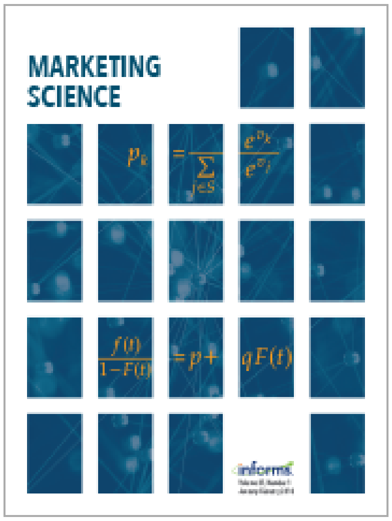

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Shrinkflation and Consumer Demand

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Abstract. This study investigates shrinkflation—the practice of reducing product size while maintaining or slightly changing prices—in the U.S. retail grocery market. We analyze a decade of retail scanner data to assess the prevalence and patterns of product size changes across various product categories. Our findings show that approximately 1.92% of products have been downsized. When comparing total sales, product downsizing is more than five times as prevalent as upsizing. Product downsizing typically occurs without a corresponding decrease in price and is widespread across product categories. Consequently, consumers end up paying more per unit volume. We further find that consumers are more responsive to price adjustments than to changes in product size. This finding suggests that reducing product sizes is an effective strategy for retailers and manufacturers to increase margins or respond to cost pressures, offering valuable implications for retailers and policymakers.

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1. Introduction

Global news increasingly highlights a tendency among firms to subtly raise prices per volume by reducing product sizes (Barrett and Rachwani 2023, Benveniste 2023, Lempert 2023). This phenomenon, widely known as "shrinkflation," has attracted attention from consumer protection agencies and policymakers worldwide (European Parliament 2022, Toeniskoetter 2022, Konish 2024). For example, France enacted a law in 2024 requiring retailers to warn consumers about shrinkflation practices (Reuters 2024). In the United States, Democratic senators proposed the "Shrinkflation Prevention Act" (Casey et al. 2024), and President Biden (2024) addressed the issue in his March 2024 State of the Union speech.

For retailers and manufacturers, shrinkflation offers an additional way to increase profit, potentially contributing to the broader trend of rising retail margins (Döpper et al. 2025). For consumers who are inattentive to product sizes, this practice can impose significant costs. In this respect, shrinkflation resembles other pricing strategies that exploit consumer underreactions by obfuscating price increases, such as complex add-on pricing (e.g., Ellison 2005, Gabaix and Laibson 2006) or hidden shipping and handling fees (e.g., Hossain and Morgan 2006, Brown et al. 2010). These costs make shrinkflation a legitimate concern for consumer protection and highlight the policy importance of understanding shrinkflation dynamics.[1] However, the prevalence of shrinkflation and how consumers respond to it remain underexplored.

This article examines the trends, characteristics, and implications of shrinkflation in the U.S. retail grocery market over the past decade, using the full sample of products from the NielsenIQ store-level scanner data. We document the prevalence of product size decreases relative to increases across product groups and analyze the associated price changes. To understand consumer reactions, we estimate how demand responds to size changes relative to price changes.

Our analysis first documents a general trend of decreasing product sizes between 2010 and 2020, with an average decline of about 8% and substantial variation across categories. This overall trend may, however, reflect not only shrinkflation alone but also broader shifts in demand and supply. To isolate shrinkflation, we focus on cases where a product is permanently replaced by an equivalent product of a different size.[2]

We find that size reductions of equivalent products occur at least five times more often than increases. Specifically, 1.89% of total sales relate to products that underwent a size decrease during our observation period, compared with only 0.35% for size increases. Downsizing is not confined to recent years; it is evident throughout the 2010–2020 period. Furthermore, size decreases appear across numerous product categories, with especially high rates in detergents, sanitary protection, and cereals—products typically used multiple times. The high prevalence in these categories suggests that firms do not downsize products solely to meet consumer preferences for smaller sizes.

Consistent with the notion of shrinkflation, our analysis shows that size decreases usually occur with little or no accompanying price changes, whereas size increases are typically connected with price hikes. Consumers end up paying more for the same volume after a product size reduction in nearly all product categories. On average, the price per volume is around 12% higher in the 12 months following a size reduction than in the preceding 12 months. In contrast, size increases lower the price per volume by about 2% on average.

The average sales of downsized products one year after a size reduction are around 6% higher than in the year before. This increase suggests that consumers rarely substitute away from downsized products, potentially because they are inattentive to changes in product size. We observe a sales increase in most product groups, suggesting that shrinkflation is an effective strategy for increasing revenue across a wide range of products.

Finally, we estimate demand elasticities for price and size changes using a constant-elasticity demand model with store-product and week fixed effects. Consumers are considerably more sensitive to the price of a product than to the product's size: a 1% price increase reduces sales by about 1.19%, whereas a 1% size decrease reduces sales by just 0.56%. Although these elasticity estimates should be interpreted cautiously because of potential aggregation bias, the consistent and substantial disparity between price and size elasticities across various alternative demand models and specifications provides clear insights into consumer reactions to shrinkflation.[3] On the supply side, findings suggest that reducing package size can be more effective in increasing profit margins than raising prices. On the demand side, consumers seem to underreact to size changes, assuming preferences for smaller packages do not drive lower size elasticities. This underreaction reinforces the case for regulating excessive shrinkflation to protect consumers.

To explore why responses to size and price changes diverge, we examine differences between downsized and upsized products. We find no significant difference in average price elasticity estimates between downsized and upsized products. However, the average size elasticity for downsized products is close to zero, whereas size elasticities for upsized products are substantially higher. These findings align with the idea that firms hide downsizing while making size increases more salient, which echoes prior studies showing that consumers tend to underreact to nonsalient attributes of goods (Chetty et al. 2009, DellaVigna 2009) and that firms exploit this tendency (Hossain and Morgan 2006, Ellison and Ellison 2009, Brown et al. 2010).

Our study contributes to the growing literature on shrinkflation and consumer responses to size changes. Early research examined shrinkflation in markets such as ice cream (Çakır and Balagtas 2014, Çakır 2022) and peanut butter and shelf-stable tuna (Çakır et al. 2013), as well as cereals (Yonezawa and Richards 2016).[4] More recent studies estimate consumer preferences and inattention to downsizing in the U.S. pepper and South Korean milk market (Meeker 2021, Kim 2024) and document how product downsizing affects various inflation measures (Ochirova 2017, McNair 2023, Rojas et al. 2024). In a recent working paper, Lee (2024) further documents shrinkflation trends in the U.S. grocery market and shows that mandatory unit price disclosure has only minimal effects on consumer responses. We extend this literature by documenting the prevalence, characteristics, and consumer responses associated with product size increases and decreases across a broad and comprehensive sample of products.

Several experimental studies also explore consumer reactions to size changes. Ordabayeva and Chandon (2013) find consumers often underestimate size increases, whereas Chandon and Ordabayeva (2017) suggest the opposite. Yao et al. (2020) show similar responses to upsizing and downsizing when prices are accessible, and Evangelidis (2024) examines when shrinkflation is perceived as unfair. Unlike these experimental approaches, we use retail scanner data and reveal substantial differences in consumer responses to product size decreases versus increases.

More broadly, we document a widespread pattern in the U.S. grocery retail market with significant implications for policymakers (Chalioti and Serfes 2024). In doing so, we contribute to studies that have used rich scanner data to examine similar patterns in the retail context, such as uniform pricing across locations (DellaVigna and Gentzkow 2019), heterogeneous advertising effects (Shapiro et al. 2021), price dispersion and promotions (Hitsch et al. 2021), pink taxes (Moshary et al. 2023), and left-digit pricing biases (Strulov-Shlain 2023).

2. Data

Our analysis uses the complete NielsenIQ Retail Scanner data from 2010 to 2020, provided by the Kilts Center at the University of Chicago. This data set records weekly sales, prices, and product characteristics for approximately four million products sold across up to 50,000 retail establishments, including grocery stores, drugstores, mass merchandisers, and other retail outlets. We exclude observations before 2010, as product size changes are not recorded.

We also exclude products sold in nonstandardized unit sizes, such as deli products, fresh vegetables, and fruits, because size changes for these products cannot be clearly identified. In addition, we restrict the data set to leading brands within each of the 1,100 product modules. We define "leading brands" as the smallest group of brands within a module whose combined sales represent at least 80% of the module's revenue during the observation period. As the scanner data record only products with nonzero weekly sales, this restriction ensures the data set covers the majority of sales while providing a consistent and accurate representation of weekly retailer assortments, which is essential for our analysis. This restriction also prevents niche products from influencing our results. Online Appendix A provides detailed summary statistics and evaluates the impact of these restrictions.

2.1. Trends in Average Product Sizes

To explore how product sizes have changed over the last decade in the U.S. retail grocery market, Figure 1(a) shows the average annual product size relative to 2010. We calculate the annual average product size across all products in our sample, using relative sales as weights. We then divide this weighted annual average by the 2010 average size to create a relative index. The results show an 8% decrease in the average product size between 2010 and 2020. This trend does not appear to be driven by changes in reported size units, as shown by the second line representing size change of products measured in units that can be translated to ounces.

Figure 1(b) breaks down the average size changes between 2010 and 2020 across product groups. Although most categories show a decrease in average product size, large heterogeneity exists. Among larger product groups, paper products, snacks, and nonalcoholic drinks exhibit the largest declines. Conversely, slight increases in average sizes occur for candy, beer, and cheese.

Although these trends provide insights into general patterns of product sizing, the decline in average size cannot be attributed solely to shrinkflation. Shifts in consumer preferences, shopping trends, and product assortment choices toward different products with inherently smaller sizes could also drive this change.

2.2. Identification of Upsized and Downsized Products

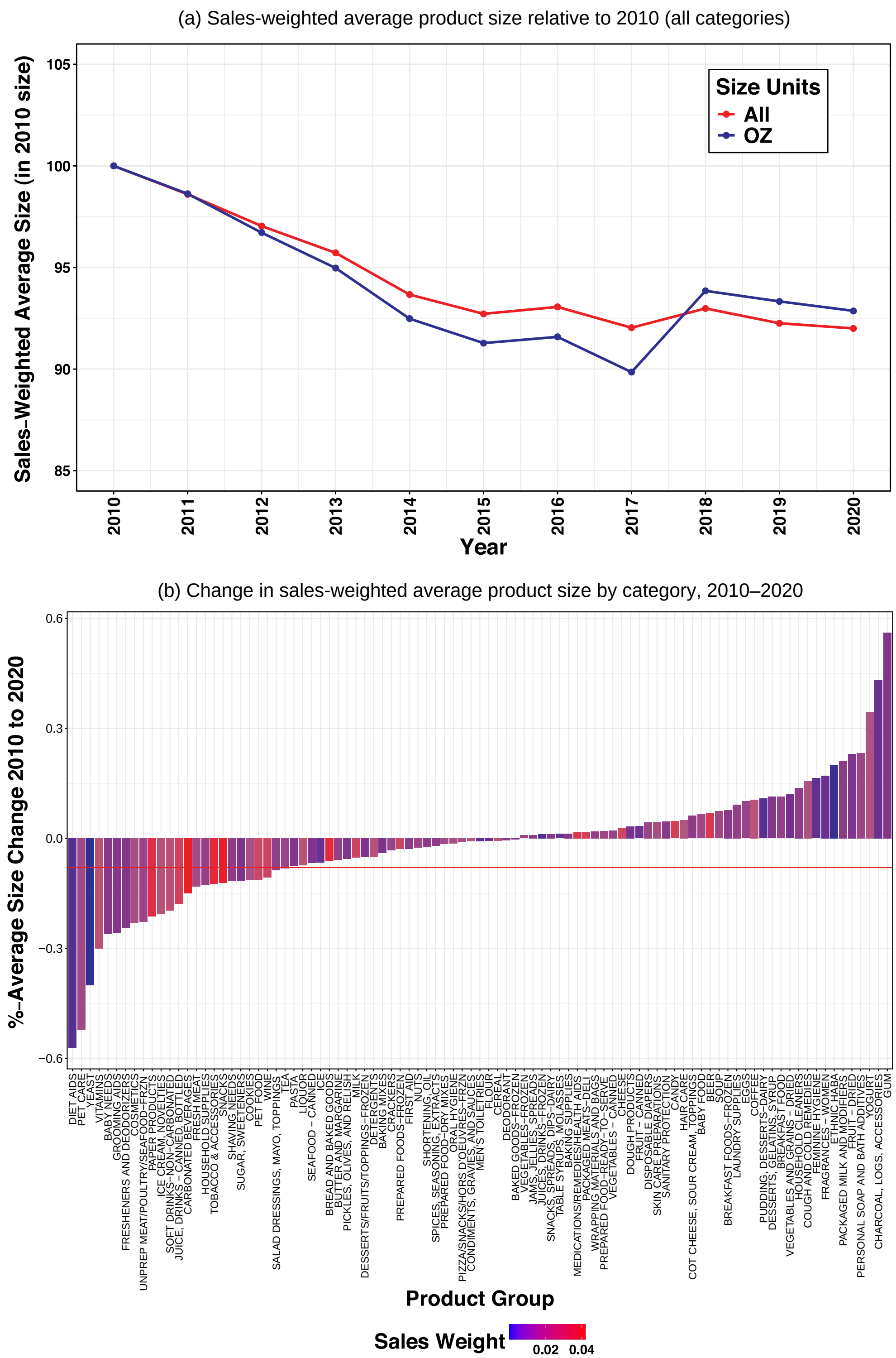
To accurately measure and analyze shrinkflation, we systematically identify each instance in a store when a product is permanently substituted by an equivalent product of a different size. The permanent substitution condition is conservative, as shrinkflation may also occur through temporary substitution. However, this approach avoids inflating our results, especially given the prevalence of product assortment expansions in the past decade (Neiman and Vavra 2023).

Because product characteristics by Universal Product Code (UPC) are updated only once a year, the scanner data cannot capture within-year size changes if a product retains its UPC. To address this, we classify products as equivalent if they share the same brand, brand description, and UPC description at the store level. Under this definition, an equivalent product is classified as downsized or upsized if it differs in both its UPC and reported size. Although products can change size without changing their UPC, industry guidelines typically require a new UPC when the net content changes (GS1 US 2023). Empirically, we show that such cases are rare compared with instances where both size and UPC change. Thus, although using UPC changes as indicators of size changes may be conservative, it does not meaningfully affect our results. Online Appendix B provides detailed justification and supporting evidence.

Next, we ensure that the old product is permanently removed and replaced by a differently sized product in the same store. We account for store-level heterogeneity, as some stores may have an overlap period to sell off old stock, whereas others may show a temporary gap between removing the old product and introducing the new one. To accommodate these variations, we permit a maximum of either an eight-week overlap or an eight-week gap between the discontinuation of the old product and the introduction of the new one. If the overlap or gap exceeds eight weeks, we do not classify it as the same product. We also require that size changes fall within a specific range, allowing for an increase or decrease of at most 25% from the original size to ensure consistency in product type. Further details on our procedure, including NielsenIQ's data specifics, are available in Online Appendix A.

Our method could mistakenly classify a product as equivalent when size changes coincide with rebranding or package redesigns that do not alter the brand or UPC description. To reduce such errors and validate our methodology, we use a UPC lookup database (https://www.upcitemdb.com/) to visually verify packaging and product details before and after size changes. Despite limitations in tracking older, discontinued products, we could validate more than 800,000 of 1,300,000 cases of size reduction as identical products in inspected groups, indicating our analysis's reliability. Moreover,

Figure 1. (Color online) Trends in Sales-Weighted Average Product Sizes, 2010–2020



Notes. This figure illustrates trends in product size changes in the U.S. retail grocery market between 2010 and 2020. Panel (a) depicts the relative annual average product size compared with 2010, calculated using sales-weighted averages. Panel (b) shows the average size change across different product groups between 2010 and 2020. For the first line in panel (a), all unit size measures are included, whereas the second line represents products measured in a unit that can be converted to ounces. Panel (b) aggregates product size changes from individual modules to product groups, with the color intensity of each bar indicating the sales share of the product group in the data set. HABA, health and beauty aids.

price adjustments and size-reduction patterns of these verified products closely match those in the overall data. Section C.1 of Online Appendix C details this visual inspection. Additionally, we use NielsenIQ's household scanner data to show that households consistently purchase the same products before and after a change in package size, which suggests that downsized products remain identical from the consumers' perspective, except for size (see Online Appendix C.2).

3. Insights into Product Size Changes

3.1. Prevalence

Table 1 displays summary statistics for all products that underwent size changes, considering all sales before and after changes in stores in which the originally sized products were substituted with newly sized products. Column 1 includes summary statistics for all products in the sample, offering a baseline for comparison. The descriptive statistics show that size reductions are a frequent occurrence. Of the 377,368 products, defined as unique combinations of brand, brand description, and UPC description, 1.92% were downsized during the observation period, whereas only 1.11% underwent a size increase. A product is classified as downsized or upsized if its size decreased or increased, respectively, in at least one observed store. This means that a single product may appear as both downsized and upsized if different package sizes coexist. Consequently, focusing solely on unique product counts can be misleading when measuring how common size changes are. Instead, examining relative sales and unique product-store combinations (i.e., "occasions") offers a more comprehensive view.

Downsized products account for a considerable proportion of transactions. Considering all sales before and after product size changes in stores in which the size changes occurred, total sales for downsized products amounted to approximately $38.57 billion, representing 1.89% of total sales. Products with size increases generated $7.10 billion in sales, equating to 0.35% of total sales. Similarly, the share of unique product-store pairs affected by downsizing is 0.61%, versus 0.13% for upsizing. These findings indicate that size decreases are substantially more common than increases.

In Figure 2, we present an overview of product size variations across different product groups. Figure 2(a) shows how frequently size changes occur at the product-store level. Figure 2, (b) and (c), shows the shares of products undergoing size changes and the shares of sales affected by size changes, respectively.[5]

Across nearly all product groups, size reductions are more common than increases. Cereals, detergents, and snacks are large product groups with a high prevalence of downsized products. In contrast, downsizing is rare in categories like milk and wine. Many categories with frequent downsizing, such as cereals, sanitary protection, and detergents, involve multiple uses where size changes typically do not affect consumption patterns. Consequently, downsizing seems unlikely to result solely from firms responding to consumer preferences for smaller product sizes.

Figure 3 provides a timeline of product size changes from 2010 to 2020. Figure 3(a) shows the average number of weekly size change occasions per year. Figure 3(b) depicts the percentage of total sales affected by size changes within a given year.[6] Size reductions consistently outnumber increases throughout 2010–2020, which indicates that downsizing is not a recent phenomenon but has been occurring since the early 2010s.

3.2. Influence of Size Changes on Prices and Sales

In this subsection, we analyze how product size changes influence prices and sales. Figure 4 illustrates the relationship between price and product size changes, with Figure 4(a) focusing on downsized products and Figure 4(b) on upsized products. We measure price changes at the store level by comparing a product's average price in the 52 weeks before a size change with its average price in the 52 weeks after. We then calculate average price

Table 1. Summary Statistics of Products with Size Changes

Statistic	All products	Downsized products	Upsized products
Unique products (% of all products)	377,368 (100%)	7,252 (1.92%)	4,185 (1.11%)
Total sales (in $) (% of all products)	2,044.99 Bn. (100%)	38.57 Bn. (1.89%)	7.10 Bn. (0.35%)
Unique occasions (% of all products)	1,317.07 Mn. (100%)	8.05 Mn. (0.61%)	1.77 Mn. (0.13%)

Notes. This table compares summary statistics of all products across stores and products that decreased or increased in size between 2010 and 2020. Note that all products solely include the top 80th-percentile brands within each module. Column 1 shows summary statistics considering all sales in the sample. Columns 2 and 3 show statistics for downsized and upsized products, considering all sales before and after the product size changes in stores that changed the product size. Bn., billion; Mn., million.

and size changes at the product module level and aggregate these module-level averages into broader product groups using the module's sales weight within each product group. Prices are not inflation-adjusted, which we consider unproblematic here, as we use rolling yearly averages relative to product size changes, and our sample period excludes years of extreme inflation.

In Figure 4, (a) and (b), each dot represents the weighted price change relative to the weighted size change for different product groups. We display fitted

Figure 2. (Color online) Overview of Product Size Changes

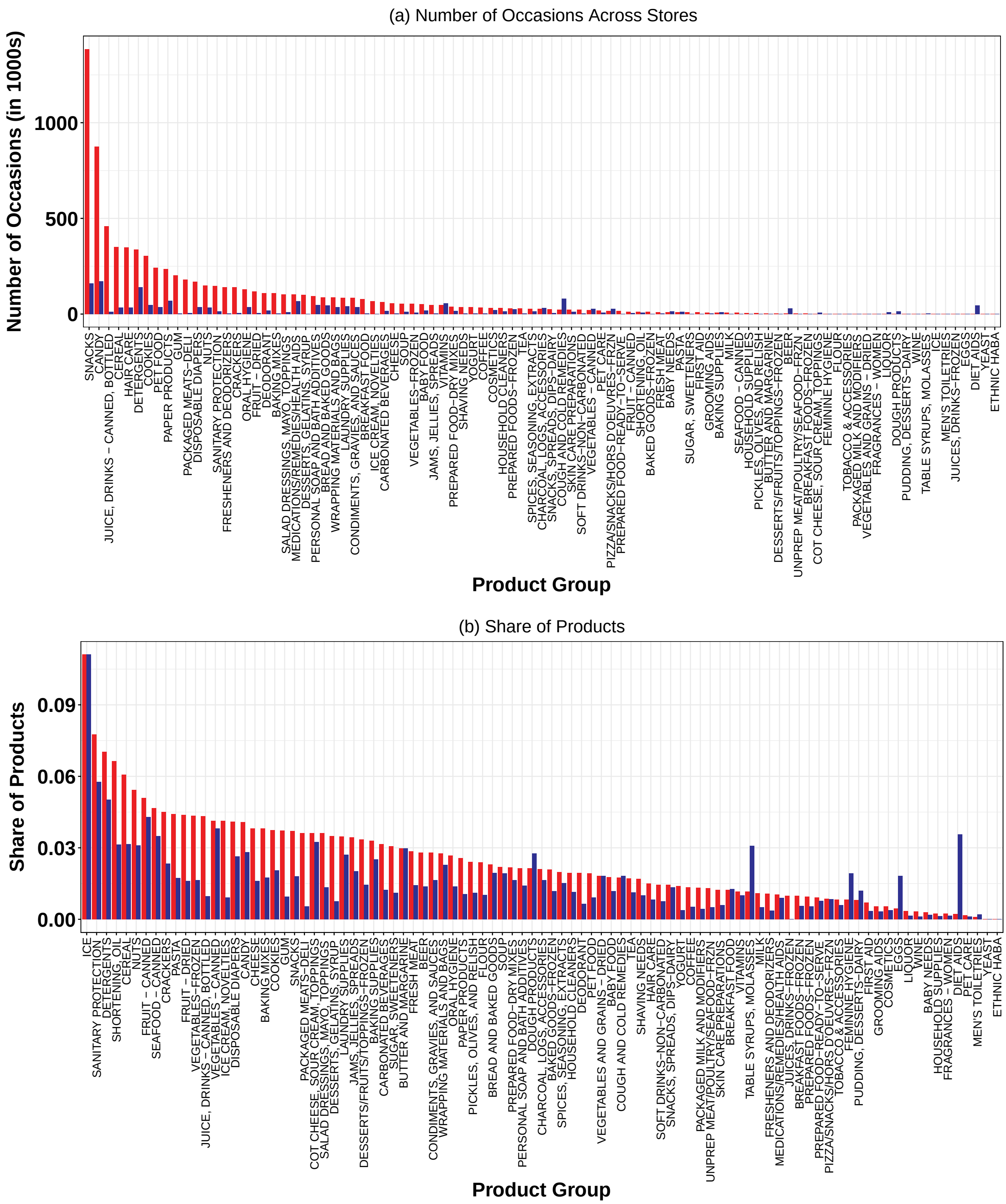
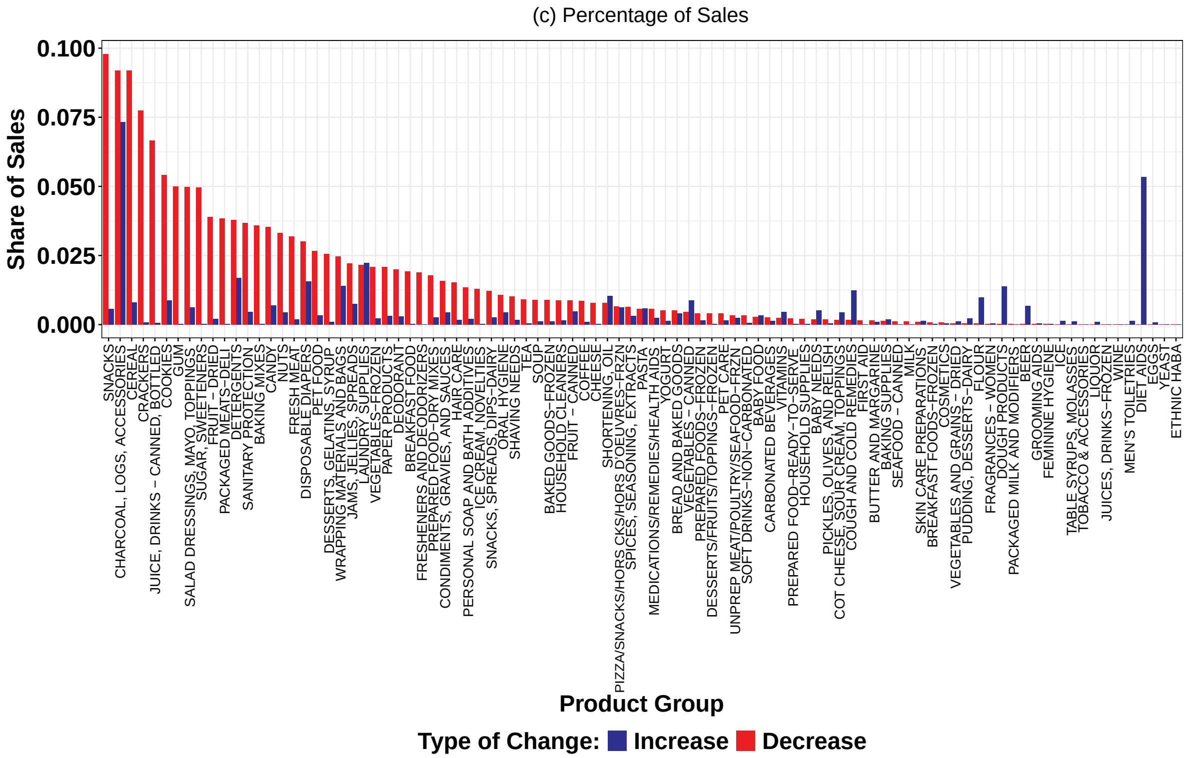


Figure 2. (Continued)



Notes. The figure illustrates the trends in product size changes across various product groups between 2010 and 2020. In panel (a), we display each instance of a size change within an individual store as a separate occurrence. In panel (b), we show the share of products compared with the total number of products in a product group that is affected by a size change. This contrasts with panel (c), which considers the percentage of sales that is affected by product size changes. Sales are measured at the store-product level. Sales of a size change are measured as the sales the year before and after a size change. The share corresponds to the aggregate sales of the size change in comparison with all sales across all stores in the product group. For each category, left bars represent an increase in product size, whereas right bars denote decreases. For a size change to be included, it must occur in an individual store in which the new product size replaces the old one permanently, not just temporarily.

values from a weighted linear regression, with weights based on the group's relative total sales. The diameter of each dot corresponds to the sales weight of the group. The 45-degree line indicates where the average size change is equivalent to the average price change. Dots above this line imply a rise in price per volume; dots below indicate a decline.

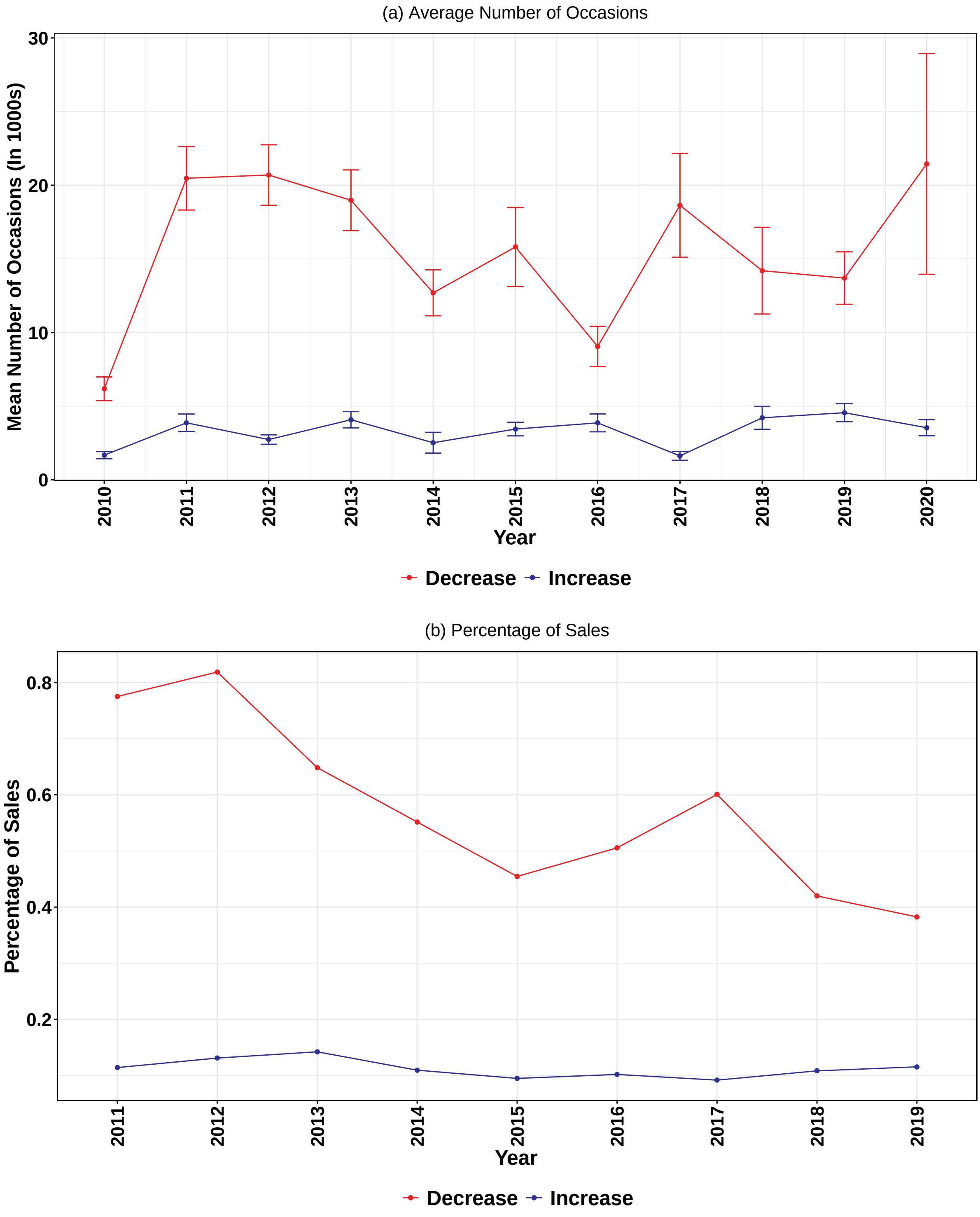
For downsized products, most groups show only small product price changes, consistent with the definition of shrinkflation. As a result, consumers pay more per volume in every group except liquor, the single dot below the 45-degree line in Figure 4(a). On average, prices per volume increase by about 12% after a size reduction, with variations across product groups (Figure 5(a)). The largest per-volume price increases occur in cosmetics, feminine hygiene products, and first-aid products, for which size reductions are frequently associated with price increases.

In contrast, product upsizing often coincides with price increases. However, these price hikes are usually smaller than the corresponding size increases, as implied by most dots in Figure 4(a) falling below the 45-degree line. On average, size increases lead to a 2% decline in price per volume. As Figure 5(b) shows, this effect varies considerably across product groups. Some large categories, such as candy and snacks, even see price-per-volume increases despite upsizing.

We next examine descriptively how size changes affect sales. Figure 6, (a) and (b), illustrates differences in average sales before and after downsizing or upsizing. We measure these differences by comparing total sales at the store-product level in the 52 weeks before a size change with the 52 weeks after, relative to the prechange total sales. We average the differences within each product module and aggregate them to the product group level using module sales weights.

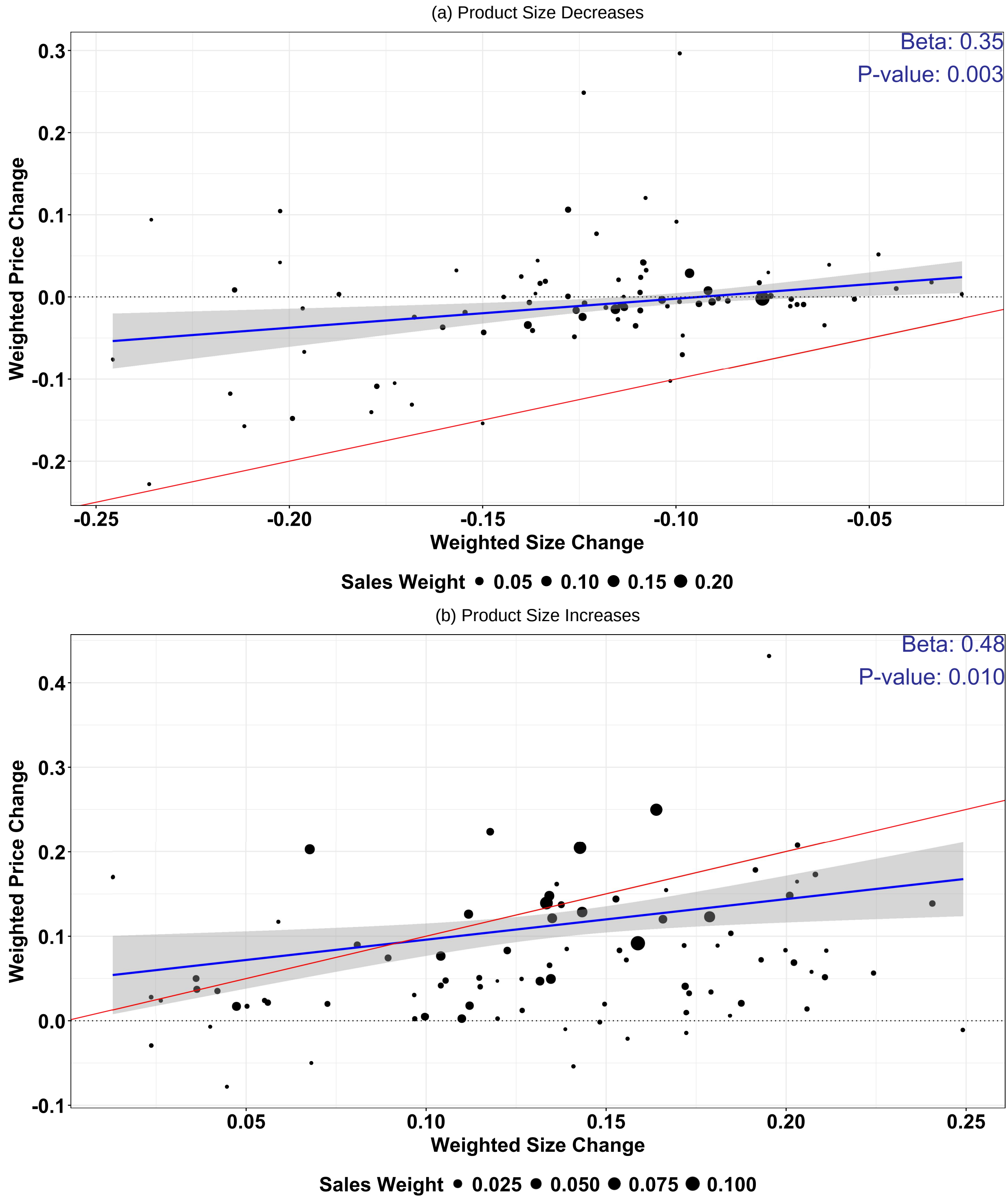
Although sales decline in some product groups, most groups show an uptick in sales after a size change. On average, total sales rise by about 6% for downsized products and 15% for upsized products.[7] These results suggest minimal substitution away from downsized products, potentially because of consumer inattention to size changes. Consequently, consumers spend more on downsized products, indicating that shrinkflation is an effective strategy for firms to boost revenues across most product groups.

Figure 3. (Color online) Timeline of Product Size Changes



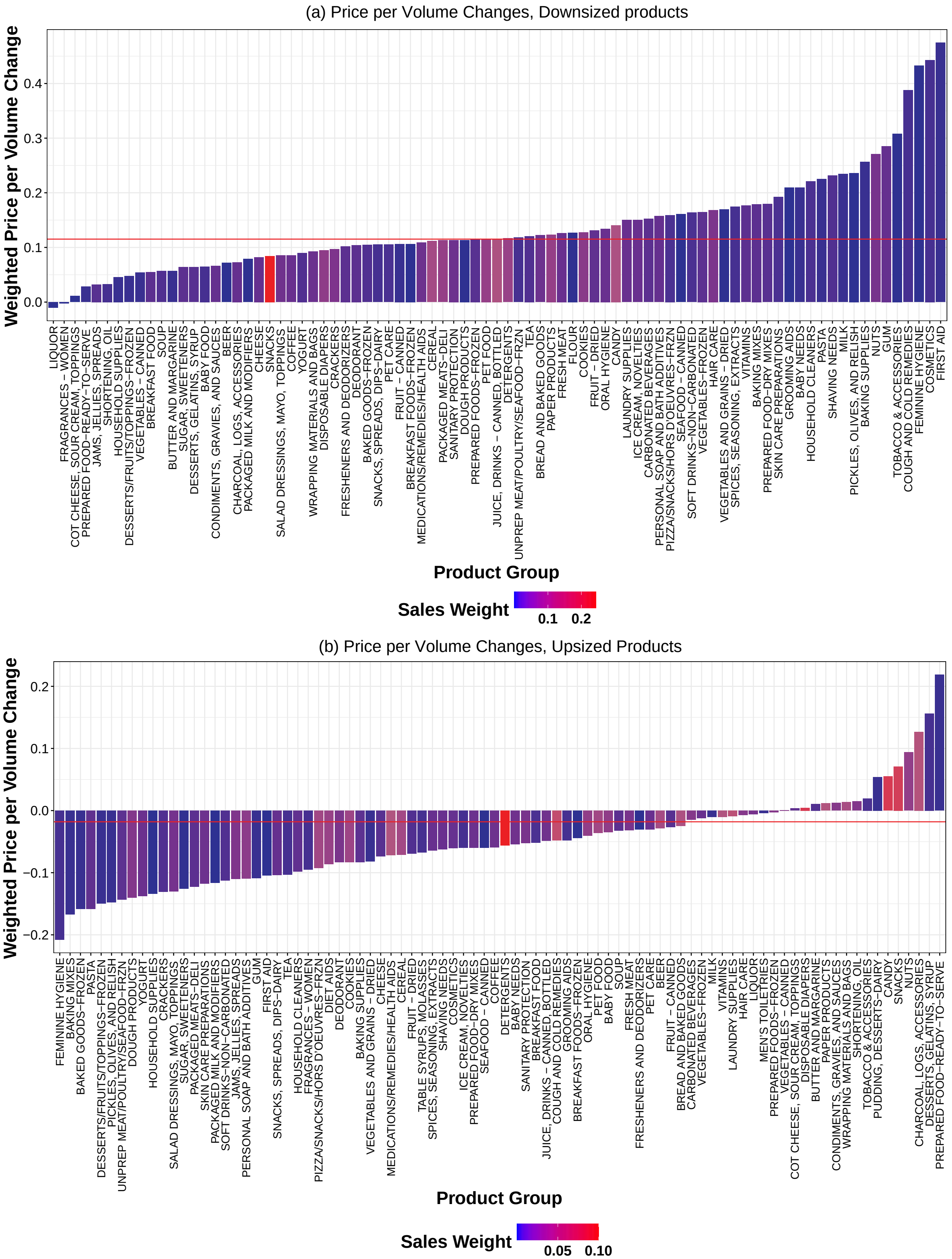
Notes. The figure provides a timeline of product size changes from 2010 to 2020. In panel (a), we depict the trends in the average number of yearly product size change occasions across all stores. The error bars refer to the 95% confidence intervals across months. Panel (b) offers a different perspective by showing the percentage of sales across all stores and product groups affected by size changes. We consider sales to be affected by size changes if they occur within 52 weeks before or after a product size change. This dual approach allows for a comprehensive understanding of the frequency and distribution of product size alterations over the decade.

Figure 4. (Color online) Price and Size Changes, Overview



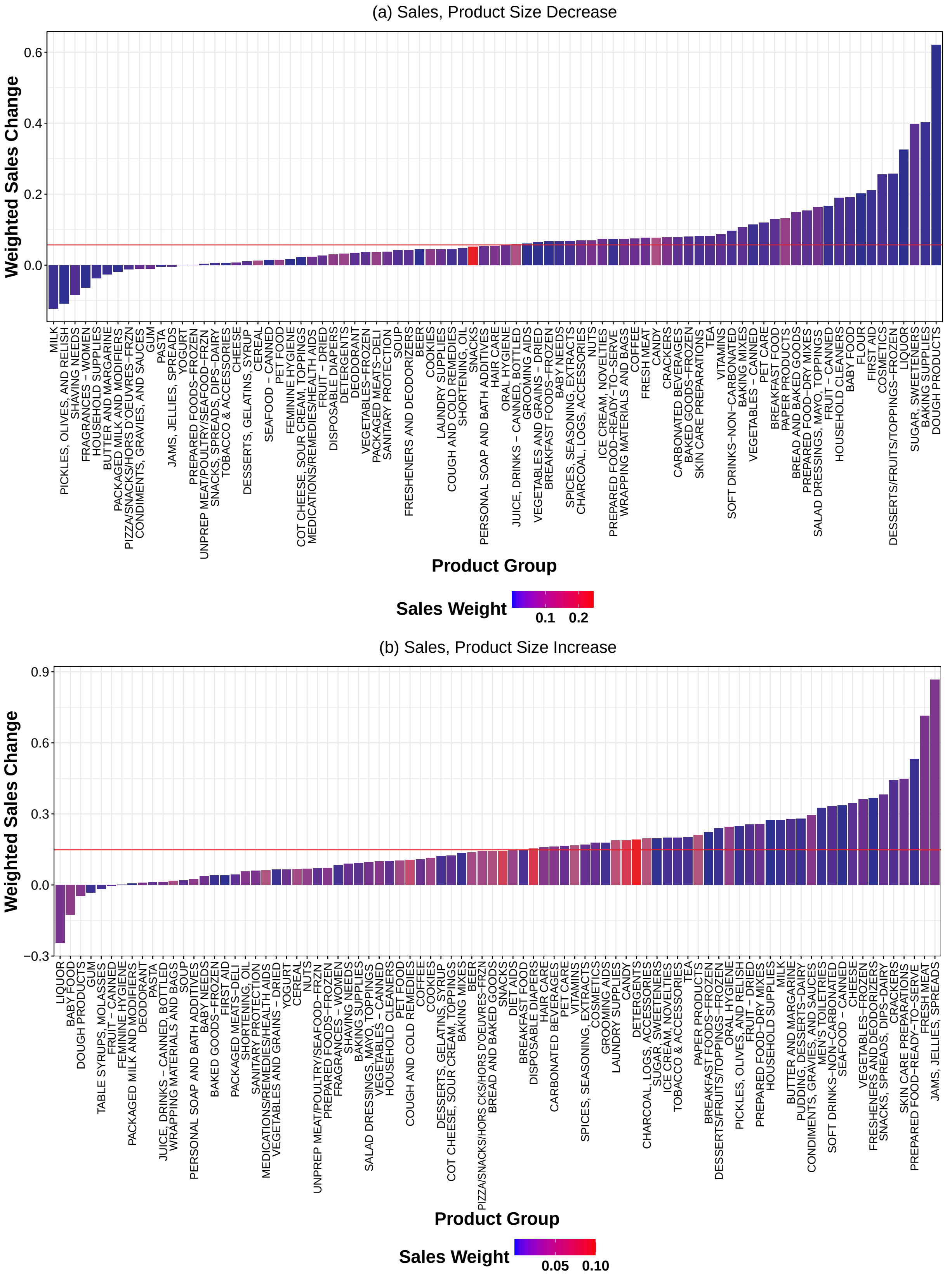
Notes. The figure shows how product size changes correlate with price adjustments. Panel (a) investigates product size reductions, and panel (b) assesses size increases. For both scenarios, the data are aggregated from individual modules to product groups. Weighted average price and size changes are calculated using sales volume of the products as a weighting factor. Weighted average price changes are analyzed at the store level by comparing prices a year before and a year after the change. The figure plots the fitted line of a linear weighted regression, in which weights are based on sales of products that underwent size changes within their respective groups. The coefficients and *p*-values of these regressions are displayed in the upper-right-hand corner of each panel. The 45 degree lines provide a baseline for proportional price-size adjustments.

Figure 5. (Color online) Price per Volume, Overview



Notes. The figure shows how product size changes affect prices per volume. Panel (a) investigates product size reductions, and panel (b) assesses size increases. For both scenarios, the data are aggregated from individual modules to product groups. Weighted average price-per-volume changes are calculated using sales volume of the products as a weighting factor. Note that prices per volume are prices divided by the size of a product using product group-specific measurements. The analysis compares these metrics from the year preceding to the year following a product size change. The color intensity of each bar in the figure corresponds to the sales weight of the product group. The lines show the weighted average price-per-volume changes across all product groups.

Figure 6. (Color online) Changes in Sales Across Product Groups



Notes. The figure shows the changes in sales of products that decrease or increase in size across product groups. Each bar corresponds to one product group. Panels (a) and (b) analyze changes in sales for product size decreases and increases, respectively. Changes are measured at the store-product level and compare sales the year before and the year after the product size change. The analysis employs an aggregation approach, consolidating data from individual products into product groups, considering their weights in sales. The intensity of color in each bar graphically represents the sales weight of the product group. The lines denote the aggregated weighted changes in volume or sales across all product groups.

4. An Empirical Model of Consumer Responses

4.1. Data for Demand Estimation

In our data, prices appear only for weeks with positive sales. To address this limitation and improve our demand estimation, we impute missing prices following Hitsch et al. (2021), Moshary et al. (2023), or Shapiro et al. (2021). We further restrict the sample to food, drugstore, and mass merchandise chains, focusing on products that changed size in at least one store. This strategy ensures a consistent product set while preserving computational feasibility.[8]

4.2. Empirical Strategy

We assess whether consumers respond differently to product price versus size changes by estimating elasticities of demand for each store-product pair. We define products as in the previous sections, requiring identical brand, UPC description, and brand description. We distinguish between price elasticity η_p and product size elasticity η_l. As our benchmark, we estimate the response of weekly log quantity, $\log(x(p_{t,s,i}))$, to the weekly log unit price and the weekly log product size of a product in a store s, allowing for store-product fixed effects, $\alpha_{s,i}$, and week fixed effects, γ_t:

$$\log(x(p_{t,s,i})) = \eta_p \log(p_{t,s,i}) + \eta_l \log(l_{t,s,i}) + \alpha_{s,i} + \gamma_t + \epsilon_{t,s,i}, \tag{1}$$

where $p_{t,s,i}$ and $l_{t,s,i}$ are the weekly unit price and package size of product i in store s. We estimate Equation (1) by product group.

Our main goal is to compare average size and price elasticities. The implicit assumption allowing for a meaningful comparison of the elasticities is that product size only affects demand through its effect on price per volume. If only the price per volume matters to consumers, we would expect the two elasticities to equate for fully attentive consumers.

Our model assumes constant price and size elasticities within each product group, which may introduce bias due to aggregation across brands, products, and time. To address such biases, researchers have proposed methods like Bayesian shrinkage techniques (e.g., DellaVigna and Gentzkow 2019, Strulov-Shlain 2023). However, because our analysis operates at the product level across many product groups, these approaches quickly become computationally infeasible. Thus, we focus on comparing average elasticity estimates across different model specifications. Specific estimates should be interpreted with caution, as they may still reflect residual aggregation bias.

We implement several alternative model specifications. First, we estimate a model that includes store-product-year and store-product-week-of-the-year fixed effects, allowing for store-product-specific effects that can vary across years, for example, because of assortment changes (see Online Appendix D.2). Second, because our benchmark model considers all size variations—even those that do not meet our classification criteria for downsized or upsized products—we reestimate the model using store-UPC fixed effects for products not classified as downsized or upsized. Third, to capture medium-term effects, we estimate models using quarterly aggregated data (see Online Appendix D.3).[9] Fourth, we implement an instrumental variable (IV) approach similar to DellaVigna and Gentzkow (2019), instrumenting a product's weekly price and size in store s with averages from other stores in the same chain located outside s's designated market area.[10] We discuss our IV approach in Online Appendix D.4.

Although the models above allow us to estimate average price and size elasticities of demand, they do not reveal how consumer sensitivity differs between upsized and downsized products. Thus, we extend the model to distinguish elasticities based on the direction of size changes:

$$\begin{aligned}\log(x(p_{t,s,i})) = {} & \eta_p \log(p_{t,s,i}) + \eta_l \log(l_{t,s,i}) \\ & + \beta_p \log(p_{t,s,i}) \times \mathbf{I}(Shrink_{i,s} = 1) \\ & + \beta_l \log(l_{t,s,i}) \times \mathbf{I}(Shrink_{i,s} = 1) \\ & + \alpha_{s,i} + \gamma_{t,\mathbf{I}(Shrink_{i,s}=1)} + \epsilon_{t,s,i}.\end{aligned} \tag{2}$$

The key differences are the interaction terms of $\log(p_{t,s,i})$ and $\log(l_{t,s,i})$ with $\mathbf{I}(Shrink_{i,s} = 1)$, which is a dummy variable that equals one if product i has been downsized in store s and zero otherwise. Because we are mainly interested in how elasticities differ between downsized and upsized products, we replace store-product fixed effects in Equation (2) with store-UPC fixed effects for products not classified as downsized or upsized. These fixed effects capture size variation unrelated to downsizing and upsizing, and therefore, the coefficient β_l indicates how the price elasticities of downsized products differ from those of upsized products. The coefficient β_p similarly captures how price elasticities differ for downsized products. However, because prices vary beyond what store-UPC fixed effects absorb, β_p compares downsized products more broadly to nondownsized products, including both upsized products and those with no size change in a given store, according to our definition. For simplicity of exposition, we refer to these differences as differences between downsized and upsized products.[11]

To validate our findings, we estimate two alternative models with interaction terms: one using store-product fixed effects, as in our benchmark model, and another with store-product-year and store-product-week-of-the-year fixed effects (details in Online Appendix D.5).

4.3. Results

Figure 7 shows a histogram of estimated size and price elasticities by product group based on our benchmark model. Consumer responses to unit price changes are significantly more pronounced than to product size changes. The average sales-weighted price elasticity is −1.19, whereas the average size elasticity is 0.56. This disparity suggests that consumers are less sensitive to changes in size than to comparable price changes. Consequently, firms can raise effective prices through downsizing without considerably lowering sales.

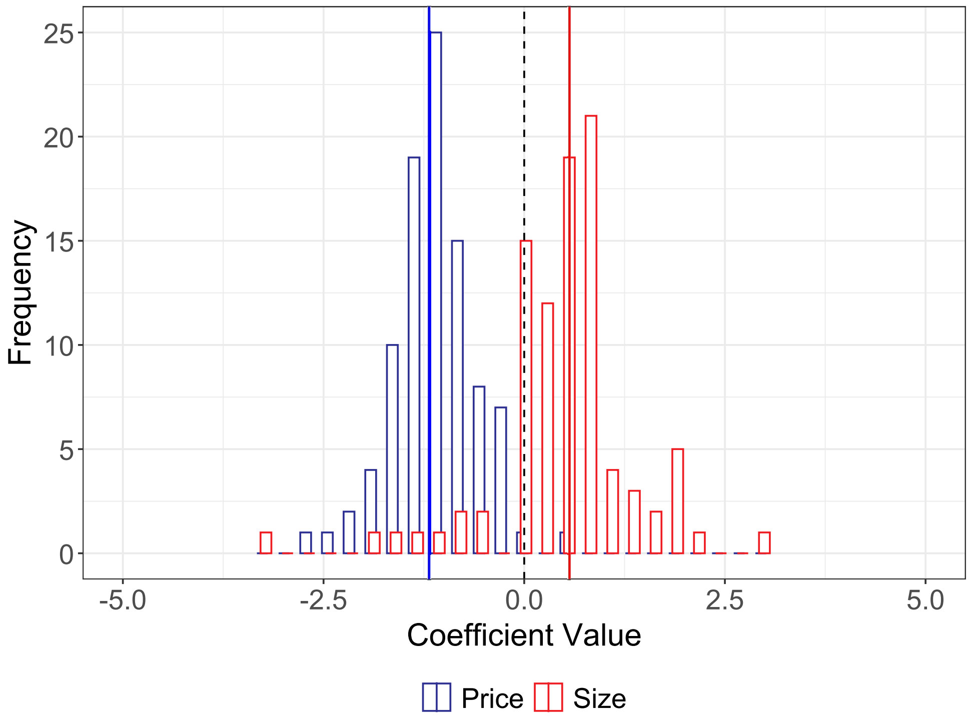
We also find notable heterogeneity in elasticities across product groups (see Table D.1 in Online Appendix D.1). A potential concern with our approach is that the observed underreaction to size changes may be attributed to consumers' preference for product size (e.g., due to stockpiling constraints or more healthful eating habits). We expect this to be less relevant in groups with more durable, multiuse products such as hair care, spices, and cosmetics. In most of these groups, size elasticities are close to zero, consistent with the notion that consumers are not attentive to product size changes.

In Online Appendix D, we present and discuss results from the alternative model specifications: (i) models with more granular fixed effects (Figure D.2), (ii) models using quarterly aggregated data (Figure D.3), and (iii) models based on an IV approach (Figure D.4). Across all specifications, the results are robust: consumers respond significantly less to changes in product size than to direct price changes. Although specific estimates should be interpreted cautiously because of potential aggregation bias, the consistent and substantial gap between size and price elasticities across all specifications supports the conclusion that consumers tend to underreact to size changes, even in the medium term, making shrinkflation a viable strategy for firms.

Next, we disentangle consumer size preferences from the price effects of size changes by examining whether elasticities differ for downsized and upsized products. Figure 8 shows the distribution of elasticities for upsized products and the corresponding interaction term coefficients across product groups.

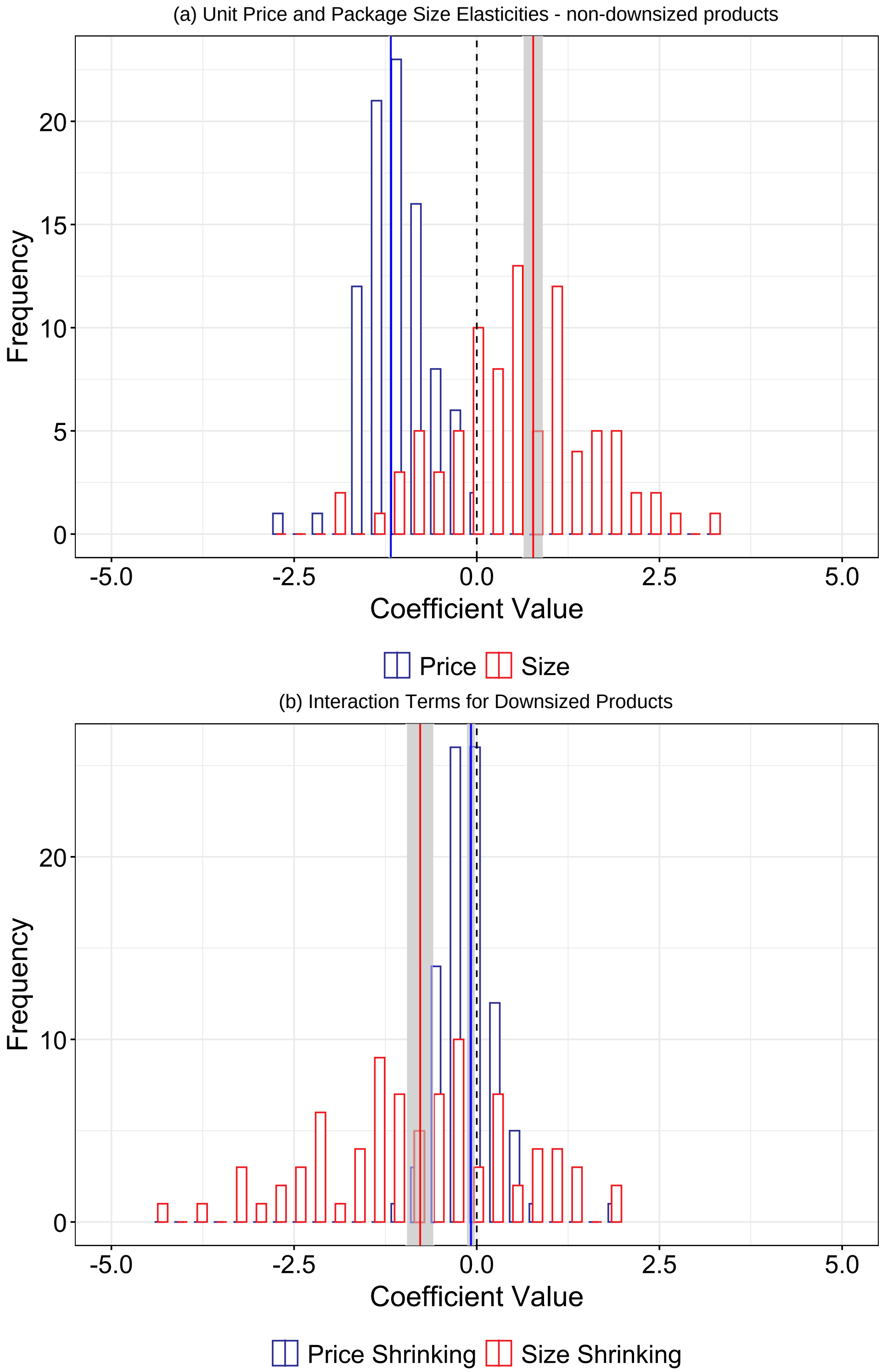
For upsized products, the weighted averages of price and size elasticities are −1.16 and 0.77, respectively. These estimates indicate that consumers are more sensitive to price than to size, for upsized products as well, though the gap is smaller than in the baseline. The average price interaction term is near zero (−0.09), suggesting that price elasticities are similar for downsized and upsized products. In contrast, the size interaction effect is −0.78, showing that consumers are less responsive to

Figure 7. (Color online) Estimated Unit Price and Product Size Elasticities



Notes. The graph presents histograms of the estimated unit price elasticities and package size elasticities, according to Equation (1), across product groups. The solid lines illustrate the sales-weighted average unit price and package size elasticity across all product groups. Weights are based on sales within product groups. The 95% confidence intervals of the weighted coefficients are very narrow and thus not visible in the figure. For visibility, we exclude product groups with extremely large standard errors that result in rejecting the hypothesis that the point estimates are within the range of ≤ −5 or ≥ 5. However, those product groups are part of the weighted average calculations.

Figure 8. (Color online) Estimated Unit Price and Size Elasticities for Downsized and Upsized Products



Notes. Panel (a) presents histograms of the estimated price elasticities ($\hat{\eta_p}$) and product size elasticities ($\hat{\eta_l}$) based on Equation (2), for upsized products across product groups. Panel (b) displays histograms of the interaction term coefficients from Equation (2), representing the differences in price elasticities ($\hat{\beta_p}$) and product size elasticities ($\hat{\beta_l}$) between downsized and upsized products across product groups. In both histograms, the solid lines represent the sales-weighted average unit price and product size elasticity across all product groups. The gray-shaded area around the weighted mean denotes the 95% confidence intervals of the weighted coefficients. For visibility, we exclude product groups with extremely large standard errors that result in rejecting the hypothesis that the point estimates are within the range of ≤ -5 or ≥ 5. However, those product groups are part of the weighted average calculations.

size changes when products are downsized. This coefficient is close in absolute value to the size elasticity for upsized products, implying that the size elasticity for downsized products is close to zero. This pattern aligns with the idea that retailers make size increases more salient, leading to stronger consumer responses. In contrast, the near-zero size elasticity for downsized products suggests that size decreases tend to be hidden.

5. Discussion

This study shows that shrinkflation is widespread in the U.S. retail market and consumers tend to react more strongly to price changes than to changes in size. This divergence is likely due to limited consumer attention to size changes, which are typically less salient than prices, and aligns with prior research showing that consumers underreact to nonsalient price attributes, such as taxes not included in posted prices (Chetty et al. 2009, DellaVigna 2009).[12]

Underreaction to hidden price attributes incentivizes firms to employ price obfuscation strategies, such as add-on pricing (e.g., Ellison 2005, Gabaix and Laibson 2006) or hidden fees (e.g., Hossain and Morgan 2006, Brown et al. 2010). Models of price obfuscation (Gabaix and Laibson 2006, Ellison and Wolitzky 2012, Janssen and Kasinger 2024) suggest that such strategies reduce consumers' price sensitivity, allowing firms to soften competition and increase profits. Our findings indicate that shrinkflation serves as an effective obfuscation strategy. This conclusion is supported by the considerably higher estimated size elasticities for upsized products, where firms have an incentive to make size changes more salient as they benefit consumers.

Although these strategies may benefit firms, they often harm inattentive consumers.[13] Shrinkflation is no exception, as recently emphasized by Chalioti and Serfes (2024). Policymakers may therefore consider regulatory interventions to protect consumers.[14] Banning product size changes appears impractical and may limit beneficial size changes. A more viable approach could involve enhancing the salience and transparency of size changes, for example, mandating that retailers clearly communicate any changes in product sizes to consumers, as implemented in France.[15] Another potential regulation could require displaying prices per volume more clearly, as already mandated by some unit pricing laws in several U.S. states (Lee 2024, NIST 2024).

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Endnotes

1 Moreover, shrinkflation may have distributional implications, as it disproportionately affects low-income households, further limiting their ability to afford groceries (Danley 2022, Davidson 2023).

2 Equivalent products are those sharing the same brand, brand description, and product description as the original, with size changes limited to less than 25% of the original size.

3 Aggregation is a common issue in studies estimating demand across products, locations, and time periods. Prior research has proposed various approaches to address this challenge, including Bayesian shrinkage methods and price normalization (e.g., DellaVigna and Gentzkow 2019, Shapiro et al. 2021, Butters et al. 2022, Strulov-Shlain 2023).

4 Recent studies also highlight shrinkflation's effects in the canned tuna industry (Webb et al. 2022, Harris-Lagoudakis et al. 2024).

5 Calculating these sales, we again consider all sales before and after the product size changes in stores that changed the product size.

6 Sales at the store level are considered affected here if they occur within 52 weeks before or after a product size change. To ensure comparability, we exclude the first and last year, as our definition of affected sales would otherwise mechanically lead to a lower share in these years.

7 This increase in sales occurs despite a decline in purchased volume, not unit sales, which decreases on average by approximately 3.5% for downsized products and rises by about 20% for upsized products (see Figure E.1 in the Online Appendix).

8 Details on the imputation procedure, data selection, and summary statistics are in Online Appendix A.

9 This approach allows us to assess medium-term consumer reactions. Capturing dynamic and long-term effects would require a more comprehensive design and offers a promising direction for future research—especially given recent reports of reversed downsizing in response to consumer backlash (Meyersohn 2024).

10 Although this approach is still widely used (Hausman 1996, Nevo 2001), results must be interpreted with caution, as the exclusion restriction assumption is likely violated. See Rossi (2014) for a detailed discussion.

11 We also interact the dummy variable with the week fixed effects ($\gamma_{t,\mathbf{I}(Shrink_{i,s}=1)}$) to allow for diverging time trends for both subgroups.

12 Other examples include Finkelstein (2009), Sallee (2011), Goldin and Homonoff (2013), Feldman and Ruffle (2015), and Taubinsky and Rees-Jones (2018).

13 For a discussion on the policy implications of related practices, see Heidhues and Kőszegi (2018).

14 To better understand the welfare implications of shrinkflation, future research could examine its distributional effects and distinguish between essential and nonessential products.

[15] Such policies may, however, also entail unintended welfare costs due to increased compliance burdens or additional obfuscation strategies by firms, which should be taken into account by policymakers.

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