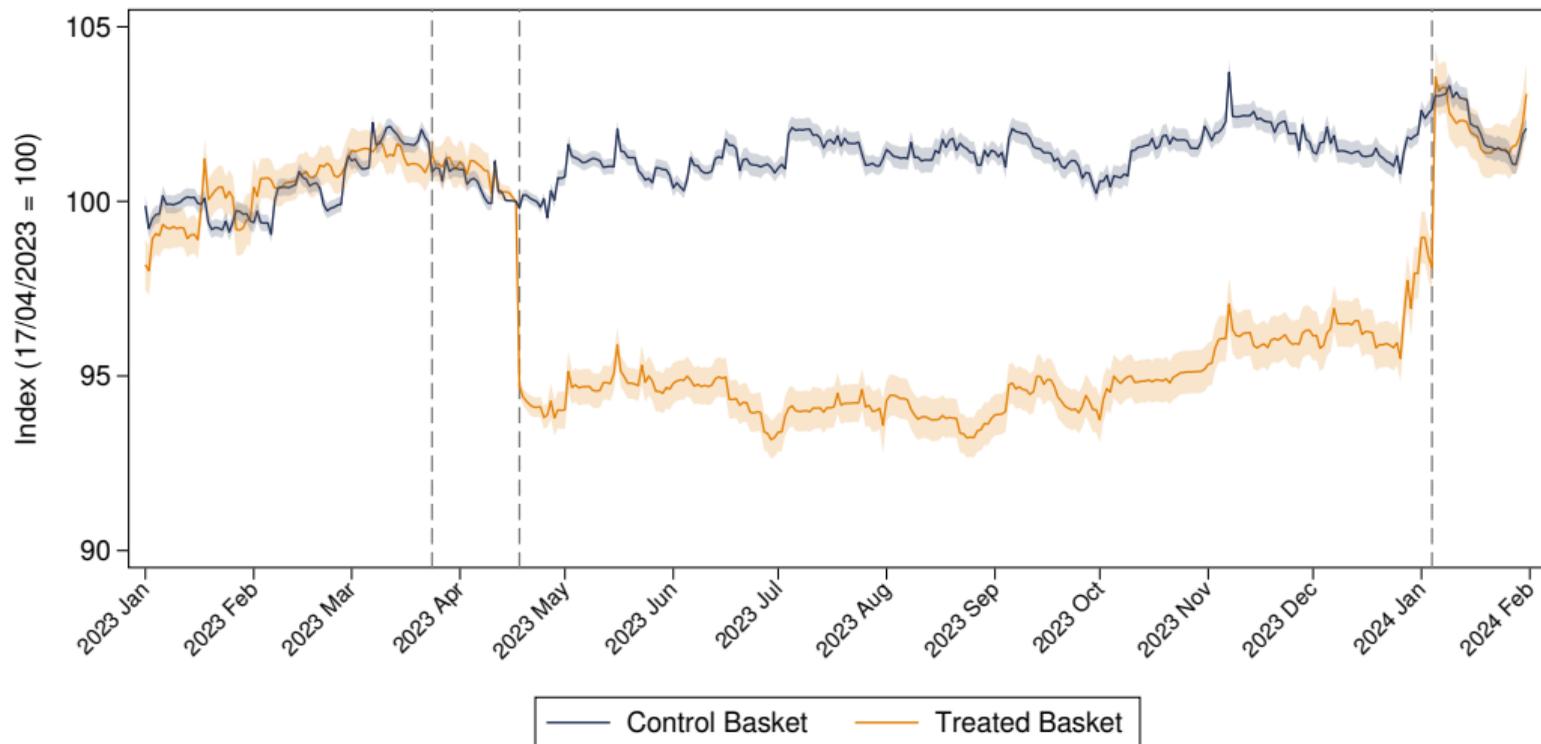
Frequency of positive and negative price changes per week
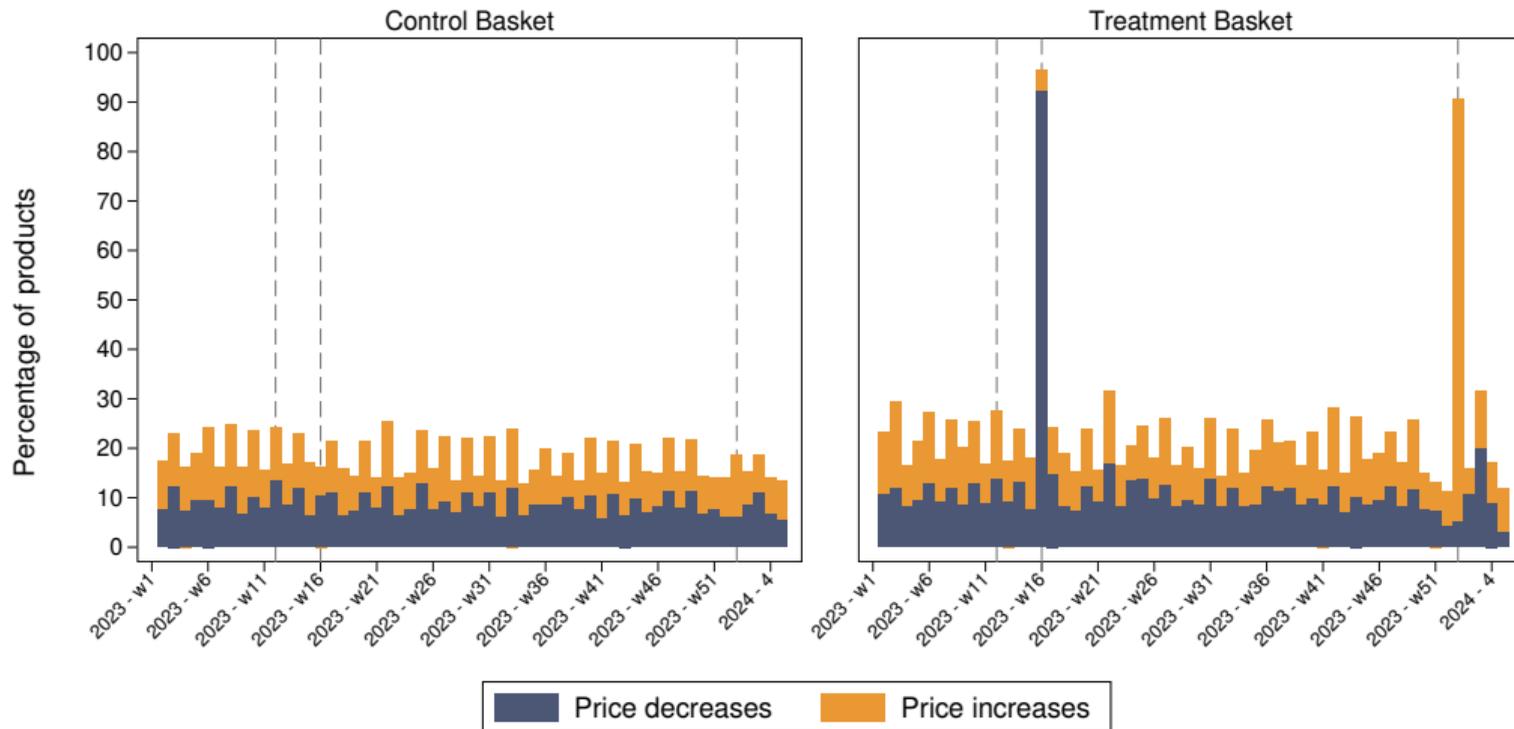
Consumer Prices

Event-study setting

- Estimate the **reduced-form effect of the policy** in three moments: announcement, implementation and reversal.

    - Compute the pass-through of the VAT policy change to consumer prices along the policy lifetime

- We consider the following **linear panel model with dynamic policy effects**:

$$P_{it} = \alpha_i + \gamma_t + \sum_{m=-G}^{M} \beta_m Z_{i,t-m} + \varepsilon_{it}$$

- $\{\beta_m\}_{m=-G}^{M}$ summarize the **magnitude of the dynamic effects** of the policy

    - $Z_{i,t}$ will refer to the three moments of the policy
    - Control group: all other food products with no VAT cut

Pass-through calculation

Pretrends p-value = 0.90 -- Leveling off p-value = 0.96
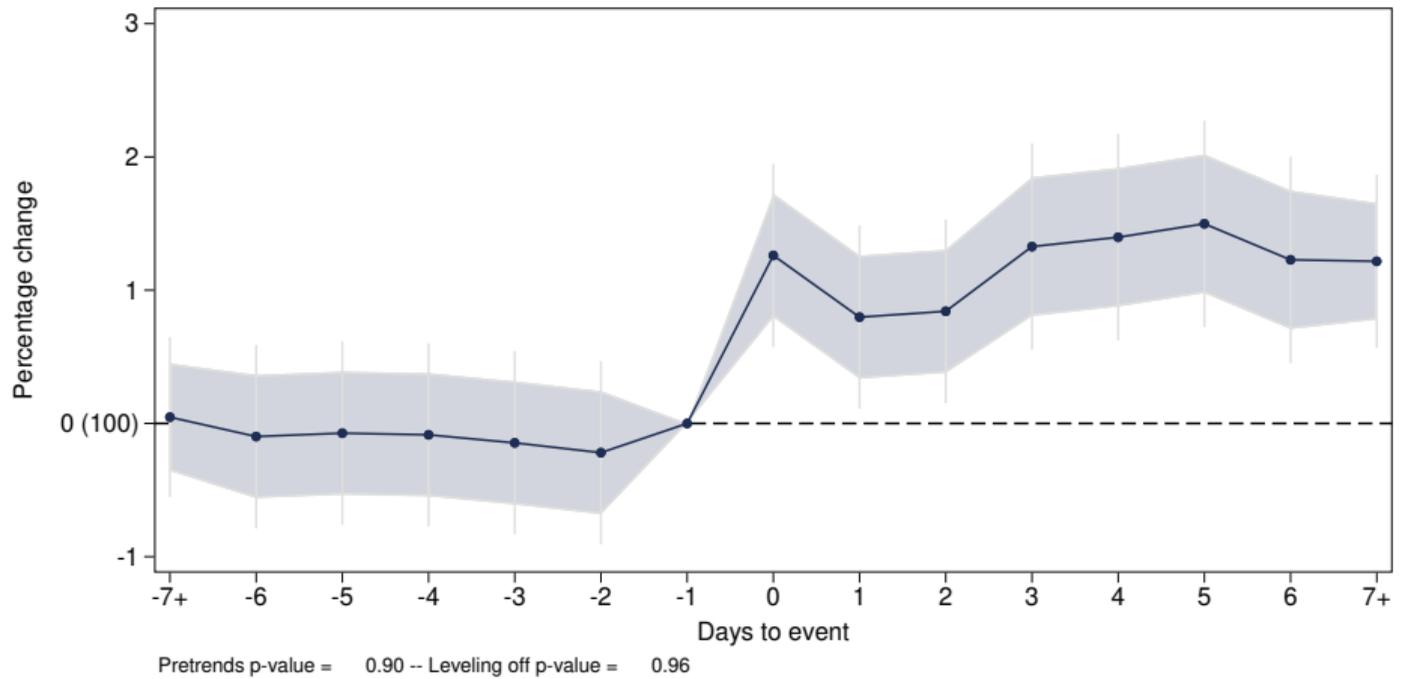
Different between pre- and post-treatment averages: 1.27%

Pretrends p-value =   0.07 -- Leveling off p-value =   0.33
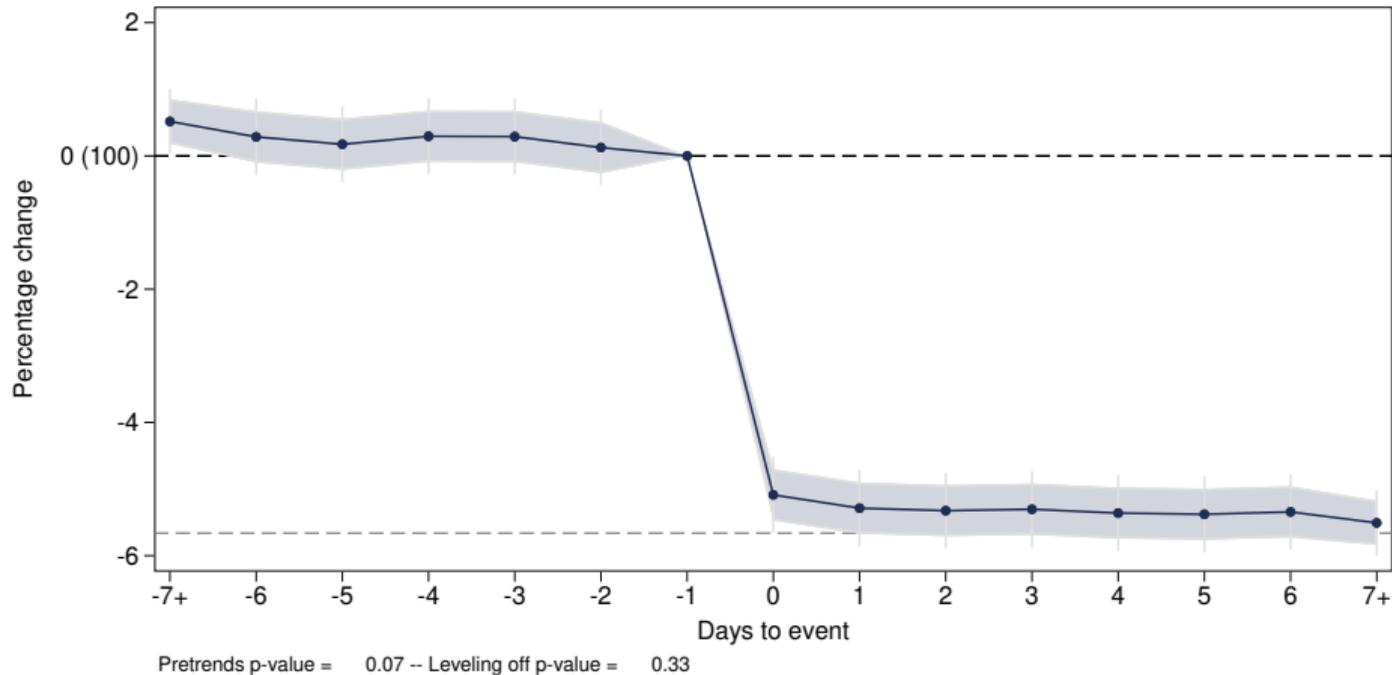
Different between pre- and post-treatment averages: -5.56% $\implies$ pass-through $\approx$ 99%

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Pretrends p-value = 0.00 -- Leveling off p-value = 0.01
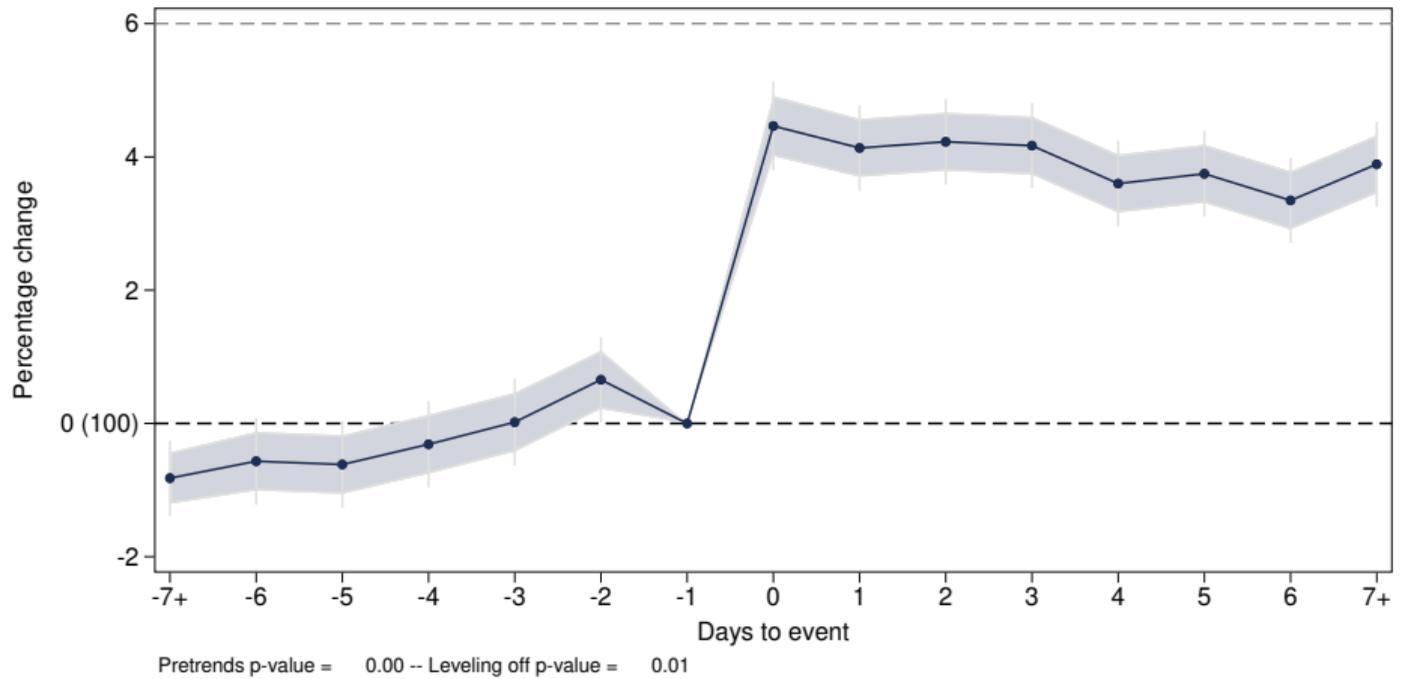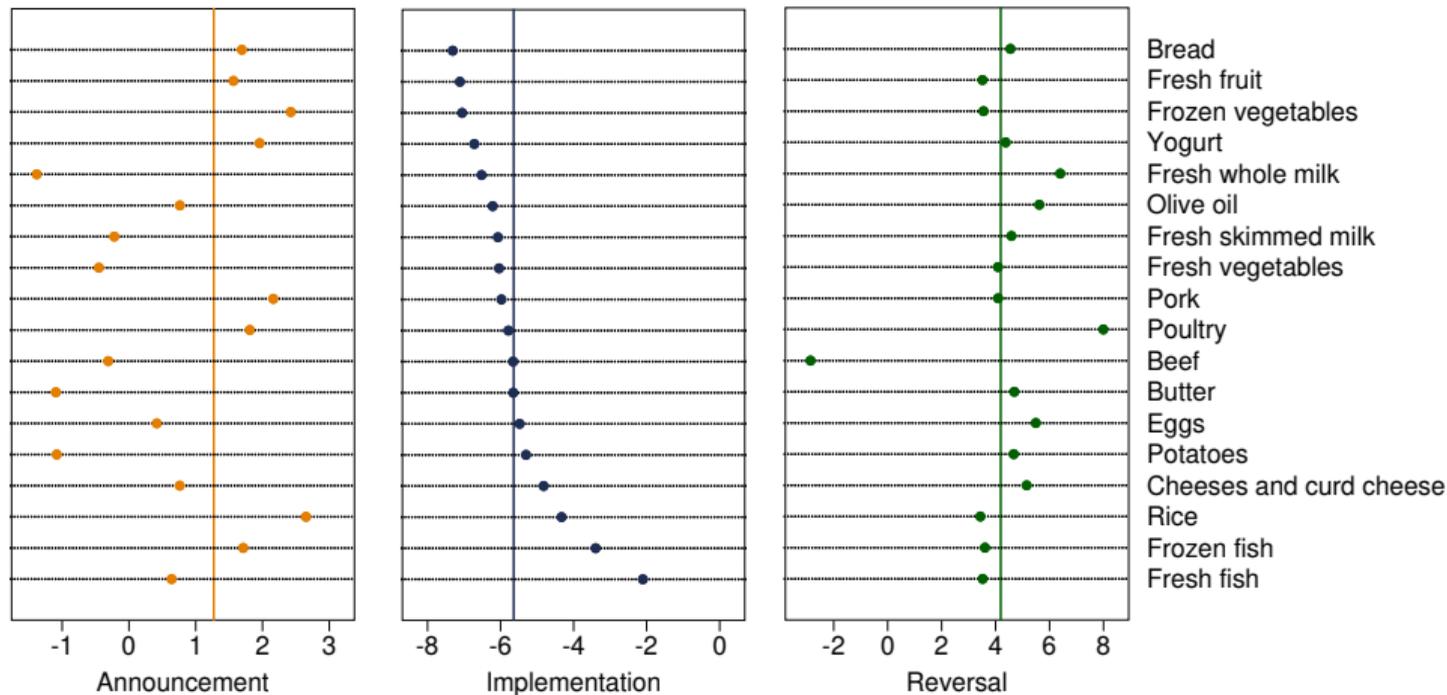
Different between pre- and post-treatment averages: 4.18% $\implies$ pass-through $\approx$ 70%

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Difference between pre- and post-treatment averages for each COICOP 5 with treated products

Robustness exercises

- **Synthetic Control Difference-in-Difference** estimator à la Arkhangelsky et al. (2021)
  - ▶ This method gives more weight to products and periods that have a similar price behavior to the treated units in the pre-treatment window

- **Missing information**: different data imputation and constant basket

- **Outcome variable**: price per unit and regular price

- **Alternative control groups**: all products, only food products, only non-food products

SC DiD   Robustness results   Vegetable Oils

Synthetic Control DiD: Implementation

	Label
	vinho tinto terras crato alentejo 0.75 l
	polvo cabecudo kg
	berbigao 1kg
	ameijoa branca 1kg
	mexilhao 1kg
	cantarilho pequeno kg
	vinho tinto reserva alentejano
	vinho tinto tapada fidalgo reserva 0.75l
	gaspacho alvalle original 500 ml
	vinho branco tapada fidalgo alentejo 0.75l
	vinho tinto tapada fidalgo regional alentejo 0.75l
	oregaos margao moidos 33g
	barritas biologicas
	posta salmao producao controlada auchan
	posta salmao auchan cultivamos bom 4/5 kg
	noz margao moscada grao com moinho 30g
	mel biologico
	pimenta margao chef 34g
	salada vitacress aromatica bio 100g
	pimenta margao branca com moinho 39g
	alho margao com moinho 40g

Unit-weights (percentage)

Synthetic Control DiD: Reversal
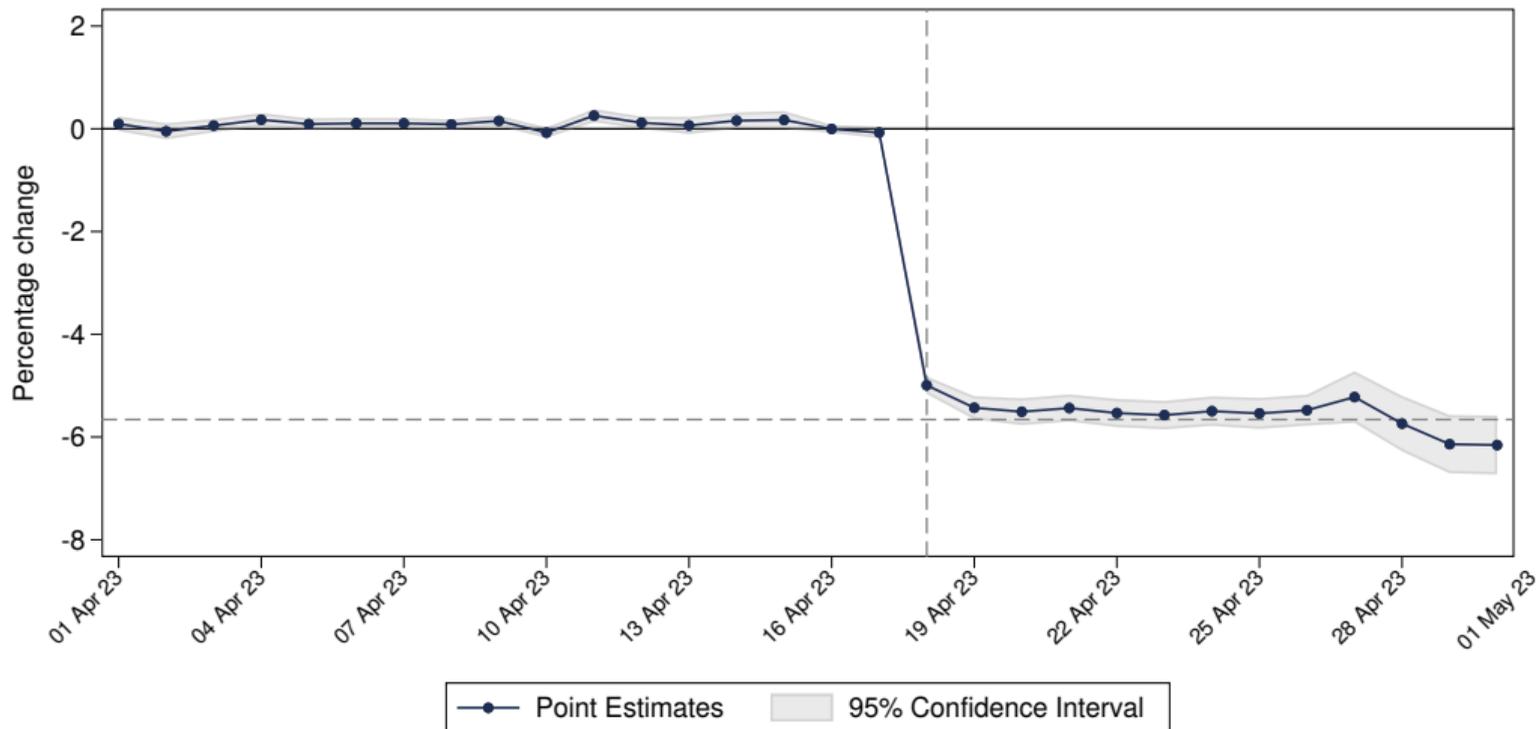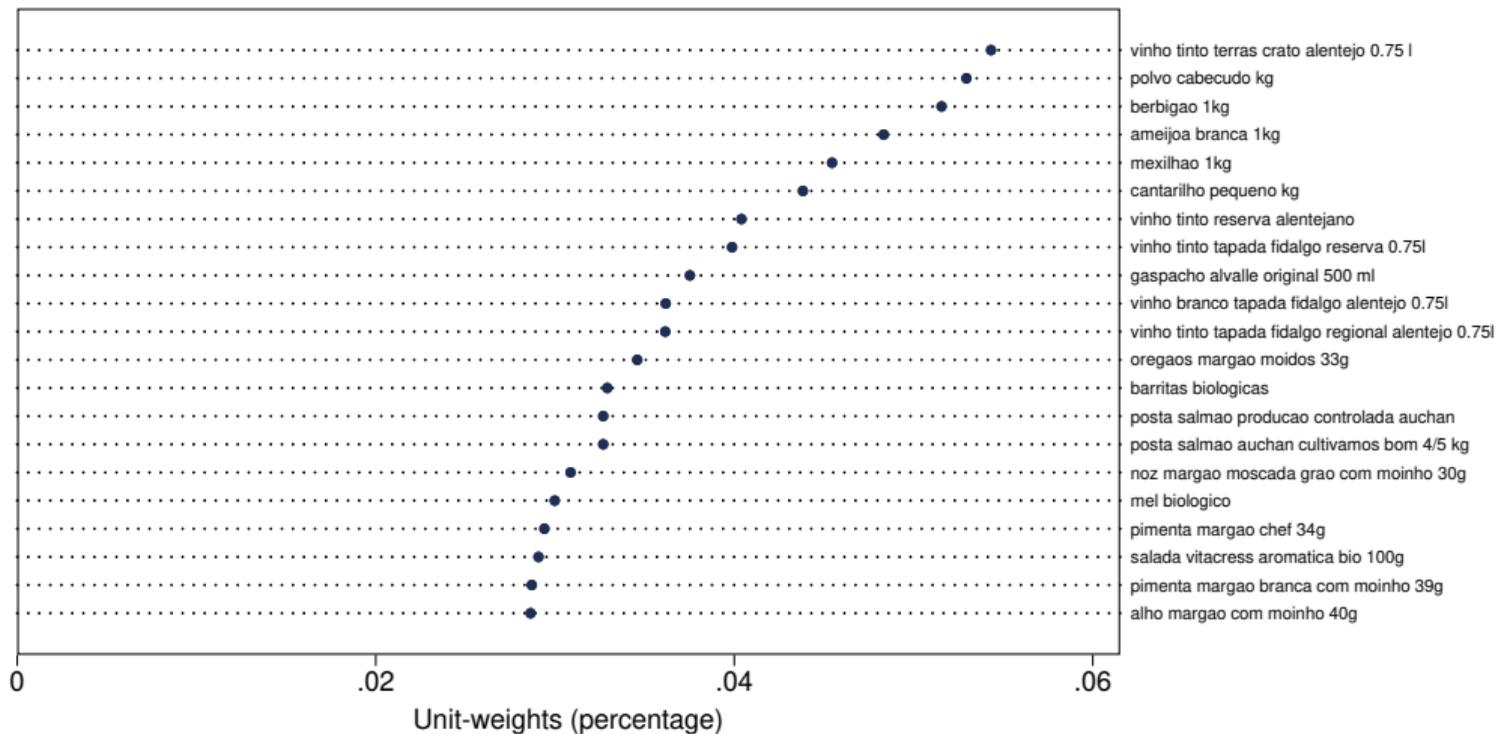
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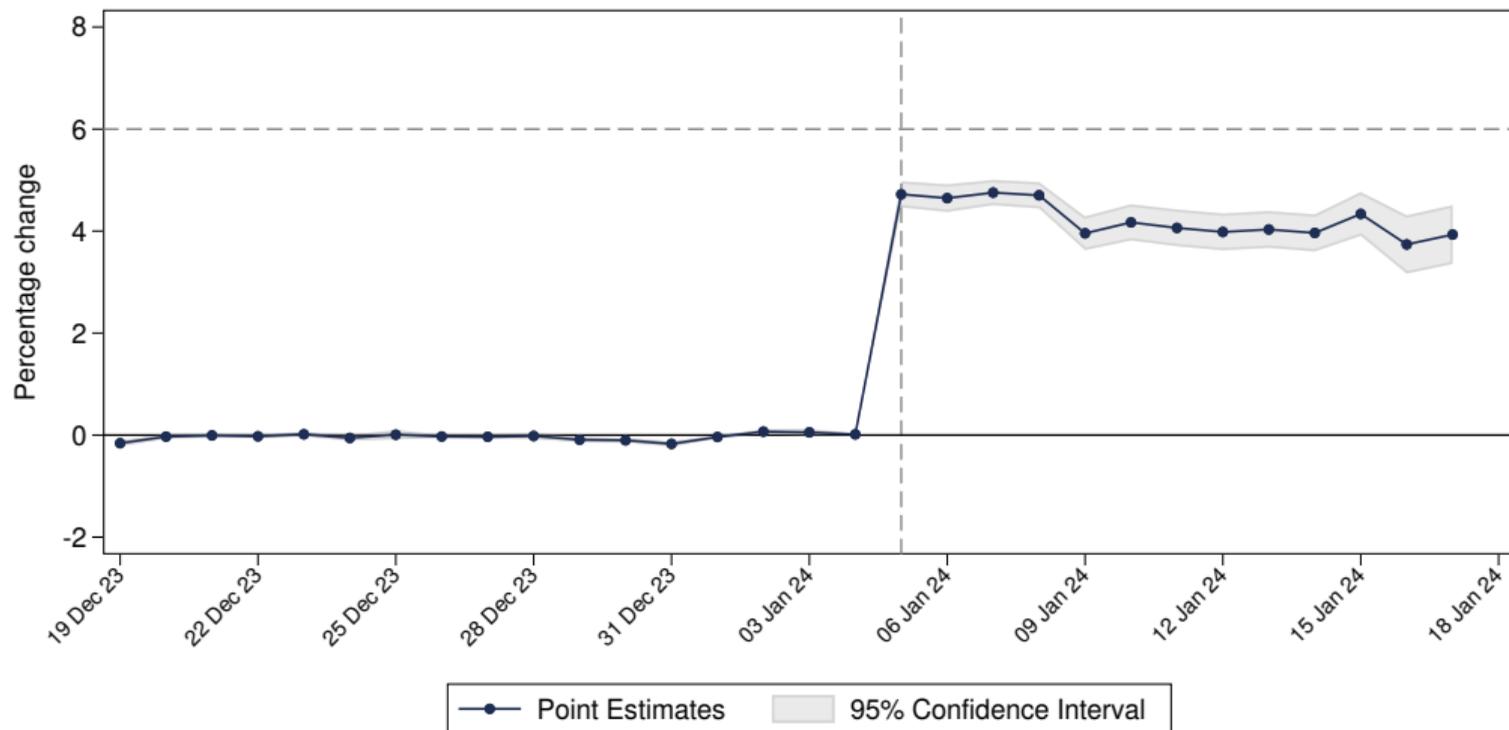
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Taking stock

- A temporary VAT cut in 6% policy in three acts:

  - ▶ **Announcement:** relative prices of treated items increased 1.27% vs. non-treated ones
  - ▶ **Implementation:** relative prices fell 5.56%
  - ▶ By the end of the policy, the price of treated goods start increasing
  - ▶ **Reversal:** relative prices increased 4.18%

- Evidence of **heterogeneity** along different food categories – no apparent pattern

Contribution to inflation

- What is the **effect of the policy on food inflation**?
  - ▶ Compare Portugal with Spain

- **Data:** CPI series at the COICOP-5 level
  - ▶ Future work: go more granular and use supermarket daily data

- We estimate the VAT cut on food inflation using a **DiD setting** with Spain as a control
  - ▶ Use observations after Jan 2023, after the Spanish VAT cut on a set of food items

Price evolution of food basket in Portugal and Spain
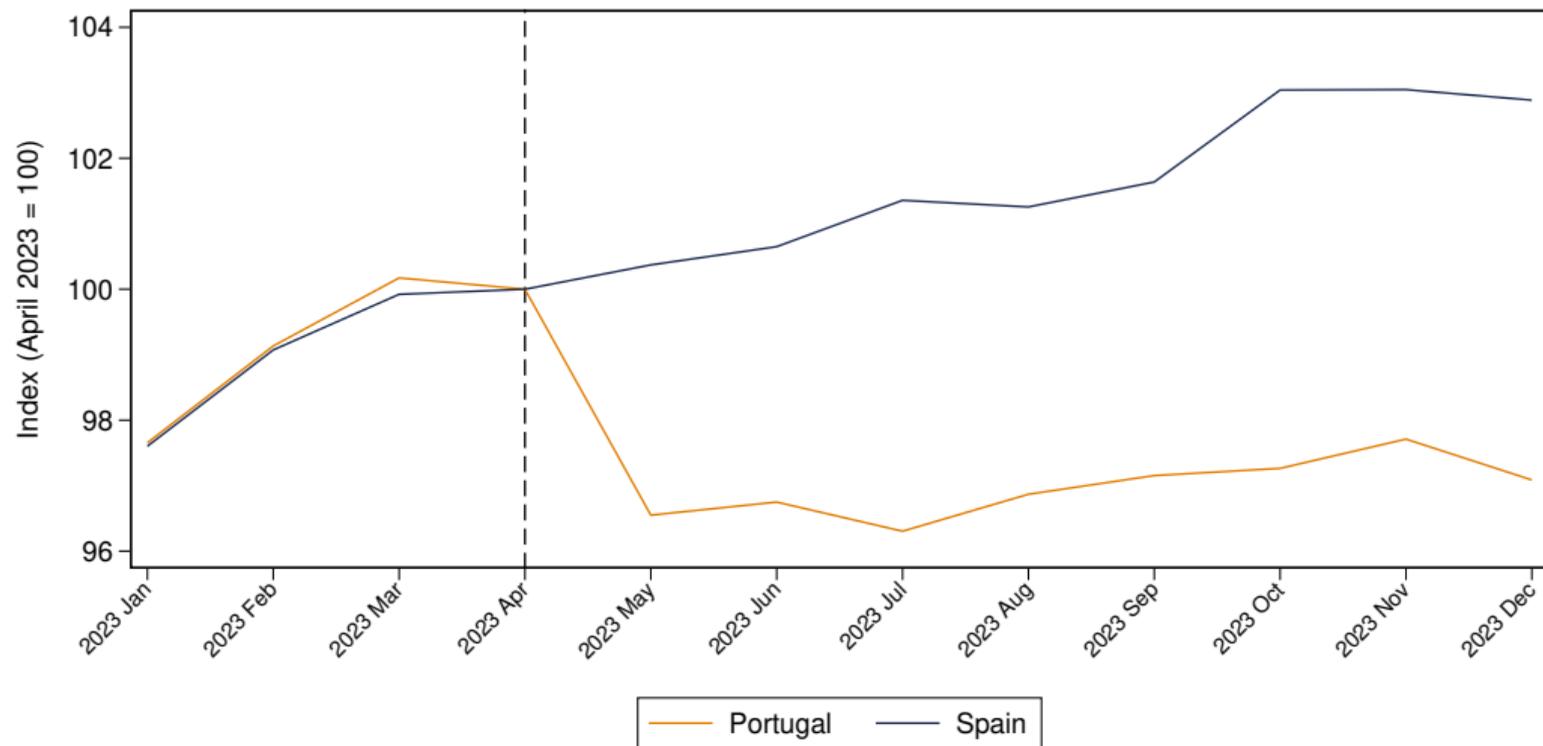
Difference-in-difference estimation

$$P_{i,t} = \mu + \alpha C_i + \gamma T_t + \tau C_i T_t + \varepsilon_{it}$$

[C_i: Country dummy (1 if PT); T_t: Treatment time dummy (1 if after April 2023)]

	(1)	(2)	(3)
C_i	-1.881***		1.769***
	(0.000)		(0.000)
T_t		0.445	3.21***
		(2.738)	(0.000)
$C_i \times T_t$			**-5.475*****
			(0.000)
$N \times T$	1188	1188	1188

- Treated food items are **12.95 – 13.3% of the consumer basket** (CPI weights 2022/2023)
- The direct effect of the VAT cut on monthly headline inflation is then **0.71 – 0.73 pp**
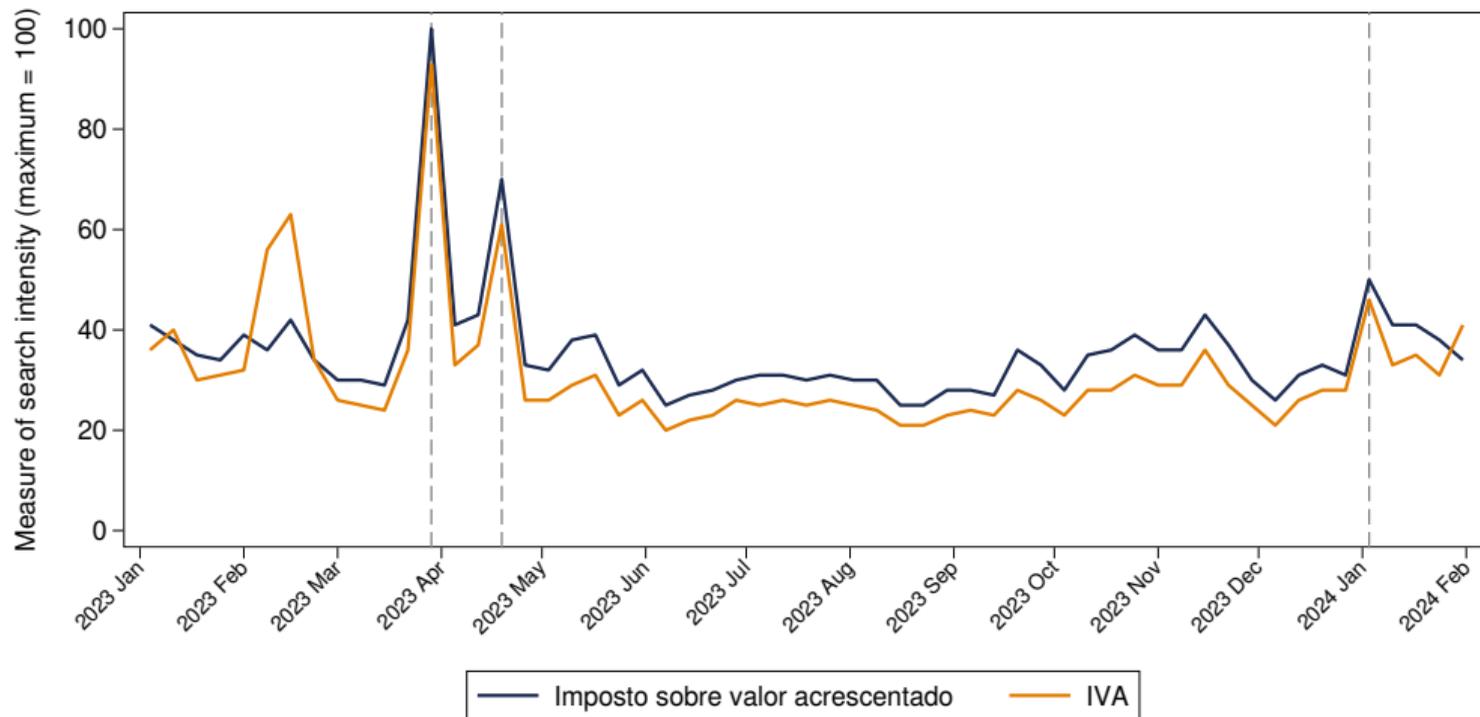
Inspecting the mechanism

- Higher pass-through than previous literature $\implies$ **possible mechanisms**:

  1. Strong media and popular scrutiny
  2. Agreements with economic agents
  3. Increased attention during high inflation periods (Binder and Kamdar, 2022; Pfäuti, 2023)
  4. Dynamic interaction between government and supermarkets
 5. Disinflation in producer prices

...and agreements with economic agents

- Several **formal agreements** were signed with the following collective groups:

  1. AJAP – Associação dos Jovens Agricultores de Portugal
  2. Associação dos Distribuidores de Produtos Alimentares – ADIPA
  3. Centromarca – Associação Portuguesa de Empresas de Produtos de Marca
  4. CONFAGRI – Confederação Nacional das Cooperativas Agrícolas e do Crédito Agrícola
  5. Confederação Nacional dos Jovens Agricultores de Portugal (CNJAP)
  6. FIPA – Federação das Indústrias Portuguesas Agroalimentares

- These aimed to ensure that the **universality of agents in the food chain** – production, processing, and distribution – **contributes to reduction and stabilization of prices**.

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Producer price event study around acts I and II

(a) Announcement
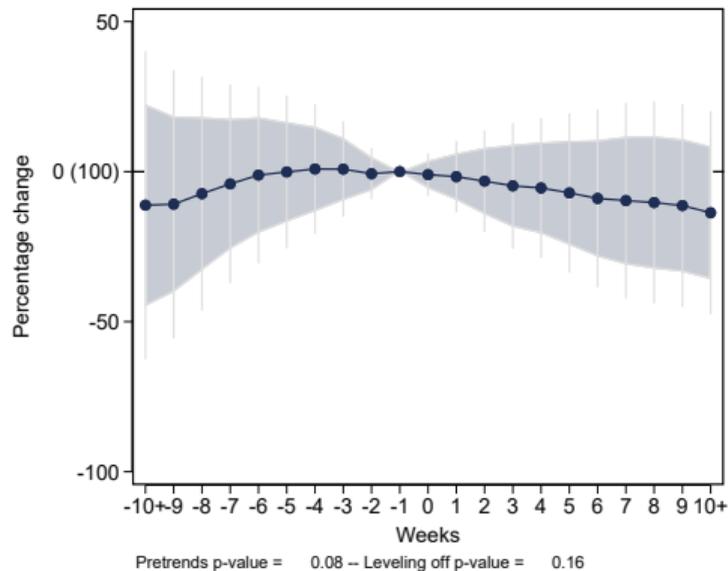
(b) Implementation
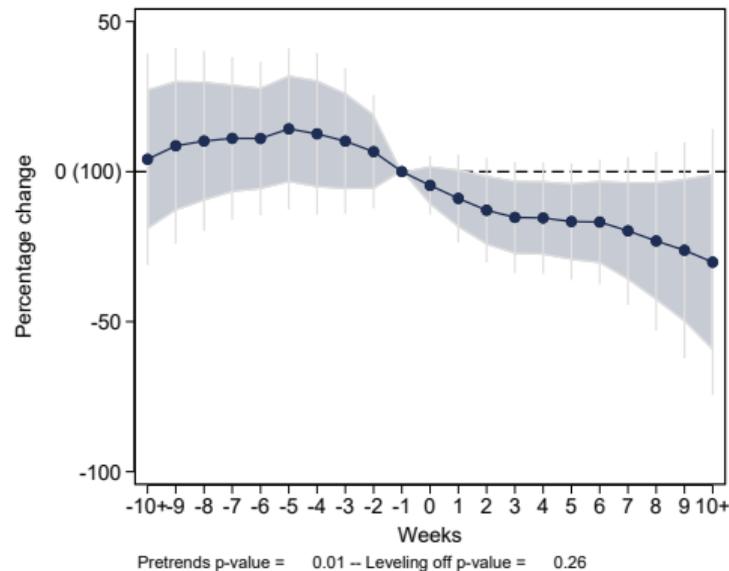
Combining the results on consumer and producer prices

- **Announcement:** no significant differences between pre- and post-period averages

- **Implementation:** significant differences at a 10% significance level

- Downward trend of producer prices

  → this could help explain the almost-complete pass-through

- Together with the pass-through to consumer prices,

  → **weak evidence for sellers' inflation** in the short-term

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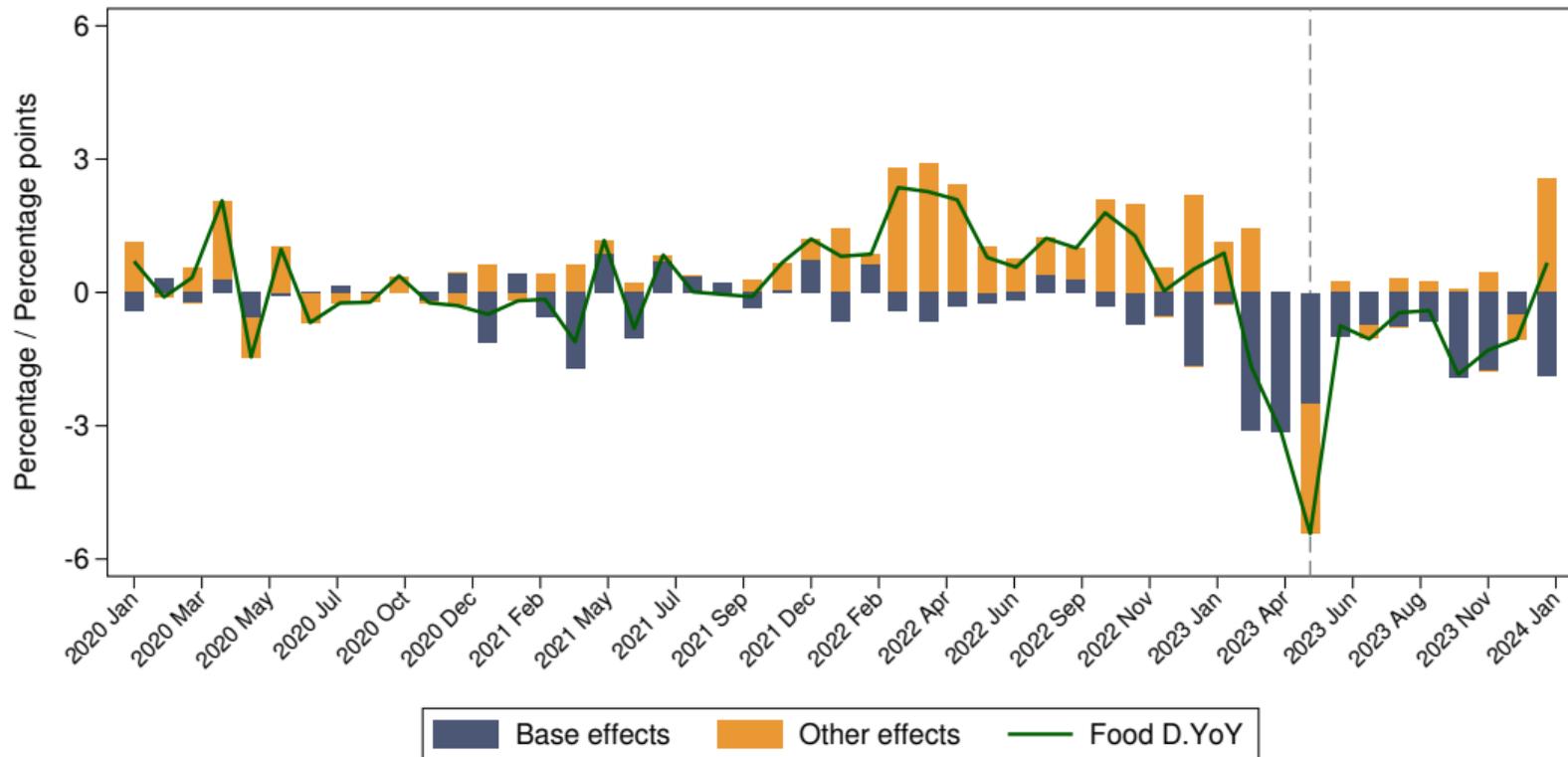
Thank you!

Appendix

Food inflation in Portugal

Legend: Base effects, Other effects, Food D.YoY

Step	Description	Products	Observations
0	Web scraped products	60,445	44,799,544
1	Keep observations after Dec-22	60,445	24,272,188
2	Drop treated products that raised doubts	48,474	19,399,736
3	Drop treated products with a decrease of 23%	48,433	19,382,934
4	Drop outlier observations	48,433	18,499,204
5	Drop non-food product	27,780	10,589,024
	Treated products	**3,225 (12%)**	**1,231,197 (12%)**

- We test 3 methods to deal with **missing values** in the dataset:

  1. Carryforward for a max of 7 days if P[t-1] = P[t+x] until product exits
  2. Carryforward with P[t-1] until product exits

Category	Items	VAT cut size
Cereals and Derivatives, Tubers	Bread, Potato, Pasta and Rice	6%
Dairy Products	Cow's Milk, Yogurt or Fermented Milk, Cheese	6%
Fruits	Apple, Banana, Orange, Pear, Melon	6%
Legumes	Red Beans, Black-Eyed Peas, Chickpeas	6%
Vegetables	Onion, Tomato, Cauliflower, Lettuce, Broccoli, Carrot, Zucchini, Leek, Pumpkin, Turnip Tops, Portuguese Cabbage, Spinach, Turnip, Peas	6%
Meat and Fish	Pork, Chicken, Turkey, Beef, Codfish, Sardine, Hake, Horse mackerel, Sea Bream, Mackerel	6%
Fats and Oils	Olive Oil, Butter	6%
	Vegetable Oils	23%
Other Products	Canned Tuna, Chicken Eggs, Plant-Based Drinks and Yogurts, Gluten-Free Products	6%

COICOP 5	Category
CP01111	Rice
CP01112	Flour and other cereals
CP01121	Beef
CP01122	Pig meat
CP01123	Sheep and goat meat
CP01124	Poultry
CP01125	Other meats
CP01147	Eggs
CP01153	Olive oil
CP01161	Fresh or refrigerated fruit
CP01163	Nuts
CP01171	Fresh or refrigerated vegetables except potatoes and other tubers
CP01174	Potatoes

Pass-through calculation

We estimate the pass-through for each moment t as:

$$\gamma_t = \frac{\frac{\sum_{m=0}^{M} \beta_{mt}}{M+1} - \frac{\sum_{m=-G}^{-1} \beta_{mt}}{G}}{\frac{\Delta \tau_t}{(1+\tau_t)}}$$

with $M = 7$ and $G = 7$ and τ_t the VAT rate in place before (after) the cut

Note that the VAT is decreasing from 6% to 0% in the implementation, which corresponds to

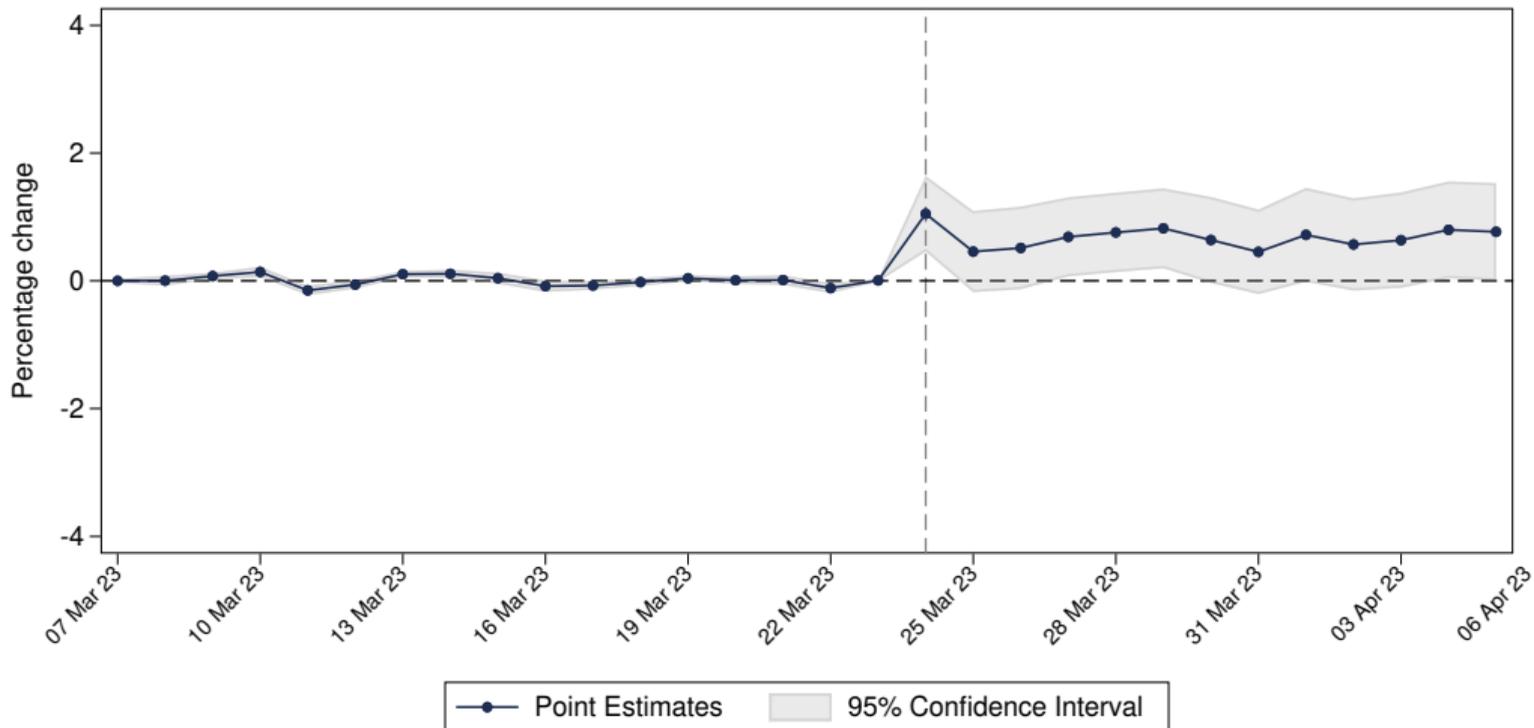$$\Delta \tau_i / (1 + \tau_i) \times 100 = -6/106 \times 100 = -5.66$$

- We use the **Synthetic Control DiD** as an alternative to estimate causal effects of VAT cut
    - the method gives more weight to products and periods that have a similar price behavior to the treated units in the pre-treatment window

- We use the estimator proposed by Arkhangelsky et al. (2021) where the standard errors are computed using a block bootstrap:

$$\left(\hat{\boldsymbol{\tau}}^{\text{sdid}}, \hat{\mu}, \hat{\alpha}, \hat{\gamma} \right) = \arg \min_{\tau, \mu, \alpha, \gamma} \left\{ \sum_{i=1}^{N} \sum_{t=1}^{T} \left(P_{it} - \mu - \alpha_i - \gamma_t - Z_{it}\tau \right)^2 \hat{\omega}_i^{\text{sdid}} \hat{\lambda}_t^{\text{sdid}} \right\}$$

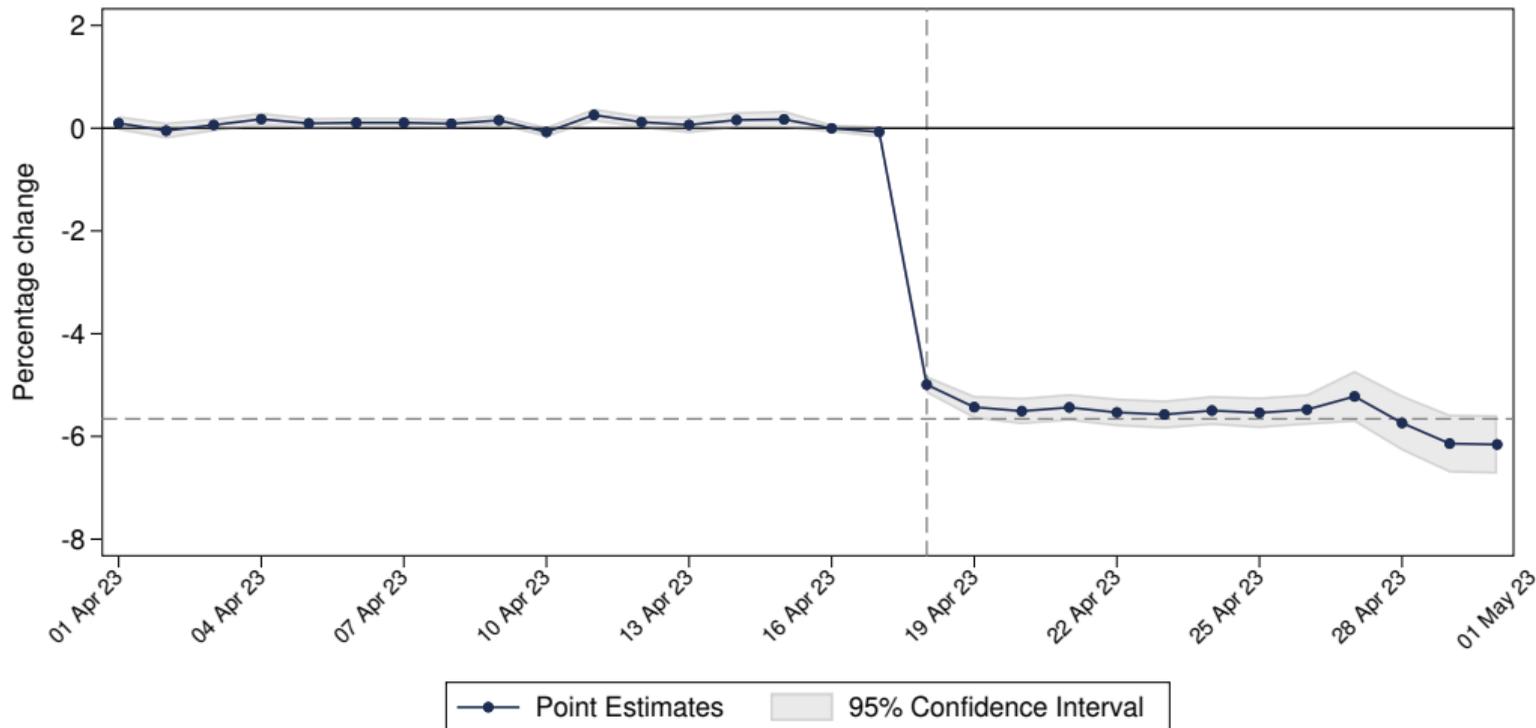- τ is our coefficient of interest that measures the average effect on the treatment (Z_{it})

	vinho tinto terras crato alentejo 0.75 l
	polvo cabecudo kg
	berbigao 1kg
	ameijoa branca 1kg
	mexilhao 1kg
	cantarilho pequeno kg
	vinho tinto reserva alentejano
	vinho tinto tapada fidalgo reserva 0.75l
	gaspacho alvalle original 500 ml
	vinho branco tapada fidalgo alentejo 0.75l
	vinho tinto tapada fidalgo regional alentejo 0.75l
	oregaos margao moidos 33g
	barritas biologicas
	posta salmao producao controlada auchan
	posta salmao auchan cultivamos bom 4/5 kg
	noz margao moscada grao com moinho 30g
	mel biologico
	pimenta margao chef 34g
	salada vitacress aromatica bio 100g
	pimenta margao branca com moinho 39g
	alho margao com moinho 40g

0   .02   .04   .06

Unit-weights (percentage)
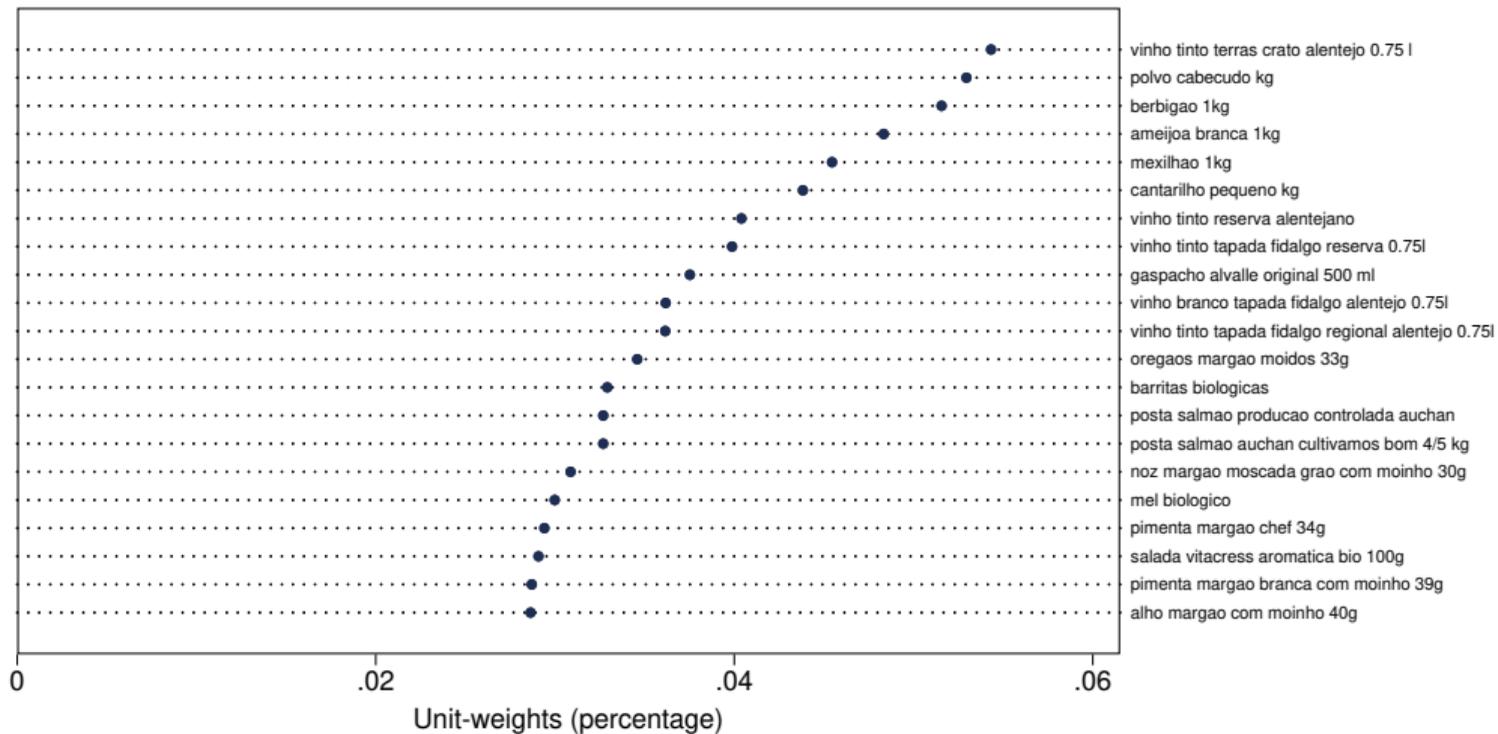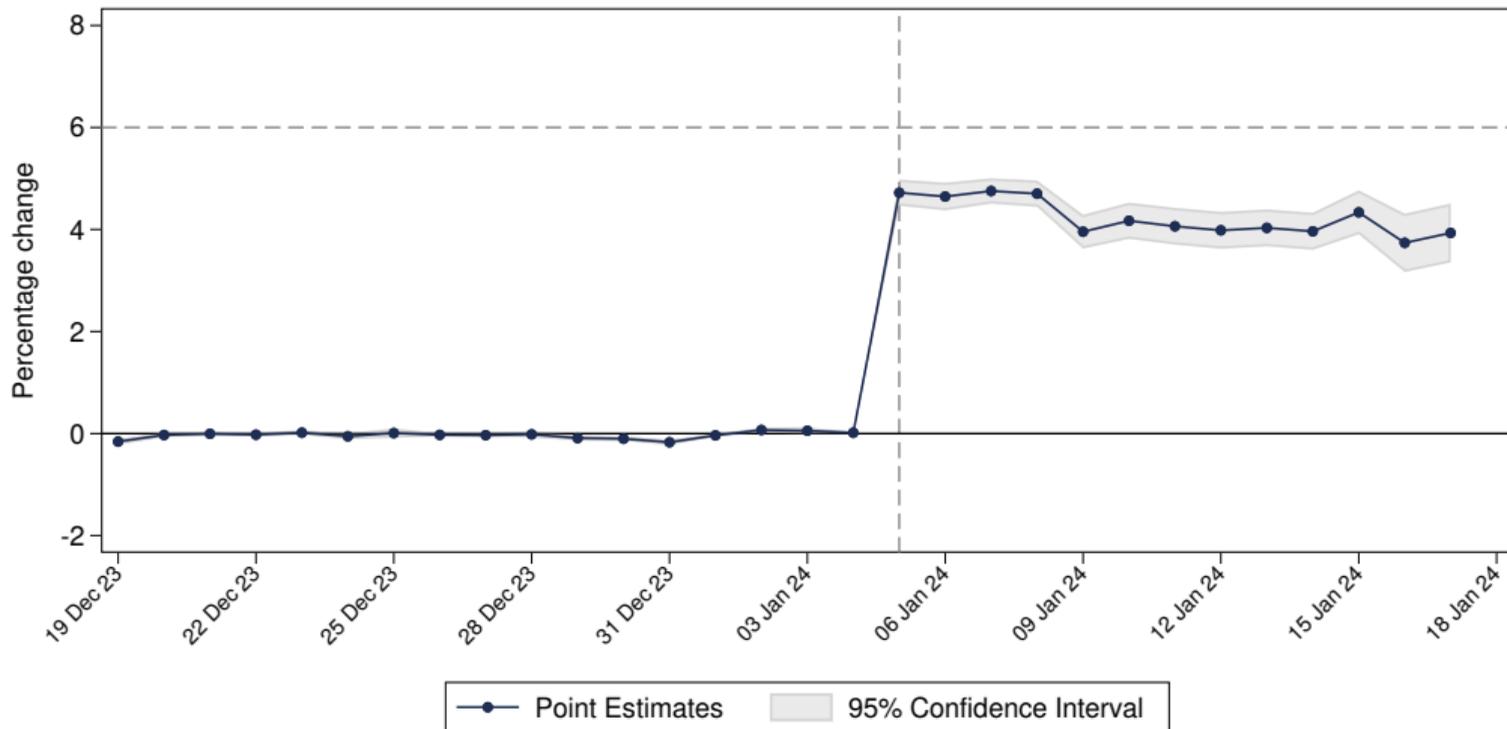
Different between pre- and post-treatment averages:

Test	Description	Announcement	Implementation	Reversal
2	Data Imputation (1)	1.19	-5.41	3.53
3	Data Imputation (2)	0.97	-5.76	3.39
4	Constant Basket	1.27	-5.87	5.15
5	Price per unit	0.97	-5.37	4.22
6	Regular Price	0.27	-4.68	4.04
6	Including all products	1.20	-5.86	4.29
7	Including all food COICOP 5	0.94	-5.38	3.68
8	Including only non-food products	1.43	-6.29	4.69
	Average pass-through		**99%**	**68%**

Pretrends p-value = 1.00 -- Leveling off p-value = 0.95

Different between pre- and post-treatment averages: -18,81 % $\implies$ pass-through $\approx$ 101%

Pretrends p-value =   0.38 -- Leveling off p-value =   0.42
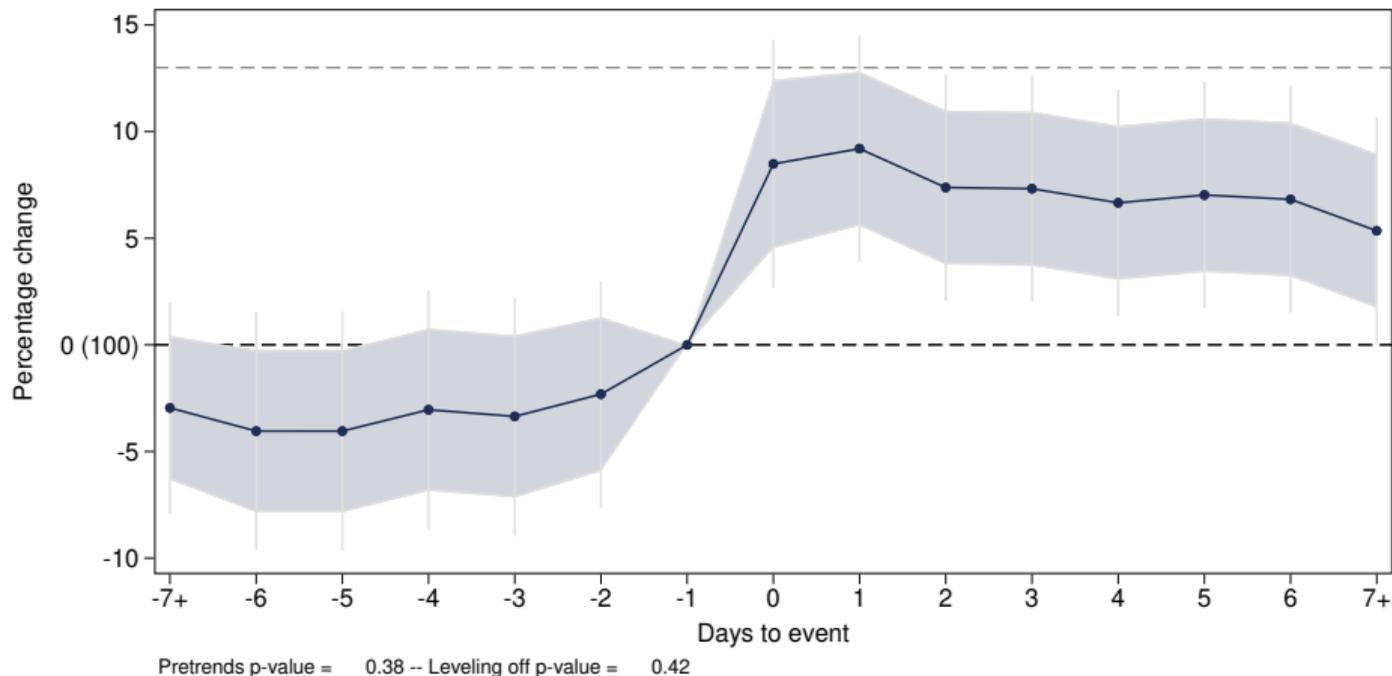
Different between pre- and post-treatment averages: 10,10 % $\implies$ pass-through $\approx 78\%$