

Boosting Consumer Demand in Spain: The Impacts of the Value-Added Tax Exemption on Essential Food Products

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Highlights

- Spain's VAT tax exemption for essential foods aims to reduce the impact of inflation.
- We assess the effect of the VAT exemption on consumer demand using a fixed-effects model.
- The policy raised demand for essential foods, from 1.5% for bread to 14% for tubers and legumes.
- Difference in demand changes was insignificant across income groups, except for flour, milk, and vegetables.

Abstract

The COVID-19 pandemic and the ongoing war in Ukraine have increased global uncertainty and inflation. In January 2023, Spain introduced a 0% value-added tax (VAT) rate on essential food products to mitigate inflation. This study examines the impact of the VAT exemption on changes in consumer demand. Using a fixed-effects model, we assess whether average demand across eight essential food categories has increased since Spain implemented the VAT exemption policy. The results indicate a statistically significant rise in demand, ranging from 1.7% for bread to 10.1% for tubers and legumes. Although lower socioeconomic-status households generally purchase more basic staples, we find no statistically significant differences in demand changes across socioeconomic status groups for most essential foods after the VAT exemption, except for flour, milk, and vegetables. Our study sheds light on the distributional effectiveness of the VAT exemption by examining its impact on consumer demand.

Keywords: Consumer demand, value-added tax, essential foods, policy intervention, Spain

JEL classification: D12, H22, Q18

1. Introduction

The global economy has been facing uncertainty and high inflation, largely driven by the recent repercussions of the COVID-19 pandemic and ongoing geopolitical instability stemming from the war in Ukraine. These factors have disrupted supply chains by driving up energy and consumer prices and amplifying economic volatility, which in turn has influenced consumer behavior and policy responses to high inflation globally (Jaworski, 2021; Vergamini et al., 2021; Jin & Gil, 2023; Jin et al., 2024; Volpe et al., 2024).

Inflation erodes purchasing power, making goods and services more expensive for consumers, which can lead to decreased overall consumption and savings (Esposti, 2024; Gylfason, 1981; Von Ungern-Sternberg, 1981). Additionally, high inflation threatens the affordability of food for low-income households (Cattaneo et al., 2023; Zhang et al., 2013). Promotions may temporarily reduce effective prices and encourage short-term purchases, though effects can vary across products and households (Bedoui et al., 2024). To help mitigate the impact of high inflation on Spanish families, the Spanish government approved a new set of anti-crisis measures, including a temporary exemption from the value-added tax (VAT) in 2023 (Spain Tax Agency, 2023).

While businesses are responsible for collecting VAT from consumers and reporting it to the government, the end consumer ultimately pays the tax as part of the purchase price. VAT reduction aims to alleviate the cost of living by lowering prices, benefiting consumers, particularly those with lower incomes (Barrell and Weale, 2009; Zhang et al., 2013). It also stimulates consumer spending and supports economic recovery by encouraging businesses and individuals to increase their spending (Steel and Harris, 2020). VAT cuts can help alleviate inflationary pressures and target essential sectors, such as food, to protect vulnerable populations from price hikes and ensure equitable access to necessary items (Benzarti and Carloni, 2019; Dorward, 2012).

Recent research has extensively examined the effects of a temporary reduction in the food VAT in various aspects, such as efficiency (Iorwerth et al., 2002) and food security (Zheng et al., 2021), however, primarily focusing on its impact on pass-through for VAT change worldwide, such as in 17 Eurozone countries (Benedek et al., 2020), Mexico (Gračner et al., 2022), and other low- and middle-income countries (Ethiopia, Ghana, Senegal, Sri Lanka, Uzbekistan, and Zambia) (Warwick et al., 2022). Benedek et al. (2020) found that the impact on consumer prices varied systematically across various types of VAT reform. Gračner et al. (2022) investigated changes in food prices following the implementation of an 8% ad valorem tax on high-calorie foods, finding that the prices of taxed foods increased by an average of 4.8%. Using a tax-benefit microsimulation model, Warwick et al. (2022) found that although preferential VAT rates reduced poverty, they were less effective at targeting poor households than cash transfers.

In Europe, most studies focus on assessing the price effects of VAT interventions, such as those by Crossley et al. (2009) for the United Kingdom, Jaworski and Olipra (2025) for Poland, as well as Scharnhop and Loy (2024) and Fuest et al. (2025) for Germany. Fedoseeva and Droogenbroeck (2024) studied price shifts across six online food retailers and found that online-only retailers implemented fewer price changes than multi-channel retailers. A few studies, however, address the incidence effects. For example, using a regression discontinuity design, Gaarder (2019) estimated the incidence and distributional effects of VAT in Norway, finding that reducing VAT on food reduces inequality in consumer welfare, partly because households adjust their spending in response to the price change. Benzarti and Carloni (2019) employed a difference-in-differences method to assess the incidence of a reduction in value-added taxes on French sit-down restaurants in 2009, examining the impact on workers, consumers, firm owners, and material suppliers.

Although there is literature on the macroeconomic effects of a broad consumption tax on demand (e.g., Feldman and Ruffle, 2015; Levine-Schayowitz, 2017; Nguyen et al., 2021; Shapiro and Slemrod, 2003), including a tax on new automobiles (Chan et al., 2014; He et al., 2023), public transportation (Barros and Prieto-Rodriguez, 2008), energy use (Berkhout et al., 2004), and the environment (West and Williams, 2017), literature is limited on essential foods, staple items with relatively low price elasticity of demand, except for Crossley et al. (2009) and Hong and Thu (2024), both of which showed that reducing the price of affected goods incentivized consumers to increase consumer spending in the United Kingdom and Vietnam.

To date, little research has been conducted on food VAT reduction in Spain, except for studies by Baquero-Pérez et al. (2023) and Amores et al. (2023). Baquero-Pérez et al. (2023) found a 5.2% price decrease, with low-income households benefiting the most from the VAT reduction. However, prices rose again in the months following the VAT reduction, indicating the limited long-term effects. Amores et al. (2023) found a 93% pass-through rate, suggesting that consumers largely absorbed the tax benefit. However, price pass-through (e.g., Fuest et al., 2025; Jaworski & Olipra, 2025; Scharnhop and Loy, 2024) does not reveal whether households changed their food purchasing behavior, nor whether responses differed across income groups. This is an important gap because the effectiveness and equity of VAT reductions depend not only on lower prices, but also on the extent to which different types of households adjust demand. Our study therefore contributes by moving beyond price effects and addressing a research gap by analyzing the impact of a temporary VAT exemption on essential food in Spain on consumer demand, including heterogeneous effects across socioeconomic status groups and food categories.

Consumer demand is a key indicator of food safety, as it reveals how a VAT exemption affects purchasing behavior (Hammour & McKeown, 2022). It helps assess whether lower prices

increase food affordability, as partly reflected in purchase quantities, and whether the food VAT exemption meets its goals of improving food affordability and security, particularly for vulnerable groups (Benzarti & Carloni, 2019; Dorward, 2012). Consumer demand is a more direct indicator of food affordability than prices alone, as it reflects how households respond to prices given their income constraints and consumption needs. While price changes capture only the cost side, tracking consumer demand allows policymakers to assess whether measures such as VAT exemptions translate into real improvements in households' ability to purchase food, thereby evaluating policy effectiveness beyond the price channel.

The remainder of the paper is structured as follows: the next section provides background on the VAT reduction in Spain, followed by a description of the data used in Section 3. Section 4 presents three fixed-effects models used to assess the impact of the VAT exemption. Section 5 discusses the findings. Finally, Section 6 concludes with a summary and policy implications.

2. Background

In Spain, VAT rates differ across product and service categories, with standard rates set at 21%, reduced rates at 10%, super-reduced rates at 4%, and a 0% rate applied to certain exempt items (Spain Tax Agency, 2025). VAT on food products ranges from the reduced rate of 10% to the super-reduced rate of 4%. The super-reduced VAT rate was introduced in 1993 at 3% and later increased to 4% in 1995, a rate that has remained unchanged since (Stripe, 2024). This super-reduced VAT rate aims to make essential goods and services, such as medicines and staple foods, more affordable for consumers and enable equal access to basic products.

Most food items, such as beef, pork, poultry, and fish, are taxed at a reduced rate of 10%. Meanwhile, staple foods such as milk, fruits, vegetables, and bread are taxed at a super-reduced

rate of 4%. Certain items, such as sugary drinks and alcoholic beverages, are subject to the standard VAT rate of 21% (Spain Tax Agency, 2025).

Starting on January 1, 2023, the Spanish government introduced a temporary VAT exemption for certain essential food products, reducing the VAT rate from 4% to 0% (Spain Tax Agency, 2023). The essential food products that qualify for the VAT exemption include bread, bread flour, eggs, cheese, milk, natural cereals, fruits, vegetables, tubers, and legumes. The VAT exemption is in response to the economic pressures stemming from the war in Ukraine and the ongoing recovery from the COVID-19 pandemic. It is also part of broader efforts to combat rising inflation and ease the cost of living for Spanish families, especially low-income families.

The VAT exemption for essential food products was initially in effect for half a year, starting on January 1, 2023, and was later extended until September 30, 2024 (Royal Decree-Law 4/2024, 2024), with the list expanded to include olive oil in July 2024. However, starting on October 1, 2024, these food products were subject to a 2% VAT, and the original 4% VAT taxation was reinstated on January 1, 2025, following a smooth transition (Spain Tax Agency, 2025).

3. Data

We construct an aggregated pseudo-panel from the *Kantar*© household scanner dataset, which covers household food purchases in Spain from January 2022 to December 2023. For each food category, the original household purchase records are collapsed at the daily level by autonomous community and socioeconomic status group¹. Specifically, we calculate the average daily price and average daily demand for each region-socioeconomic status group cell, generating a pseudo-

¹ *Kantar*© classifies households into four socioeconomic status groups, using a broader set of household characteristics: a) the occupations of all household members; b) general attributes of the living place, such as size, location, and ownership, among others; c) household equipment; d) the number and type of vehicles owned.

panel whose unit of observation is defined by food category, region, socioeconomic status group, and day. Each cell can be considered a representative household. This aggregation allows us to examine changes in demand before and after the VAT exemption while accounting for regional and socioeconomic status-group heterogeneity and reducing the sparsity that would arise from modeling individual household purchases of specific food categories at a daily frequency.

Due to data limitations, our analysis focuses on the two years surrounding the policy: one year before and one year after. *Kantar*© is a global market research firm that provides detailed shopping information from a randomly selected, representative sample of households in Spain. Each household was given a barcode scanner to identify and track products by scanning Universal Product Codes and reporting the scanned details on their shopping receipts, including the type of food, purchase quantities, weight (in kilograms or liters), dates, locations, and prices (in euros). The dataset also contains household sociodemographic information, including age, gender, household size, socioeconomic status level, and region.

Figure 1 illustrates the daily average price for each food category between 2022 and 2023. The average price trend for certain essential food categories, such as cheese and cereal, is rising, reflecting ongoing inflation. In contrast, categories like vegetables and bread show no clear observable increasing trend. There is a noticeable price increase around Christmas for certain food categories, such as cheese, bread, and fruit. The tuber and legume categories were aggregated due to limitations in the original data structure, which made it difficult to distinguish them. As a result, the combined category exhibits higher price volatility.

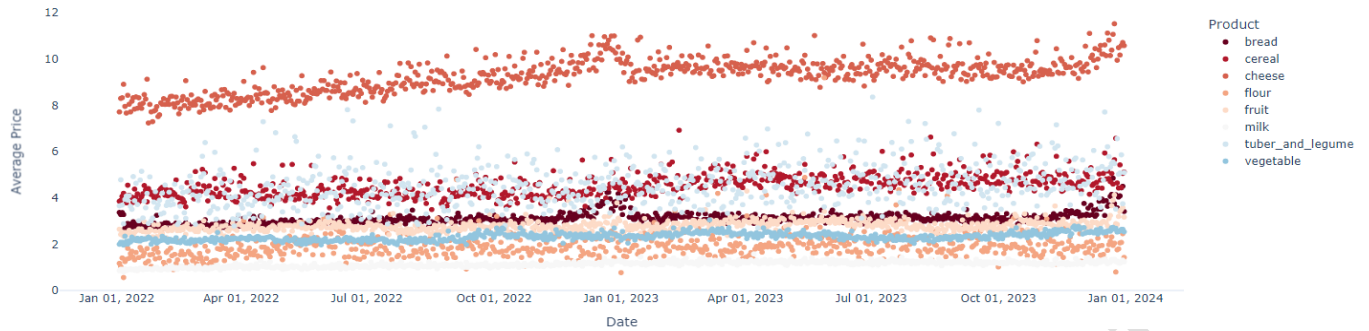


Figure 1: Price trends over time by product type (unit: euros)

Table 1 presents descriptive statistics on the daily average demand for each food category by socioeconomic status group, both before and after the 2023 VAT exemption was implemented. The mean, standard deviation, and number of observations are listed in Columns 3 – 8. On average, low- and lower-middle-socioeconomic-status families purchase more essential foods than high- and higher-middle-socioeconomic-status families in both years.

The last column in Table 1 presents the results of a two-sided *t*-test used to assess whether there is a statistically significant difference in average demand by socioeconomic status group between 2022 and 2023. Among all food categories with statistically significant differences, most show a decline in 2023 compared to 2022, likely due to rising prices and uncertainty due to high inflation, except for cereal in the middle-high socioeconomic status group and flour in the low-socioeconomic status group, which show increased average demand in 2023. However, the magnitude of the difference is marginal.

Table 1. Descriptive statistics of demand data (unit: kilogram or liter)

		Before intervention (2022)			After intervention (2023)			Mean difference
		Mean	Std	N	Mean	Std	N	
bread	high	0.546	0.24	5501	0.537	0.23	5456	**
	upper-middle	0.553	0.2	5712	0.554	0.21	5745	

	lower-middle	0.573	0.29	5678	0.558	0.23	5713	**
	low	0.6	0.29	5498	0.61	0.37	5446	
cereal	high	0.593	0.24	3154	0.599	0.26	3058	
	upper-middle	0.581	0.22	4068	0.591	0.22	3908	**
	lower-middle	0.6	0.25	3585	0.604	0.27	3550	
	low	0.603	0.29	3013	0.609	0.32	2997	
cheese	high	0.349	0.14	5095	0.347	0.14	5109	
	upper-middle	0.342	0.14	5486	0.342	0.11	5447	
	lower-middle	0.348	0.12	5365	0.348	0.12	5418	
	low	0.358	0.16	5157	0.352	0.15	5091	**
flour	high	1.158	0.95	2451	1.118	0.89	2447	
	upper-middle	1.15	0.74	3350	1.15	0.93	3309	
	lower-middle	1.172	0.83	2939	1.163	0.74	3018	
	low	1.241	0.83	2542	1.297	1.04	2535	**
fruit	high	1.239	0.65	5363	1.198	0.61	5458	***
	upper-middle	1.234	0.58	5683	1.218	0.61	5688	
	lower-middle	1.244	0.64	5631	1.224	0.56	5660	*
	low	1.274	0.67	5465	1.212	0.65	5477	***
milk	high	5.348	3.29	4780	5.198	3.36	4805	**
	upper-middle	5.223	2.76	5347	5.288	3.22	5370	
	lower-middle	5.428	3.54	5214	5.235	3.29	5231	***
	low	5.155	3.54	5037	4.778	3.68	4975	***

tuber and	high	0.647	0.83	899	0.628	0.44	864	
legume	upper-	0.63	0.49	1308	0.623	0.5	1310	
	middle							
	lower-	0.663	0.5	1048	0.683	0.53	997	
	middle							
	low	0.739	1.07	928	0.69	0.63	869	
vegetable	high	1.011	0.88	5022	1.007	0.95	5103	
	upper-	1.051	0.78	5548	1.058	0.96	5541	
	middle							
	lower-	1.096	1.24	5442	1.054	1.15	5469	*
	middle							
	low	1.09	1.03	5184	1.05	1.07	5159	*

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4. Model specification

Following Gračner et al. (2022), we use a fixed-effects model to assess the extent to which consumer demand changes following the VAT exemption, comparing log-transformed consumer demand for each food category in Spain before (2022) and after the policy intervention (2023). Our study includes two models illustrated in Equations 1 – 2.

$$\begin{aligned} \log(D_{int}) = & a_i + \rho_i \log(P_{int}) + \phi_i \log(PS1_{int}) + \theta_i \log(PS2_{int}) + \beta_i T + \sum_{j=1}^J \gamma_{ij} S_{ij} + \\ & \mu_{in} + v_{int} \end{aligned} \quad [1]$$

where $\log(D_{int})$ and $\log(P_{int})$ denote the logarithm of the consumer demand and price of food category i in region n in year t , respectively. We use VAT-exclusive real prices because including observed VAT-inclusive prices on the right-hand side could make the policy coefficient difficult to interpret, as the VAT exemption is expected to affect demand partly through changes in consumer prices. $PS1_{int}$ and $PS2_{int}$ are two weighted average price indices based on the VAT-exclusive real prices and average expenditure weight for other VAT-affected foods and non-VAT-affected foods

(beef, veal, lamb, pork, poultry, other fresh meat, processed meat, fish, other seafood, composite dishes, snacks, other foods, and the residual category), respectively. For 2023, we used the same expenditure weight as in 2022 (base-period expenditure weight) to avoid endogeneity arising from contemporaneous substitution responses to the policy. We include $PS1_{int}$ and $PS2_{int}$ to control for the cross-price effects between different staple food categories as well as between staple and non-staple food categories. T is a period dummy that equals one after January 1, 2023, when the VAT exemption is implemented, and zero otherwise. β_i is the main coefficient of interest, which describes the change in consumer demand in 2023 (after policy intervention), relative to the average percentage change in 2022 (before policy intervention). We hypothesize that consumer demand increases after 2023 due to policy support.

We control for seasonality S_{ij} for each food category i by including a vector of quarterly time dummies, where $j = 1, 2, 3$, and 4 indicate spring (reference), summer, autumn, and winter, respectively. μ_{in} denotes the regional fixed effects, capturing the time-invariant characteristics, namely factors that could otherwise affect demand changes, regardless of the VAT exemption. We cluster the standard errors at the regional level to address the serial correlation in consumer demand within regions. a_i is the constant and v_{int} is the residual.

$$\begin{aligned} \log(D_{int}) = & a_i + \rho_i \log(P_{int}) + \phi_i \log(PS1_{int}) + \theta_i \log(PS2_{int}) + \beta_i T + \sum_{m=1}^M \sigma_{im} Inc_{im} + \\ & \sum_{j=1}^J \gamma_{ij} S_{ij} + \mu_{in} + v_{int} \end{aligned} \quad [2]$$

Equation 1 evaluates whether consumer demand has significantly changed following the introduction of the VAT exemption in 2023. Equation 2 extends the analysis by incorporating socioeconomic status group dummies, where $m = 1, 2, 3$, and 4 denote the high, upper-middle, lower-middle, and low socioeconomic status groups, respectively, with the high socioeconomic

status group serving as the reference. Our primary focus in Equation 2 is on the coefficient σ_{im} , which indicates whether consumer demand differs across socioeconomic status groups relative to the high-socioeconomic status group. We hypothesize that low-socioeconomic-status families consume more essential foods than high-socioeconomic-status families, as they are more financially vulnerable and can afford fewer high-protein products (Emmons, 1986; Muleya et al., 2022; Orta-Aleman et al., 2024).

$$\begin{aligned} \log(D_{int}) = & a_i + \rho_i \log(P_{int}) + \phi_i \log(PS1_{int}) + \theta_i \log(PS2_{int}) + \beta_i T + \sum_{m=1}^M \sigma_{im} Inc_{im} + \\ & \sum_{m=1}^M \omega_{im} TInc_{im} + \sum_{j=1}^J \gamma_{ij} S_{ij} + \mu_{in} + v_{int} \end{aligned} \quad [3]$$

In Equation 3, we additionally include interaction terms $TInc_{im}$ between the period dummy T and the socioeconomic status dummies Inc_{im} . It is worth mentioning that β_i has a different interpretation in Equation 3 than in Equation 1 due to the inclusion of interaction terms. In Equation 3, β_i describes the change in consumer demand in 2023 (after policy intervention) relative to the average percentage change in 2022 (before policy intervention) for the reference group (high-socioeconomic status group). The coefficient of interest in Equation 3, ω_{im} , captures whether the change in demand differs significantly in other socioeconomic status groups compared with the reference group in response to the VAT exemption. We hypothesize that, following the 2023 policy intervention, low- and lower-middle-socioeconomic status families may increase their demand the most, as they are the target voluntary group for the VAT exemption, which aims to improve food affordability and equal access to basic products (Benzarti and Carloni, 2019; Dorward, 2012).

All regressions employ two-sided t -tests to assess the statistical significance of average demand changes following the policy intervention, with results reported at the 1%, 5%, and 10%

significance levels ($p < 0.01$, $p < 0.05$, and $p < 0.1$). We conduct the analysis using STATA MP 16 (StataCorp, 2019).

5. Results

Table 2 presents the results of two fixed-effects models based on a pseudo-panel dataset from 2022 to 2023. The pseudo-panel is disaggregated into four socioeconomic status groups and 15 regions across Spain. The daily price, other price indices, and demand are expressed in natural logarithms, indicating that the results should be interpreted as percentage changes. The observations vary from 8,223 (tuber and legume) to 44,749 (bread).

Model (1) evaluates whether consumer demand has significantly changed following the introduction of the VAT exemption in 2023. It shows similar patterns of results across the eight essential food categories, except fruit. Following the VAT exemption, there is a statistically significant increase in demand for bread (1.7%), cereal (3.6%), cheese (1.9%), flour (4.4%), milk (6.7%), and tubers and legumes (10.1%). However, the period dummy for vegetables is not statistically significant. A 1% own-price increase reduces consumer demand by 0.22% (cereal) to 0.63% (tuber and legume), consistent with economic theory that basic staples are inelastic (Ben-Chendo et al., 2018; Dorward, 2012), as people would still buy essentials even when prices rise.

We use two price indices to control cross-price effects between different staple food categories as well as between staple and non-staple food categories. Most of them are negative and statistically significant. We control for the seasonal and regional fixed effects. Most seasonal dummies are statistically significant, indicating that consumer demand has seasonal patterns, especially for cheese, milk, and flour. The Wald test results on region-specific effects justify our choice of the fixed-effects model. The null hypothesis, which states that these effects are homogeneous (i.e., there are no constant regional differences), is rejected across all essential food

categories. The autocorrelation test results are not significant, indicating that there is no first-order autocorrelation and, therefore, food purchase habits are not present in the model.

Socioeconomic status group dummies are included in Model (2) to assess whether demand for essential foods varies across socioeconomic status levels, capturing potential heterogeneity in consumer behavior in general. Compared with high-socioeconomic status families, low-socioeconomic status families buy more bread (8.7%) but buy less milk (12.2%); lower-middle-socioeconomic status families buy more bread (5.3%) and vegetables (5.6%); upper-middle-socioeconomic status families buy more bread (5.7%), fruit (4.2%), and vegetables (8.1%). In short, lower-socioeconomic status families generally purchase more basic staples (except for milk), prioritizing calories and necessities.

Model (3), which includes interaction terms between the period dummy and socioeconomic status dummies, is used to assess whether the change in demand differs significantly across socioeconomic status groups in response to the VAT exemption. Compared with high-socioeconomic-status families (reference), only higher-middle-socioeconomic-status families purchase more flour (3.6%) and milk (4.5%) after the VAT exemption, while low-socioeconomic-status families purchase fewer vegetables (3.7%). All parameters for the other socioeconomic status groups across the remaining essential food categories are not statistically significant. Therefore, this study finds no significant variation in the change in demand across socioeconomic status groups in response to the VAT exemption for most essential food items.

307 Table 2. Factors explaining the natural logarithm of demand (dependent variable), 2022-2023.

	bread			cereal			cheese			flour		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Own price	-0.386*** (0.015)	-0.386*** (0.015)	-0.386*** (0.016)	-0.220*** (0.014)	-0.221*** (0.014)	-0.221*** (0.014)	-0.348*** (0.023)	-0.348*** (0.023)	-0.348*** (0.023)	-0.455*** (0.017)	-0.455*** (0.017)	-0.455*** (0.017)
Price index 1 (other VAT- affected foods)	-0.006 (0.007)	-0.006 (0.007)	-0.006 (0.007)	-0.039*** (0.008)	-0.039*** (0.008)	-0.040*** (0.008)	-0.015** (0.007)	-0.015** (0.007)	-0.015** (0.007)	-0.043*** (0.010)	-0.042*** (0.010)	-0.042*** (0.010)
Price index 2 (non-VAT- affected foods)	0.014 (0.009)	0.014 (0.009)	0.014 (0.009)	-0.050*** (0.008)	-0.050*** (0.008)	-0.050*** (0.008)	-0.020*** (0.006)	-0.020*** (0.007)	-0.020*** (0.007)	-0.053*** (0.010)	-0.052*** (0.010)	-0.053*** (0.010)
Policy effect	0.017** (0.007)	0.017** (0.007)	0.014 (0.024)	0.036*** (0.005)	0.036*** (0.005)	0.038*** (0.012)	0.019*** (0.005)	0.019*** (0.005)	0.015 (0.010)	0.044*** (0.008)	0.044*** (0.008)	0.016 (0.016)
Upper-middle- income group		0.057*** (0.021)	0.053* (0.029)		-0.007 (0.018)	-0.007 (0.019)		-0.001 (0.013)	-0.007 (0.013)		0.026 (0.024)	0.008 (0.025)
Lower-middle- income group		0.053* (0.028)	0.053 (0.037)		-0.009 (0.017)	-0.006 (0.016)		0.002 (0.012)	-0.001 (0.015)		0.017 (0.023)	0.002 (0.024)
Low-income group		0.087** (0.036)	0.086* (0.047)		-0.014 (0.023)	-0.014 (0.023)		-0.004 (0.017)	-0.002 (0.018)		0.053 (0.033)	0.032 (0.031)
Interaction term (policy × middle-high socioeconomic status group)			0.008 (0.029)			-0.001 (0.014)			0.013 (0.009)			0.036* (0.022)
Interaction term (policy × middle-low- socioeconomic status group)			0.001 (0.028)			-0.006 (0.017)			0.006 (0.014)			0.029 (0.019)
Interaction term (policy × low- socioeconomic status group)			0.002 (0.030)			-0.001 (0.013)			-0.005 (0.015)			0.040 (0.027)

Summer	-0.019*** (0.007)	-0.019*** (0.007)	-0.019*** (0.007)	-0.004 (0.005)	-0.004 (0.005)	-0.004 (0.005)	-0.004 (0.006)	-0.004 (0.006)	-0.004 (0.006)	-0.025*** (0.009)	-0.025*** (0.009)	-0.025*** (0.009)
Autumn	-0.010** (0.005)	-0.010** (0.005)	-0.010** (0.005)	-0.007 (0.006)	-0.007 (0.006)	-0.007 (0.006)	0.012** (0.006)	0.012** (0.006)	0.012** (0.006)	-0.024*** (0.008)	-0.024*** (0.008)	-0.024*** (0.008)
Winter	-0.006 (0.005)	-0.006 (0.005)	-0.006 (0.005)	-0.001 (0.005)	-0.001 (0.005)	-0.001 (0.005)	0.014*** (0.004)	0.014*** (0.004)	0.014*** (0.004)	-0.023** (0.010)	-0.023** (0.010)	-0.023** (0.010)
Constant	-0.134*** (0.020)	-0.183*** (0.025)	-0.182*** (0.029)	-0.229*** (0.025)	-0.221*** (0.031)	-0.221*** (0.030)	-0.314*** (0.046)	-0.314*** (0.048)	-0.312*** (0.047)	0.280*** (0.013)	0.255*** (0.022)	0.269*** (0.020)
Regional fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald test joint significance	4604***	4617***	4625***	2121***	2120***	2124***	3404***	3399***	3397***	12706***	12717***	12723
Autocorrelation test statistics	0.051	0.051	0.054	0.143	0.143	0.142	0.064	0.064	0.105	2.054	2.054	2.049
Autocorrelation p-value	0.823	0.823	0.817	0.707	0.707	0.707	0.802	0.802	0.747	0.157	0.157	0.158
Adjusted R2	0.46	0.57	0.57	0.30	0.30	0.29	0.71	0.72	0.72	0.68	0.70	0.69
N	44,749	44,749	44,749	27,333	27,333	27,333	42,168	42,168	42,168	22,591	22,591	22,591

Note 1: Robust standard errors clustered by region are reported in parentheses.

Note 2: Prices are in natural logarithms.

Note3: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 2 (continued). Factors explaining the natural logarithm of demand (dependent variable), 2022-2023.

	fruit			milk			tuber and legume			vegetable		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Own price	-0.470*** (0.031)	-0.471*** (0.031)	-0.470*** (0.031)	-0.594*** (0.044)	-0.595*** (0.044)	-0.594*** (0.044)	-0.630*** (0.039)	-0.629*** (0.039)	-0.629*** (0.039)	-0.566*** (0.031)	-0.566*** (0.031)	-0.566*** (0.031)
Price index 1 (other VAT-affected foods)	-0.006 (0.007)	-0.006 (0.007)	-0.006 (0.007)	-0.086*** (0.008)	-0.086*** (0.008)	-0.086*** (0.008)	-0.200*** (0.039)	-0.199*** (0.039)	-0.199*** (0.039)	-0.058*** (0.010)	-0.058*** (0.010)	-0.058*** (0.010)
Price index 2 (non-VAT-affected foods)	-0.006 (0.011)	-0.006 (0.010)	-0.007 (0.010)	-0.066*** (0.013)	-0.066*** (0.013)	-0.067*** (0.013)	-0.168*** (0.055)	-0.166*** (0.055)	-0.166*** (0.055)	-0.028* (0.015)	-0.028* (0.015)	-0.028* (0.015)

Policy effect	-0.015*** (0.004)	-0.015*** (0.004)	-0.020 (0.012)	0.067*** (0.012)	0.067*** (0.012)	0.060*** (0.017)	0.101*** (0.016)	0.100*** (0.016)	0.108*** (0.028)	0.007 (0.006)	0.007 (0.006)	0.019 (0.014)
Upper-middle-income group		0.042** (0.020)	0.035 (0.022)		0.039 (0.029)	0.017 (0.029)		0.002 (0.030)	0.002 (0.029)		0.081*** (0.022)	0.083*** (0.023)
Lower-middle-income group		0.027 (0.020)	0.020 (0.023)		0.008 (0.034)	0.002 (0.034)		0.029 (0.036)	0.032 (0.039)		0.056** (0.026)	0.060** (0.026)
Low-income group		-0.005 (0.029)	0.000 (0.031)		-0.122*** (0.045)	-0.106** (0.046)		0.029 (0.043)	0.038 (0.053)		0.007 (0.030)	0.026 (0.033)
Interaction term (policy × middle-high socioeconomic status group)			0.014 (0.015)			0.045** (0.018)			-0.002 (0.025)			-0.004 (0.015)
Interaction term (policy × middle-low socioeconomic status group)			0.014 (0.015)			0.012 (0.023)			-0.010 (0.029)			-0.008 (0.021)
Interaction term (policy × low-socioeconomic status group)			-0.011 (0.014)			-0.032 (0.025)			-0.023 (0.045)			-0.037** (0.018)
Summer	0.067*** (0.010)	0.067*** (0.010)	0.067*** (0.010)	-0.020*** (0.006)	-0.020*** (0.006)	-0.020*** (0.006)	-0.004 (0.018)	-0.004 (0.018)	-0.005 (0.018)	0.035** (0.017)	0.035** (0.017)	0.035** (0.017)
Autumn	-0.009 (0.006)	-0.009 (0.006)	-0.009 (0.006)	0.015* (0.008)	0.015* (0.008)	0.015* (0.008)	0.086*** (0.027)	0.086*** (0.027)	0.086*** (0.027)	0.062*** (0.015)	0.062*** (0.015)	0.062*** (0.015)
Winter	0.010* (0.005)	0.010* (0.005)	0.010* (0.005)	0.020** (0.008)	0.020** (0.008)	0.020** (0.008)	-0.005 (0.017)	-0.005 (0.017)	-0.005 (0.017)	0.003 (0.007)	0.003 (0.007)	0.002 (0.007)
Constant	0.643*** (0.026)	0.628*** (0.028)	0.629*** (0.030)	1.598*** (0.018)	1.618*** (0.026)	1.622*** (0.029)	0.377*** (0.096)	0.359*** (0.100)	0.356*** (0.099)	0.463*** (0.026)	0.427*** (0.037)	0.422*** (0.036)

Regional fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald test joint significance	9401***	9409***	9477***	4542***	4612***	4641***	2931***	2928***	2937***	4968***	5004***	5104***
Autocorrelation test statistics	0.013	0.013	0.006	0.578	0.578	0.577	0.085	0.085	0.085	0.001	0.001	0.001
Autocorrelation p-value	0.911	0.911	0.941	0.450	0.450	0.450	0.772	0.772	0.772	0.975	0.975	0.9801
Adjusted R ²	0.52	0.58	0.58	0.64	0.76	0.76	0.59	0.60	0.60	0.74	0.81	0.80
N	44,425	44,425	44,425	40,759	40,759	40,759	8,223	8,223	8,223	42,468	42,468	42,468

Note 1: Robust standard errors clustered by region are reported in parentheses.

Note 2: Prices are in natural logarithms.

Note3: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

6. Discussion

The results suggest that the VAT exemption was associated with higher average demand across most essential food categories, although the magnitude and statistical significance of the response varied by product. This heterogeneity is consistent with previous evidence indicating that food demand varies across product groups and that many staple foods are price-inelastic (e.g., Andreyeva et al., 2010; Cornelsen et al., 2015; Frontuto et al., 2025; Green et al., 2013; Jin & Gil, 2025; Gehrke & Jin, 2026). In our estimates, own-price elasticities are below one in absolute value, indicating that demand falls when prices rise, but by less than the proportional price increase. This is expected for essential foods, since households have limited scope to reduce consumption of basic staples even during periods of high inflation.

Differences in inflationary pressure across food categories may help explain why the VAT exemption did not translate into higher demand for all products. Fruit and vegetables are the only two exceptions: fruit demand declined significantly by 1.5%, while the increase in vegetable demand was not statistically significant. In 2023, prices rose by 9.7% for fruit and 10.8% for vegetables relative to 2022, more than offsetting the 4% VAT reduction and resulting in higher final consumer prices despite the tax exemption (INE, 2026). By contrast, inflation was lower for categories such as bread, flour, and cereals, at 3.5%, and milk and cheese, at 1.0%. The VAT exemption was therefore more likely to generate a positive demand response in these lower-inflation categories, while its effect was diluted for fruit and vegetables by stronger underlying price increases.

The socioeconomic status-group results indicate that food consumption patterns differ across socioeconomic groups. Low-socioeconomic status and lower-middle-socioeconomic status households tend to purchase more basic staples, which is consistent with Bennett's Law, according to which the share of calories derived from starchy staples declines as income rises (Bennett, 1941).

More generally, previous evidence suggests that food-price changes can have stronger consequences for poorer households because food accounts for a larger share of their budget and because their capacity to purchase more or substitute is more limited (Darmon & Drewnowski, 2015; Green et al., 2013). Although lower socioeconomic-status households generally purchase more basic staples, we find no statistically significant differences in demand changes across socioeconomic status groups for most essential foods after the VAT exemption, except for flour, milk, and vegetables. The targeted staple foods with low price elasticity of demand might be one reason (Cornelsen et al., 2015; Dehghan et al., 2024; Gehrke & Jin, 2026). Inflation may have offset part of the VAT reduction, which could limit demand responses among lower-socioeconomic status groups. Additionally, in a developed country like Spain, low-socioeconomic-status families may already consume levels of essential foods close to the minimum necessary, whereas high-socioeconomic-status families do not significantly increase their consumption, as the intake of staples such as bread or cereal is naturally limited by the saturation effect. This can be another reason limiting variation in demand across socioeconomic status groups.

7. Conclusions and policy implications

The global economy is facing uncertainty and high inflation, driven by the aftermath of the COVID-19 pandemic and the war in Ukraine, which have disrupted supply chains, raised prices, and triggered global policy responses (Jaworski, 2021; Volpe et al., 2024). Under this background, our study aims to address a gap in existing research by examining the impact of a temporary food VAT exemption in Spain on consumer demand. Based on a pseudo-panel dataset derived from the household scanner dataset *Kantar*[®], we use the fixed-effects model to assess the demand change after the policy intervention in 2023 and find that there is a statistically significant increase in demand for bread (1.7%), cereal (3.6%), cheese (1.9%), flour (4.4%), milk (6.7%), and tuber and

legume (10.1%). However, the period dummy for vegetables is not statistically significant. We find that low- and lower-middle-socioeconomic status families tend to consume more essential foods overall; however, there is no significant variation in the change in demand across socioeconomic status groups in response to the VAT exemption for most essential food items, except for flour, milk, and vegetables.

Our findings have several policy implications. First, the observed increase in demand for essential food products following the VAT exemption indicates that indirect tax relief can be an effective short-term policy tool to support household consumption during periods of high inflation. By reducing the final price of staple foods, VAT exemptions can help mitigate the erosion of household purchasing power and preserve access to basic food items as food prices rise rapidly. This is particularly important during cost-of-living crises, when households may respond to higher prices by reducing food quantities and changing the composition of their food baskets. In this sense, temporary VAT reductions on essential foods can serve as a rapid and relatively simple policy instrument to maintain consumer access to essential foods during economic downturns. However, their effectiveness depends on the extent to which the tax reduction is passed through to consumer prices (e.g., Fuest et al., 2025; Jaworski & Olipra, 2025; Scharnhop & Loy, 2024) and whether the resulting price decrease is large enough to offset broader inflationary pressures.

Second, the VAT exemption can stimulate demand among low- and lower-middle-socioeconomic status households, but its effects are uneven across food categories. This implies that indirect tax relief can be a useful short-term instrument for protecting household access to essential foods during periods of high inflation, particularly when applied to products for which lower-socioeconomic status consumers are responsive to price changes. However, policymakers should consider designing more targeted VAT reductions, prioritizing staple foods where tax relief

is more likely to translate into higher consumption among vulnerable households. At the same time, VAT exemptions should be complemented by other measures, such as direct income support, food vouchers, or targeted nutrition policies, especially for products for which lower-socioeconomic status households do not respond despite the tax reduction. This would improve the distributional effectiveness of food-price policies.

Third, the study emphasizes the importance of evaluating fiscal policy interventions not only through the price effects demonstrated by previous research (e.g., Benedek et al., 2020; Fuest et al., 2025; Gračner et al., 2022; Jaworski & Olipra, 2025) but also through changes in consumer behavior. Incorporating demand-side analysis therefore provides a more complete assessment of the real-world effectiveness of VAT exemptions. This is particularly important for food policies, where the ultimate policy objective is not only to reduce prices but also to protect food access during periods of economic stress. We provide insights to help policymakers better identify which households benefit in practice and where complementary measures may be needed. Future evaluations of temporary VAT reductions should therefore combine price pass-through analysis with evidence on consumption responses, distributional effects, and product-level heterogeneity to inform more targeted and effective fiscal interventions.

While our study provides valuable insights into the impact of a temporary VAT exemption on consumer demand for essential food products in Spain, it is not without limitations. The analysis relies on aggregate demand data, which may mask underlying heterogeneity in consumption behavior across different demographic subgroups. Moreover, due to data limitations, the study's short-term duration limits our ability to assess whether the observed changes in demand are sustained over time or influenced by other concurrent economic factors. The results should be interpreted as a correlation rather than a causal relationship, as we lack an experimental design

with a control group. We encourage future studies to explore further. Future research should test the robustness of our findings using alternative identification strategies that allow stronger causal inference. More granular household-level data would also help capture heterogeneous responses by socioeconomic status, household composition, region, age, employment status, promotion, and baseline consumption patterns, thereby identifying which groups benefit most from VAT exemptions. In addition, longer observation periods are needed to assess whether demand responses persist beyond the short term. Comparative studies across countries and policy settings would further clarify whether the Spanish experience is context-specific or generalizable, and whether VAT exemptions should be combined with targeted measures such as income support or food vouchers.

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