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Abstract

How do import tariffs affect retail prices? We combine daily product-level posted prices from seven major Canadian retailers with product-level tariff exposure to estimate tariff effects in a difference-in-differences framework. Prices of tariffed goods rose gradually, peaking at 6% after three months, implying pass-through of roughly one quarter of the 25% tariff. We find little spillover to untariffed substitutes and a rapid reversal of price effects after tariff removal. Adjustment occurred mainly through the frequency of price changes. Pass-through shifted with trade-policy news and was larger for products labeled "Tariffed," showing that tariff-induced inflation depends on policy expectations and tariff salience.

Keywords: Tariffs; Price pass-through; Inflation dynamics; Expectations
JEL codes: E31, F13, E52.

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1 Introduction

In early 2025, the United States implemented the largest and most broad-based tariff increases in decades, including on close trading partners such as Canada. Canada responded swiftly with retaliatory tariffs on U.S. imports, creating a sizable and well-defined trade cost shock. Because these tariffs were introduced in March and largely removed in September, the episode provides a rare opportunity to study how a temporary retaliatory tariff shock transmits to domestic consumer prices, and how much of the effect unwinds when the policy is reversed. It also provides evidence from outside the United States, where retail-price evidence on tariff pass-through remains limited.

We examine this question using daily product-level posted prices from seven large Canadian retailers, covering groceries, appliances, hardware, electronics, clothing and footwear, and personal care. The data span October 1, 2024, to February 23, 2026, and include detailed product characteristics. For some retailers, we also observe point-of-sale labels, which we use as supplementary information on product origin and tariff visibility. Linking these prices to product-level tariff exposure allows us to measure the magnitude and timing of pass-through from the border to the retail shelf at high frequency, around both the introduction and removal of the tariffs.

To identify tariff exposure at the product level, we use generative AI methods to assign each item to its corresponding 8-digit Harmonized System (HS8) category and to identify its country of origin, supplemented when available by retailer-provided origin labels. The HS8 classification uses a hierarchical procedure that moves through the HS structure, while the country-of-origin procedure combines product descriptions with online search. This mapping allows us to distinguish goods directly subject to Canadian retaliatory tariffs from domestic substitutes, third-country substitutes, other imported goods, and domestic controls. In the resulting sample, 82% of products are imported, including 14% from the United States and 21% from China, while the remainder are produced domestically. We define a product as *Tariffed* if it is imported from the United States and belongs to an HS8 category subject to Canadian retaliatory tariffs.

We estimate the dynamic effect of Canadian retaliatory tariffs introduced on March 4, 2025, using a difference-in-differences design (Dube et al., 2025). The baseline specification compares price changes for *Tariffed* products with those of domestically produced goods in non-tariffed HS8 categories (*Domestic non-substitutes*), which serve as the control group. We also estimate analogous effects for untariffed products that may be indirectly exposed to the policy: domestic goods and third-country imports in the same HS8 categories as tariffed U.S. products, and imported goods in non-tariffed HS8 categories. The results yield five main findings.

First, retaliatory tariffs raise relative prices of tariffed products, but pass-through is gradual and incomplete. The estimated effect peaks at 6% by mid-June 2025, implying pass-through of roughly one quarter of the 25% tariff. Prices increase steadily for roughly four months after the March 4 imposition and then decline after most tariffs are removed. We find little or no effect on the relative prices of untariffed substitutes—domestic or third-country imports in the same HS8 categories as tariffed U.S. products—or on the relative prices of other imported goods. As a result, the aggregate effect is small: the tariffs add roughly 0.3 percentage points to the Consumer Price Index (CPI) at the peak. Evidence from Canadian International Merchandise Trade data shows little systematic decline in the prices received by U.S. exporters of tariffed products, suggesting limited absorption by foreign exporters. Because we do not observe distribution margins or input costs along the supply chain, we do not decompose the incidence of the tariff between retailers, wholesalers, importers, and other domestic firms.

Second, tariff-induced price effects vary substantially across retailers. The largest effects are observed for appliance and electronics retailers, followed by household goods and grocery chains. In contrast, variation across product categories is more limited, suggesting that retailer-level pricing decisions and supply conditions play an important role in determining pass-through. A decomposition of the average tariff effect attributes approximately 41% of the variation to heterogeneity in pass-through across retailers, 30% to heterogeneity across product categories, and the remaining 29% to a common component. We provide additional evidence that tariff changes affect prices faster for retailers and goods associated with a higher share of U.S. imports and leaner inventories.

Third, we document discrete jumps in pass-through around major trade policy announcements *after March 4*. For appliances, household goods, and electronics—and to a lesser extent groceries—the estimated tariff effect increases sharply on or around April 2, 2025, when the U.S. administration unexpectedly announced a broad escalation of tariffs on U.S. imports. For example, for one appliance retailer, the estimated pass-through jumped from –0.4% on April 1 to 7% on April 3, reaching its 9.8% peak 29 days later. Because Canadian tariffs were already in place at that time, such discontinuity suggests that retailers revised their expectations about the persistence of the policy, treating it as more likely to remain in effect. We provide direct evidence that firms' expectations about the persistence of tariffs affect their pricing decisions. Using randomized hypothetical scenarios in the Bank of Canada's *Business Leaders Pulse* survey, we find that firms expecting U.S.–Canada tariffs to remain in place for three years report significantly higher intended pass-through than firms expecting tariffs to last only one year.

Fourth, the price effects largely reverse when the tariffs are removed, and the adjustment occurs mainly through the frequency of price changes. After most Canadian retaliatory tariffs were removed on September 1, 2025, the estimated price effects were largely reversed within four months. The reversal is nearly complete for appliances, electronics, and groceries, but only partial for household goods. Decomposing price adjustment shows that the initial increase after March 4 occurred primarily through a higher frequency of price increases among tariffed products relative to control products, with little contribution from the size of price changes. Conversely, after September 1, the relative price decline occurred primarily through a higher frequency of price decreases among tariffed products. These findings provide new evidence that firms rely mainly on the timing of price adjustments to transmit tariff shocks to retail prices, suggesting that models with fixed adjustment frequencies may understate the price effects of tariff shocks.

Fifth, tariff visibility at the point of sale is associated with larger and faster pass-through. Two retailers in our sample display a "Tariff" banner on the price tags of 671 out of 1,192 tariffed products, making the policy salient to consumers. We compare price responses for tariffed products with and without the banner within the same retailer; separately, we compare prices of matched tariffed products of the *same brand* sold across retailers that do and do not display the banner. In both exercises, pass-through is substantially larger and faster for products displaying the "Tariff" banner, while we detect no statistically significant relative price response for tariffed products without the banner. These results are consistent with retailers' concerns about antagonizing customers: when retailers can make the policy origin of a cost increase salient to consumers, they appear more willing to raise prices.

Taken together, the results show that the inflationary effects of tariffs depend not only on statutory tariff rates and product coverage, but also on expectations about policy persistence, retailer-level pricing strategies, and the information provided to consumers at the point of sale. Temporary tariffs can have meaningful retail-price effects, but those effects may be muted when the policy is expected to be short-lived, when retailers have scope to adjust margins or inventories, or when tariff exposure is not salient to consumers. Conversely, broader, more persistent, or more visible tariff regimes may generate larger and faster pass-through to consumer prices.

Related literature and contributions. This paper contributes to several literatures on tariff pass-through, retailer price setting, policy expectations, temporary cost shocks, and tax salience.

First, we contribute to empirical work measuring the consumer-price effects of tariffs using high-frequency price data. Irwin (2019) studies U.S. sugar tariffs during 1890–1914 and finds incomplete and asymmetric pass-through. Cavallo et al. (2021) show that the 2018–19 U.S. tariffs were largely reflected in import prices but generated only modest retail price increases, implying incomplete transmission from the border to the retail shelf. More recently, Cavallo, Llamas, and Vazquez (2025) document faster and larger retail adjustment during the 2025 U.S. tariff episode, estimating a 24% retail pass-through and a 0.7 percentage point contribution to CPI inflation by October 2025.[1] Relative to this literature, we study a retaliatory tariff episode outside the United States and use daily product-level prices to trace both the introduction and removal of tariffs. We find substantial but incomplete pass-through, at roughly one quarter of the 25% tariff. This magnitude is close to the estimate for the 2025 U.S. tariff episode, but the aggregate inflation effect is much smaller because Canadian tariffs covered a narrower set of goods and generated few spillovers to untariffed products.

Second, our results speak to the role of retailers in shaping pass-through. A broader literature shows that markup adjustment, market power, distribution networks, uniform pricing, and the distinction between pass-through in levels and percentages can all affect how cost shocks are transmitted to retail prices (Hellerstein, 2008; Nakamura and Zerom, 2010; Alexander et al., 2024; DellaVigna and Gentzkow, 2019; Sangani, 2026). Our estimates are percentage pass-through estimates—they do not by themselves identify tariff incidence along the supply chain, which would require detailed data on import-cost shares, distribution margins, and input costs. We add to this literature by showing that tariff pass-through varies across retailers as much as across product categories. This pattern suggests that retailer-level pricing strategies and supply conditions, rather than product characteristics alone, are central to the transmission of tariff shocks. Consistent with this interpretation, we find larger and faster pass-through among retailers and goods with greater exposure to U.S. imports and leaner inventories.

Third, our results help distinguish price spillovers from sourcing responses. Product-level studies of tariff episodes find that tariff effects can spill over to closely related goods (Flaaen, Hortaçsu, and Tintelnot, 2020) and from imported to domestic products (Cavallo, Llamas, and Vazquez, 2025). Trade and supply-chain studies show that tariffs can also induce sourcing reallocation and propagate through global value chains (Fajgelbaum et al., 2024; Dang, Krishna, and Zhao, 2023; Handley, Kamal, and Monarch, 2025; Grossman, Helpman, and Redding, 2024). Our empirical design separates tariffed goods from

[1] This evidence complements studies using border prices. Amiti, Redding, and Weinstein (2019), Fajgelbaum et al. (2020), and Gopinath and Neiman (2026) find that recent U.S. tariffs were largely borne by importers through higher import prices, with little adjustment in foreign exporter prices. Ganapati and Hottman (2026) find lower pass-through at the border once quantity-discount effects are taken into account.

domestic substitutes, third-country substitutes, and other imported goods. We find little evidence of indirect price effects on untariffed products, even though import values and quantities from the United States decline and imports from other countries increase (Macklem, 2026). The contribution is therefore to show that trade flows can respond strongly to tariffs without necessarily generating broad retail-price spillovers.

Fourth, the paper contributes to work on policy uncertainty, expected tariff duration, and inflation dynamics. Cavallo et al. (2021) conjecture that low retail pass-through of the 2018–19 U.S. tariffs may have reflected perceptions that the tariffs were temporary. Schmitt-Grohé and Uribe (2025) show that transitory tariffs have muted effects on inflation, while persistent tariffs generate stronger and more sustained price responses. Barnichon and Singh (2025) argue that tariff uncertainty can lower inflation by delaying price adjustment and dampening demand. We provide direct evidence on the importance of expected persistence. Retail prices responded discontinuously around major trade-policy news, even when Canadian tariffs were already in place for the goods in our sample, and survey evidence shows that firms expecting tariffs to last longer report substantially higher intended pass-through. These findings show that tariff pass-through depends not only on tariff rates, but also on firms' beliefs about policy persistence.

Fifth, we provide evidence on the reversal of temporary tariff shocks and the margins of price adjustment. Evidence on the asymmetry of temporary tariff changes is limited: Irwin (2019) finds that tariff reductions are fully passed through to consumer prices, while tariff increases are only partially passed through. Related evidence from sales taxes shows that prices often respond more to tax increases than to tax decreases (Benzarti et al., 2020), although the degree of asymmetry varies across settings (Doyle and Samphantharak, 2008; Karadi and Reiff, 2019). In our setting, most price effects unwind after the Canadian tariffs are removed, making the average response close to symmetric. However, the speed of reversal varies across retailers and goods. We show that adjustment occurs mainly through the frequency of price changes: retailers raise the frequency of price increases when tariffs are imposed and the frequency of price decreases when tariffs are removed. Remaining asymmetries are associated mainly with smaller price decreases, consistent with positive trend inflation (Ball and Mankiw, 1994) and other sources of downward price rigidity (Peltzman, 2000).

Finally, our setting connects to research on tax salience, disclosure, and origin information. Consumers respond more strongly to taxes and fees when they are made explicit (Chetty, Looney, and Kroft, 2009; Finkelstein, 2009), and disclosure policies can affect demand and firms' pricing incentives (Bradley and Feldman, 2020; Donnelly et al., 2021; Taubinsky and Rees-Jones, 2018). Evidence on country-of-origin claims similarly shows that salient origin information can affect willingness to pay (Kong and Rao, 2021). Canadian retailers' "Tariff" banners allow us to study whether tariff visibility is associated with pass-through at the point of sale. We find that tariffed products displaying the label exhibit substantially larger and faster price increases than tariffed products without the label, both within retailers and among matched products sold across retailers. This provides new evidence that the point-of-sale information related to the tariff can shape its pass-through.

2 Data from large Canadian retailers

We use micro price data from PriceStats, a private firm that collaborated with The Billion Prices Project (Cavallo and Rigobon, 2016). The dataset contains daily posted prices for 111,842 products sold by seven major multi-channel Canadian retailers from October 1, 2024 to February 23, 2026. Each observation includes product identifiers, consumption category classifications, and sale indicators. For some retailers, we also observe point-of-sale labels, including "Tariff" banners used by retailers to indicate products affected by tariffs, and "Made in Canada" labels, which we use to complement our AI-assisted classification of country of origin.

Missing price observations are filled using carry-forward methods when products remain listed but prices are temporarily unavailable. For the construction of aggregate price indices, we exclude temporary sale prices; however, all posted prices, including sales, are used in the pass-through estimations. As part of the data cleaning process, we exclude 2,114 products (approximately 1.7 percent of the sample) that exhibit implausibly large price-level jumps at the COICOP 3-digit level within specific retailers.

The daily frequency and product-level granularity of the data allow us to compare price dynamics across retailers and categories over a common time horizon. High-frequency posted prices reduce measurement error relative to data based on aggregated revenues, which can be affected by time aggregation and compositional changes (Cavallo, 2018). Moreover, prior research on multi-channel retailers shows that web-scraped prices closely track prices in the corresponding brick-and-mortar stores, including in Canada, where online and offline prices were identical 91 percent of the time (Cavallo, 2017).

2.1 AI methods for identifying affected products

To map products to affected tariff categories, we apply large language models (LLMs) to identify countries of origin (COO) and classify goods into HS8 categories targeted by Canadian tariffs. Details are provided in Appendix C.

For COO identification, we use an LLM with web-search capabilities. The model takes as inputs the product name and retailer URL, then follows a structured protocol: first inspecting the retailer page for explicit COO statements, then searching other sources (other retailers, manufacturer websites) if needed, and finally inferring the most likely country based on brand and product category when no explicit information is available.[2]

We classify 20,227 products as **Domestic** if their country of origin is Canada or if the retailer displays a "Made in Canada" or similar banner next to the product.[3] The remaining 91,615 products are classified as **Imported**: 17% originate from the United States, 21% from China, and the remainder from Mexico, Italy, Taiwan, Vietnam, and 95 other countries. For 45% of imported products, the specific country of origin could not be classified and no "Tariff" banner was observed; because these products cannot be linked to U.S. origin or to retailer-provided tariff information, we classify them as non-U.S. imports.

To assign HS8 classification, we use a hierarchical LLM-based method that navigates the HS tree level-by-level rather than selecting from thousands of codes at once. At each stage, the model receives the product description and valid subcategories at the current level, selects one category, then moves to its subcategories—repeating until reaching a terminal 8-digit code. For example, "roasted, non-decaffeinated, certified organic coffee" is classified through: Vegetable products → Coffee, tea, spices → Coffee → Roasted, not decaffeinated → Certified organic (HS8 code 0901.21.10). This approach requires no labeled training data, reduces classification errors by constraining choices at each step, and applies uniformly to both imported and domestic products—enabling comparisons between tariffed goods and their domestic competitors. The resulting HS8 assignments bridge high-frequency retail price data with tariff schedules, enabling precise measurement of tariff exposure at the product level.

2.2 Canadian retaliatory tariffs on U.S. products

In February and March 2025, the new U.S. administration repeatedly threatened, implemented, and then put on hold tariffs targeting Canada and Mexico. Substantial U.S.

[2]We assess the accuracy of this approach using a validation sample of 8,941 products from three large retailers, for which COO was obtained either by scraping it directly from the product description on the retailer's website or by scraping COO from *other* retailers' websites using the product's UPC. The model correctly distinguishes domestic from imported items 85% of the time and it identifies COO correctly 88% of the time. Accuracy is broadly similar across the most common origin countries in our sample.

[3] Only three retailers in our sample display labels such as "Made in Canada", "Product of Canada", or "Prepared in Canada". Under Canada's *Competition Act*, these origin labels are voluntary but must not be false or misleading. "Made in Canada" applies to products for which the last substantial transformation occurred in Canada, at least 51% of total direct production costs were incurred in Canada, and the label includes an appropriate qualifier disclosing imported content. "Prepared in Canada" is treated as a descriptive label indicating that certain processing occurred in Canada.

tariffs remained in effect for steel, aluminum, and automobiles.

In response, Canada implemented retaliatory tariffs against U.S. imports on March 4 with a 25% tariff on groceries, appliances, furniture, household goods and electronics, affecting C$30 billion in imports. This initial action was expanded on March 13 with a 25% tariff on steel, aluminum, and consumer goods, adding C$29.8 billion more and increasing pressure on economically and politically important U.S. sectors.[4]

On April 2, 2025, the United States issued a broad set of tariff measures, introducing a baseline tariff regime and higher tariffs on certain goods, which triggered wider trade tensions and possible escalation dynamics between the United States and trading partners (including Canada). One week later, on April 9, the United States reduced most of those tariffs for 90 days to a 10% universal rate. This universal tariff did not apply to most of exports from Canada and Mexico, which remained exempt under the Canada-United States–Mexico Agreement (CUSMA).

Canadian policy shifted toward mitigation and de-escalation later in the year. On May 7, a remission order was published to provide temporary tariff relief for goods used in manufacturing or processing, food and beverage packaging, agricultural production, public health, healthcare, public safety, and medical supplies and critical industrial inputs, reducing the effective tariff rate to zero for eligible imports through October 16, 2025 (later extended to December 16, 2025, and further into 2026). On September 1, 2025, Canada removed retaliatory tariffs on most products, while steel, aluminum, and automobiles remained subject to tariffs. As of October 2025, the effective Canadian tariff rate on U.S. goods was about 1% (2.6% in July), and the average U.S. tariff rate on Canadian goods was 5.9% (4.4% in July 2025).

Table 1 shows that most products in our sample are imported (81.9%): 14.1% from the United States and 67.8% from other countries. Tariffed products account for 3.3% of imported goods and 19.3% of goods imported from the United States. They are concentrated in food and beverages and in household operations, furniture, and equipment, but are also present in clothing and footwear, health and personal care, transportation, recreation, culture, and reading.[5]

[4] Appendix B lays out the timing of events in the 2025 U.S.-Canada trade war and provides further details.

[5] The transportation category includes parts for repair of personal transportation equipment, but does not include cars.

Table 1. Product composition.

	Products	%	Tariffed	% Tariffed
Domestic	20,227	18.1	0	0.0
Imported	91,615	81.9	3,060	3.3
U.S. origin	15,793	14.1	3,060	19.4
Non-U.S. origin	75,822	67.8	0	0.0
Affected HS8	21,027	18.8	3,060	14.6
Unaffected HS8	90,815	81.2	0	0.0
Food and beverages	27,254	24.4	1,034	3.8
Clothing and footwear	8,483	7.6	27	0.3
Hh operations, furniture, equipment	41,163	36.8	1,011	2.5
Health and personal care	1,937	1.7	159	8.2
Transportation	10,330	9.2	279	2.7
Recreation, culture, reading	22,607	20.2	550	2.4
Total	**111,842**	**100.0**	**3,060**	**2.7**

Note: Column "%" provides the share of the total number of unique products. Column "% Tariffed" provides the ratio of "Tariffed" products to the number of unique products in column "Products" (in %). Imported goods account for about 25% of the Canadian CPI basket for goods based on consumer expenditures (Brouillette and Savoie-Chabot, 2017).

2.3 Product groups

We further categorize the products into five mutually exclusive groups: (i) **Tariffed**—products imported from the U.S. that are in HS8 categories tariffed by Canada; (ii) **Domestic substitutes**—domestic products in HS8 categories tariffed by Canada; (iii) **Third-country substitutes**—products imported from countries other than the U.S. within tariffed HS8 categories; (iv) **Imported non-substitutes**—goods imported from the U.S. or third countries in HS8 categories that are *not* tariffed by Canada; and (v) **Domestic non-substitutes**—domestic products in HS8 categories that are not tariffed.

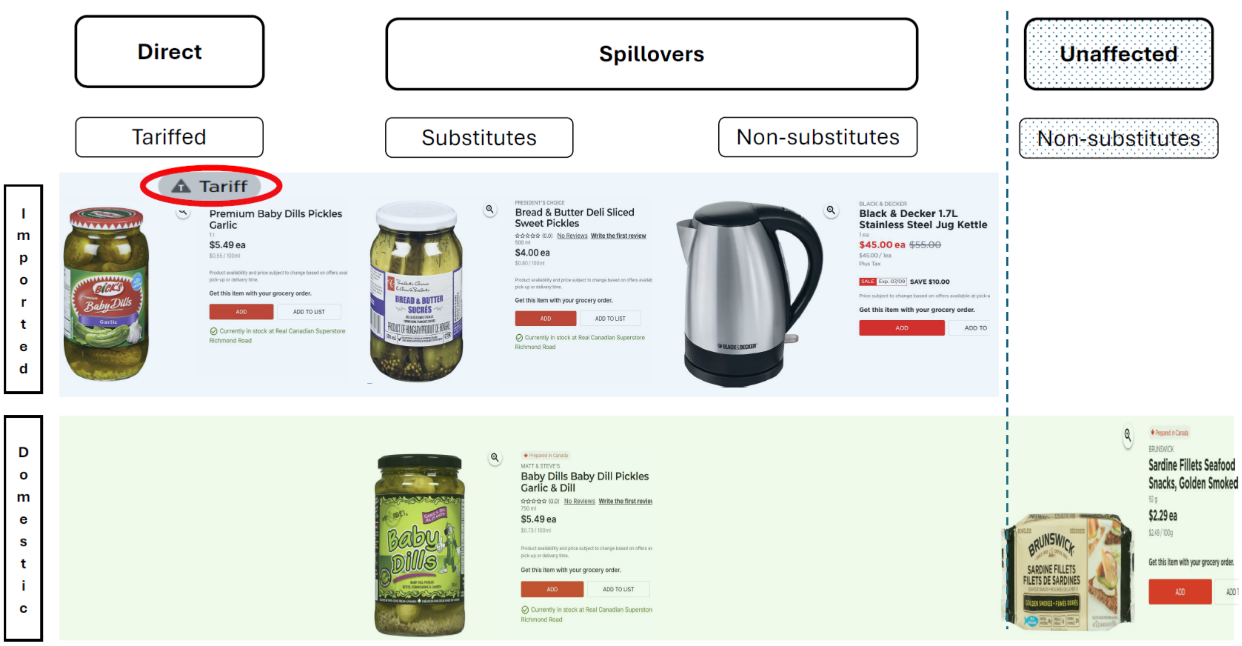
Figure 1 provides examples of how the products are classified. HS8 category 2001.10.00 "Vegetables, fruit, nuts and other edible parts of plants, prepared or preserved by vinegar or acetic acid" (Cucumbers and gherkins) is one of the HS8 categories affected by Canadian tariffs on U.S. imports. If a product "BRAND-1 Premium Baby Dills Pickles Garlic" is classified in this HS8 category, and it has a "Tariff" banner (provided by some retailers) or is imported from the United States, it is **Tariffed**.

There are other pickles sold in Canada that are also classified in this HS8 category but are not tariffed. Those are the substitutes imported from non-U.S. destinations (**Third-country substitutes**)—e.g., "BRAND-2 Bread & Butter Deli Sliced Sweet Pickles"— and the substitutes produced in Canada (**Domestic substitutes**)—e.g., "BRAND-3 Baby Dills

Baby Dill Pickles Garlic & Dill."

There are products that are not in HS8 categories affected by tariffs, i.e., they are less substitutable with products in affected HS8 categories. They can be imported from the United States or elsewhere (**Imported non-substitutes**)—e.g., "BRAND-4 1.7L Stainless Steel Jug Kettle"—or produced domestically (**Domestic non-substitutes**)—e.g., "BRAND-5 Sardine Filets Seafood Snacks, Golden Smoked."

Figure 1. Product groups

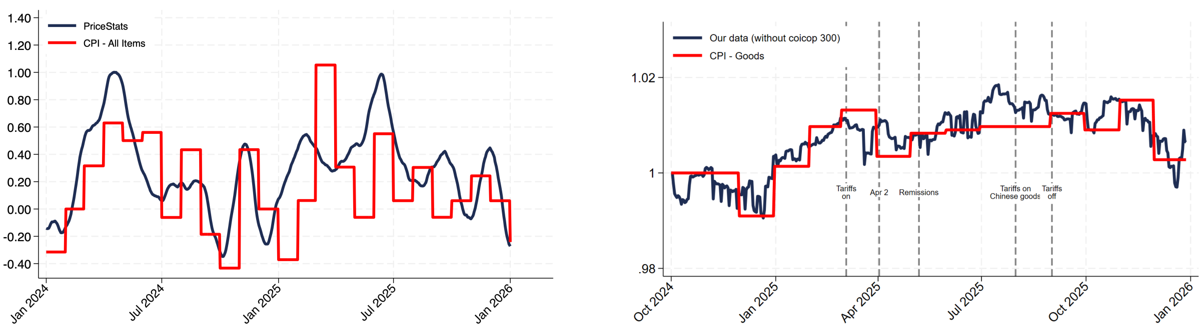


The estimation of the effects of tariffs in Section 4 is based on the differences-in-differences approach, where we use **Domestic non-substitutes** as the control group. The direct effects are estimated by using **Tariffed** goods as the treatment group. The other three groups are used for identifying the indirect effects of tariffs, or *spillovers*. For example, a pass-through to **Third-country substitutes** could indicate relocation of demand toward imports from other countries as importers look to replace the United States with other sources. Similarly, they can source domestically, which would show up as an effect on **Domestic substitutes**. Finally, a pass-through to **Imported non-substitutes** could indicate broader-based spillovers to goods not affected by tariffs. It could also reflect "imported inflation" from the United States: for example, U.S. tariffs on Canadian steel and aluminum could raise the prices of U.S.-produced exports to Canada, such as the steel jug kettle in Figure 1.

3 Aggregated Price Dynamics in 2025

To assess the representativeness of the data, Figure 2(a) compares monthly inflation rates computed by PriceStats at daily frequency with official all-items CPI inflation in Canada. The PriceStats series closely tracks the dynamics of CPI inflation, although temporary discrepancies arise because PriceStats does not include shelter, while the official CPI series does. Because our analysis uses a subset of the full PriceStats data, we also construct price indexes from our sample as weighted geometric means of product-level price changes, using CPI weights at the 1-digit COICOP level. Figure 2(b) compares this index in levels with the official CPI-Goods index and shows that both the level and dynamics of our sample-based index are closely aligned with the official series.[6] These comparisons indicate that the online price data capture the main aggregate price patterns in Canada and provide a reliable basis for studying product-level price responses.

Figure 2. Comparison of inflation and price indexes, CPI and PriceStats



(a) Monthly inflation rates

(b) Price indexes

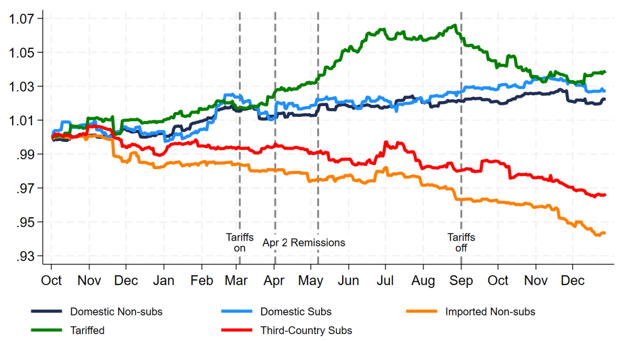
Note: Panel (a) presents month-over-month inflation rates computed by PriceStats and Canadian CPI-All items computed with data from Statistics Canada. Panel (b) presents a price index computed with our micro data and the CPI-Goods price index from Statistics Canada. Our index is computed as a weighted geometric mean of observed price changes using CPI weights at the 1-digit COICOP level for the period October 1, 2024 – December 28, 2025. This price index excludes COICOP 300 "Clothing and footwear," which requires significant adjustment for quality.

Next, we examine price dynamics for the five product groups defined in Section 2.3. Figure 3 plots average price indexes separately for all goods, food and beverages, household goods, appliances, and furniture, and other goods. The main pattern is visible in Panel (a): prices of tariffed products begin to diverge from the other product groups

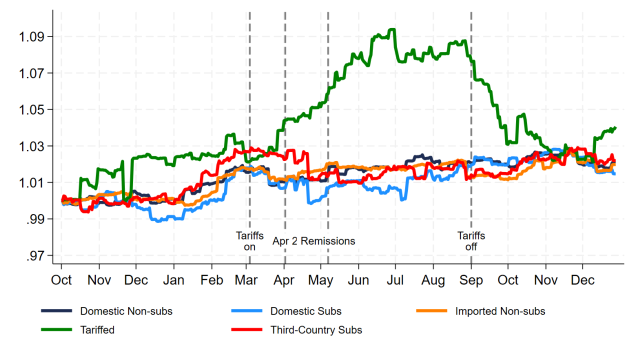
[6]The indexes in Figure 2(b) exclude COICOP 300 "Clothing and footwear", which exhibits a significant downward trend (Figure A2) in the PriceStats data. In the computation of the CPI, Statistics Canada performs quality adjustments and accounts for frequent seasonal product rotation and sales in clothing and footwear, which are not applied in our data. Figure A1 provides indexes that include "Clothing and footwear".

around March and April 2025, rise through the summer, and then decline after the removal of most Canadian retaliatory tariffs on September 1. Panels (b)–(d) show that this symmetric hump-shaped pattern is broad but heterogeneous across categories. The post-September decline is strongest for food and beverages in Panel (b), while prices of tariffed household goods, appliances, and furniture in Panel (c), and other tariffed goods in Panel (d), adjust more slowly. By contrast, prices of third-country substitutes and imported non-substitutes decline relative to domestic goods over much of the period, especially in Panel (d). This latter pattern is driven largely by clothing and footwear imported from China and Vietnam.

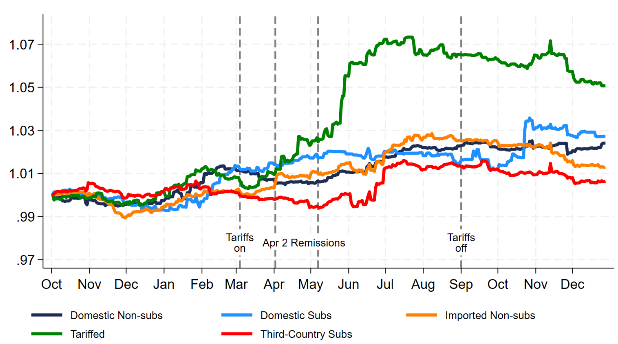
Figure 3. Price movements by product groups



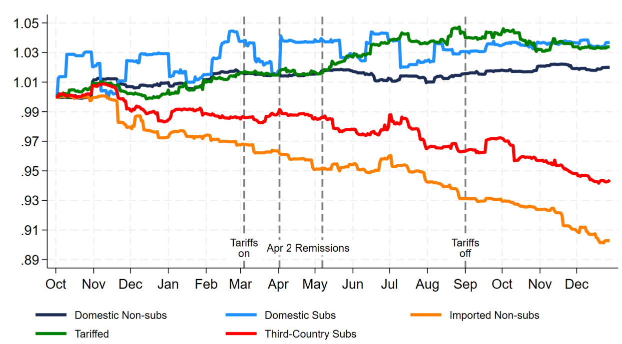
(a) All goods



(b) Food and beverages



(c) Household goods, appliances, and furniture



(d) Other goods (clothing and footwear, health and personal care, electronics, recreation, transport)

Note: Price indexes are weighted geometric means of price changes, excluding price discounts, with COICOP 1-digit weights. Tariffed goods are imported from the U.S. subject to Canadian tariffs; Domestic substitutes are domestic goods in the tariffed HS8 categories; Third-Country substitutes are goods imported from third countries in tariffed HS8 categories; Imported Non-substitutes are goods imported from the US or third countries in non-tariffed HS8 categories; and Domestic Non-substitutes are domestic goods in non-tariffed HS8 categories. Canadian retaliatory tariffs are imposed at HS8 level. Note the y-axis scales and ranges are different across panels.

4 Tariff effects on consumer product prices

This section provides estimates of the price effects of Canadian 2025 tariffs on U.S. imports. Section 4.1 provides total effects for all product groups. Section 4.2 dissects the effects across retailers and product categories. Section 4.3 summarizes the effects on trade flows.

4.1 Direct effect of Canadian tariffs

We analyze the effect of the tariff on retail prices for Canada as an event study of March 4, 2025—the date when Canadian tariffs were introduced. We use **Domestic non-substitutes** as our control group, and the four remaining groups as treated.[7] We estimate dynamic treatment effects using local projections difference-in-differences (LP-DiD) regressions (Dube et al., 2025):

$$\Delta_h \ln p_{i,t+h} = \beta_{0,h}\, D_{it} + \sum_{r\in\mathcal{R}} \beta_{r,h} \left(D_{it} \times \mathbb{1}\{R_i = r\}\right) + \sum_{c\in\mathcal{C}} \gamma_{c,h} \left(D_{it} \times \mathbb{1}\{C_i = c\}\right) + \delta_{rt}^{(h)} + \delta_{ct}^{(h)} + \varepsilon_{it}^{(h)}. \tag{1}$$

In equation (1), the dependent variable is the h-horizon log price change, $\Delta_h \ln p_{i,t+h} \equiv \ln(p_{i,t+h}) - \ln(p_{i,t-1})$, where $p_{i,t}$ denotes the posted price of product-retailer i for retailer r on day t.[8] Indicator D_{it} equals one on the day a tariff is applied to the relevant treatment group for product-retailer i (and zero otherwise), and we estimate a separate set of regressions for each treatment group. The coefficients $\beta_{0,h}$, $\{\beta_{r,h}\}_{r\in\mathcal{R}}$, and $\{\gamma_{c,h}\}_{c\in\mathcal{C}}$ trace the response of prices to the tariff event at horizon h, allowing the response to vary across retailers $\mathcal{R}$ and CPI categories $\mathcal{C}$.[9] The fixed effects $\delta_{rt}^{(h)}$ absorb retailer-by-day relative price variation common to all products sold by retailer r at time t (e.g., promotions or repricing events), and $\delta_{ct}^{(h)}$ absorb category-by-day relative price variation common to all products in CPI category c at time t (e.g., category-specific cost or demand shocks). We estimate (1) by weighted least squares,[10] and we report standard errors clustered at the product-retailer level to allow for arbitrary serial correlation in shocks within product-

[7] For this estimation, we drop COICOP categories "Clothing and footwear" and "Shelter, maintenance and repair" because they have fewer than 100 unique tariffed products in our sample. We also dropped one retailer that had fewer than 100 unique tariffed products.

[8] Without further analysis, we cannot identify the same product across different retailers. Therefore, index i identifies a unique product-retailer pair.

[9] We omit the first retailer and CPI category, so $\beta_{r,h}$ and $\gamma_{c,h}$ estimate differential pass-throughs.

[10] We use COICOP-1 level weights, and uniform weights within a COICOP-1 level and day.

retailer over time and across horizons.[11]

The rate of the pass-through from the 25% tariff ($\tau = 0.25$) to total (i.e., inclusive of tariff) retail prices is equal to price effects (i.e., $\beta_{0,h}$, $\{\beta_{r,h}\}_{r\in\mathcal{R}}$, and $\{\gamma_{c,h}\}_{c\in\mathcal{C}}$) divided by $\ln(1+\tau) \approx 0.22$. For example, an 11% tariff-induced change in retail prices would correspond to a 50% pass-through of the 25% tariff rate, indicating that half of the tariff cost is borne by final consumers, and the remaining half is paid by distributors (retailers, wholesalers, importers) and foreign exporters. Cavallo et al. (2021) provide a theoretical framework motivating an empirical specification similar to (1), which they use to estimate the retail-price pass-through of the 2018 U.S. tariffs on Chinese imports.[12] Throughout the paper, we report the estimated price effects, which can be converted to the rate of pass-through by dividing by 0.22.

Figure 4 provides average price response estimates for each of the four treated product groups, $\widehat{\beta}_h \equiv \widehat{\beta}_{0,h} + \sum_{r\in\mathcal{R}} w_{r,h}\,\widehat{\beta}_{r,h} + \sum_{c\in\mathcal{C}} w_{c,h}\,\widehat{\gamma}_{c,h}$.[13] The effect of tariffs on prices of tariffed products (Panel a) increased gradually after March 4, peaking at 6% after 105 days, by mid-June. It decreased gradually after the tariff removal on September 1, down to 1.2% by the end of December. Hence, about 1/4 of the 25% tariff was passed through to prices of tariffed products over the six months that the tariffs were in effect.[14] Most of the price effect was reversed within three months after the tariffs were removed. The magnitude and timing of the pass-through for Canada are very similar to the pass-through of the U.S. import tariffs estimated by Cavallo, Llamas, and Vazquez (2025) using PriceStats' U.S. retail price data. Our findings suggest that permanently removing the U.S. tariffs

[11] As a robustness check, we re-estimate our main specifications using two-way wild cluster bootstrap inference at the retailer level (Roodman et al. (2019); MacKinnon, Nielsen, and Webb (2021)), with Webb six-point weights to address the small number of retailer clusters. All main results remain statistically significant at conventional levels.

[12] The literature also uses the dollar-for-dollar pass-through explained in Flaaen et al. (2025), Sangani (2026). Estimation of how the tariff burden is divided between distributors and foreign exporters and estimation of the dollar-for-dollar pass-through would both require detailed data on distribution margins, which is beyond the scope of this paper.

[13] To summarize the heterogeneous effects, we form weighted averages across retailers and CPI categories. For each horizon h, we compute:

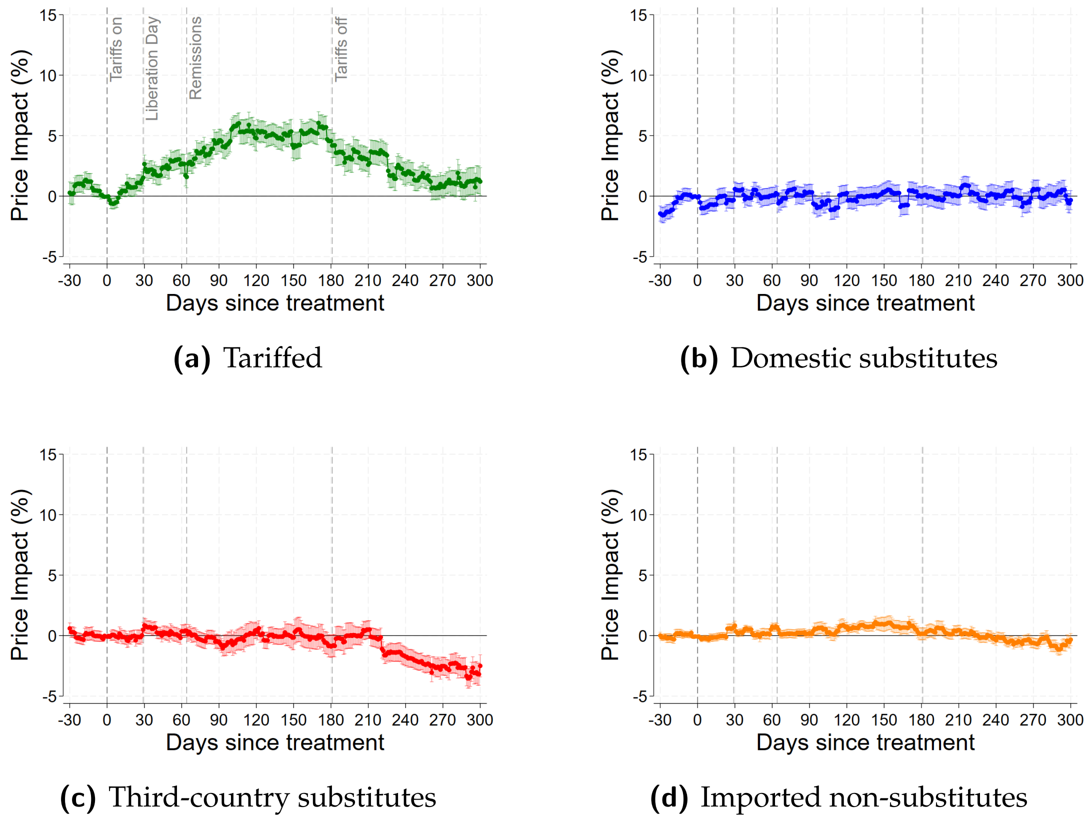
$$S_h \equiv \sum_{i,r,t\in\mathcal{S}_h} aw_{it}\,D_{it}, \qquad S_{r,h} \equiv \sum_{i,t\in\mathcal{S}_h} aw_{it}\,D_{it}\,\mathbb{1}\{R_i = r\}, \qquad S_{c,h} \equiv \sum_{i,r,t\in\mathcal{S}_h} aw_{it}\,D_{it}\,\mathbb{1}\{C_i = c\},$$
$$w_{r,h} \equiv \frac{S_{r,h}}{S_h}, \qquad w_{c,h} \equiv \frac{S_{c,h}}{S_h},$$

where aw_{it} are the analytic weights used in (1).

[14] The Canadian dollar depreciated 6.8% between October 1st, 2024 and March 3rd, 2025 (Figure A5 in Appendix A). After the imposition of retaliatory tariffs, it *appreciated* back to the level it had at the beginning of our sample. It is possible that this appreciation mitigated the price impact of Canadian tariffs. However, since we do not observe a significant change in the relative prices of *Third-country substitutes*, we conclude that the impact of the exchange rate on retail prices was limited.

could result in a fast reversal of the associated price effects.

Figure 4. Average price impact across treated product groups



(a) Tariffed

(b) Domestic substitutes

(c) Third-country substitutes

(d) Imported non-substitutes

Note: The price impact is estimated by the difference-in-differences linear projections of the March 4 effect, with 1-digit COICOP weights, using specification (1). Each plot provides the estimated average price impact for each of the four treated groups (Tariffed, Domestic substitutes, Third-Country substitutes, and Imported Non-substitutes) relative to the control group (Domestic Non-substitutes). Vertical lines refer to March 4, April 2, May 7, and September 1, 2025, respectively.

Figure 4 (Panels b, c, d) shows minimal or no indirect effects of the Canadian tariffs on the other treated groups. This result contrasts with findings from other studies of import tariffs that document significant spillovers.[15] Our result suggests that such spillovers are not universal and may depend on tariff policy scope, timing, and retailer behavior.

Given the small share of tariffed products and no significant spillovers to other goods, the total effect of Canadian tariffs on consumer prices in our dataset is very small, adding roughly 0.3 p.p. to the all-items CPI by mid-summer. By contrast, the effect of U.S. tariffs

[15] Cavallo, Llamas, and Vazquez (2025) show that prices of imported goods rose twice as much as domestic ones after U.S. imposed import tariffs in 2025, with spillovers concentrated in categories like furnishings and low-priced goods. Flaaen, Hortaçsu, and Tintelnot (2020) document significant spillovers in the 2018 U.S. washing machine case: while tariffs directly raised washer prices by around 12%, dryer prices—untariffed but complementary—also rose by a similar amount.

estimated by Cavallo, Llamas, and Vazquez (2025) is much larger, 0.7 p.p. by October 2025, due to a much larger share of tariffed products.

We report several robustness results in the appendices. In Appendix E, we assess pre-trends more formally using three alternative approaches. Across all exercises, there are no systematic deviations from zero across the pre-treatment period, and the post-treatment dynamic path closely tracks our baseline estimates. In Appendix F, we address the concern that tariffs may not be randomly assigned across countries or across HS codes. Using an alternative double LP-DiD approach, we show that the contributions from non-random assignment of tariffs to the estimated price effects in Figure 4(a) are small.

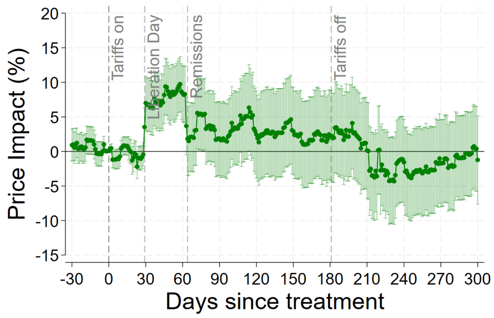
4.2 Tariff price effects across goods and retailers

We now turn to our estimates of price impacts across retailers and CPI categories. Figure 5 shows large variation of the effects across retailers. First, the speed of the estimated relative price increase and decrease varies across retailers. For example, the relative price for the Appliances and Electronics retailers reaches its peak rapidly, and dissipates to zero shortly after tariffs are removed. For Grocery retailers, the relative price rises more gradually, but is also sharply reversed after tariffs are removed. The price effect for the Household Goods retailer, on the other hand, declines more slowly, falling to around half of its peak level by the end of December.

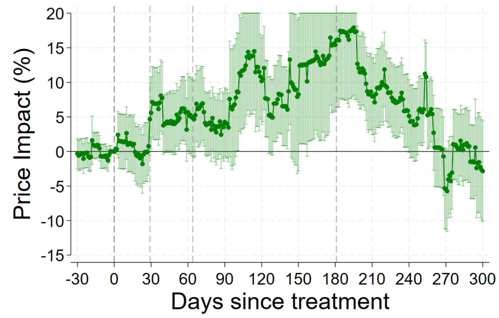
Second, the tariff effect on relative prices of Appliances and Electronics retailers moved significantly around April 2 ("Liberation Day") and May 7 ("Remissions"). For example, for the Appliances Retailer, the relative price jumped from –0.4% on April 1 to 7% on April 3, a day after the announcement of broad U.S. import tariffs by the U.S. administration, and reached its peak of 9.8% 29 days later. Because Canadian retaliatory tariffs had already been in place for roughly a month, these discrete movements suggest that the U.S. announcement influenced these retailers' expectations of the future path of *Canadian* tariffs. They are consistent with belief updating about policy persistence: even though April 2 did not introduce new U.S. tariffs specifically on Canada, it plausibly increased the perceived likelihood that the trade conflict would escalate and endure, raising the expected duration of Canada's retaliation.[16] In Appendix D we provide examples from the contemporaneous media coverage that the counter-tariffs were perceived to be temporary when they were introduced and then viewed as more persistent after the announcement of the U.S. tariffs on April 2, 2025.

[16]On April 3, 2025, Canada announced new 25% tariffs on products not included in our dataset—non-CUSMA compliant fully assembled vehicles and non-Canadian and non-Mexican content of CUSMA compliant vehicles imported into Canada from the United States; these tariffs were effective on April 9, 2025.

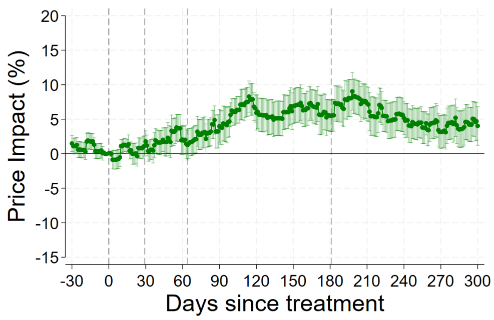
Figure 5. Estimated price effects across retailers



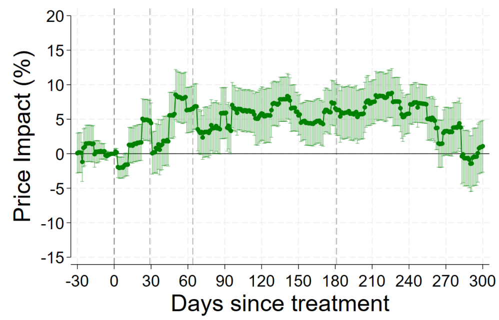
(a) Appliance Retailer



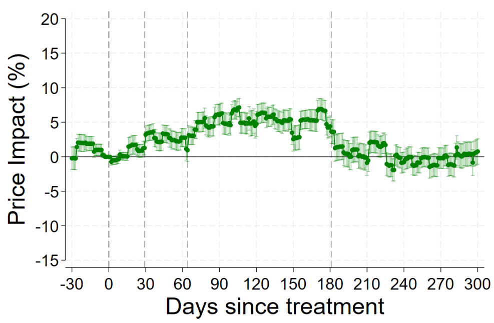
(b) Electronics Retailer



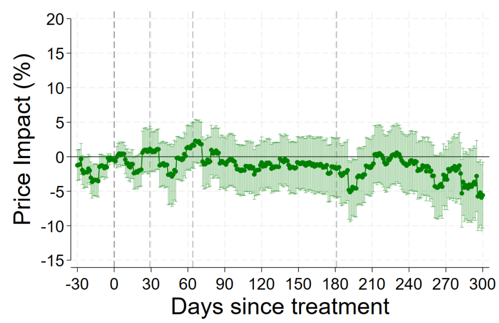
(c) Household Goods Retailer



(d) Grocery Retailer 1



(e) Grocery Retailer 2



(f) Grocery Retailer 3

Note: The price effects of tariffs are estimated by the difference-in-differences linear projections of the March 4 effect using specification (1). Each plot provides the estimates for each of the retailers of the price impact on Tariffed goods relative to the control group (Domestic Non-substitutes). Vertical lines refer to March 4, April 2, May 7, and September 1, 2025, respectively. Coefficients are averaged across CPI categories using the weights of Footnote 13.

At least half of the April 2 effect was reversed at the time of the publication of the remissions order for the tariffs on U.S. products by the Canadian government on May 7, 2025. Our dataset includes some of the products eligible for remissions. For example, infant formula and nutrition formula are present in the food category in our dataset.

Washing machines and other appliances may be sold to long-term care facilities and, thus, might be eligible for remissions. Firms importing aluminum cans or steel for canned products could claim remissions. However, remissions were limited to imports used for processing rather than direct retail sale and were granted only on a case-by-case basis. Given that the remissions do not broadly apply to the final consumer products in our dataset, we interpret the reversal of the tariff impact as the result of the correction of retailers' beliefs that the tariffs would persist.

After most of the Canadian retaliatory tariffs were removed on September 1, 2025, their relative price effects were completely reversed by grocery retailers (within a month or so), and by appliance and electronics retailers (within three months or so). By contrast, the effect persists for the household goods retailer, where it is at around 2/3 of its peak by the end of 2025.

Breaking down estimated tariff effects by CPI categories instead of by retailers (Figure A4) yields somewhat smaller variation, suggesting that the effect of tariffs is determined at a retailer level rather than dictated by product characteristics. The impact of tariffs is the largest for food and beverages. In line with retail-level estimates, the effects are completely reversed for food and beverages after the tariffs were lifted.

To quantify the contributions of retailer and CPI category effects to the total tariff effect shown in Figure 4, we compute the partial R^2 for the first three terms of specification (1), and average each of them across horizons $h > 0$. We find that, of the total increase in the R^2 when comparing the unrestricted model to the model with only fixed effects, the treatment effect without interactions explains 29%; the retailer-specific treatment effects explain 41%, and the CPI category-specific treatment effects explain 30%.[17] We interpret this decomposition as pointing toward retailers playing a dominant role in the determination of tariff effects.

4.3 Impact on import values and quantities

The Canadian counter-tariffs significantly reduced imports of tariffed U.S. goods. We use Canadian International Merchandise Trade monthly data at the HS10 level for the dollar value and quantity of goods by country of origin and by province of destination for the January 2024–March 2026 period. We estimate LP-DiD specification similar to (1) for import values and quantities using *Tariffed* and *Third-country substitutes* as treatment groups, and *Imported non-substitutes* as the control group (Appendix G).

We find that imports of tariffed U.S. products declined rapidly and substantially rela-

[17]Results are unchanged when we permute the order in which we add the regressors.

tive to non-tariffed imports, with effects appearing in March, when the tariffs were introduced. The decline deepened over the following months, reaching its largest magnitude around mid-2025, with peak declines of 26% for import values and 21% for import quantities. These reductions in trade flows are comparable to the 25% to 30% fall in import values after the imposition of the U.S. tariffs on Chinese imports reported in Amiti, Redding, and Weinstein (2019). Similar to them, we also find relatively small movements in average ex-tariff unit values, implying that the prices received by exporters did not change significantly, and therefore most of the tariff was passed through to domestic prices.

5 Determinants of the effects of import tariffs on consumer prices

In this section, we provide evidence on some of the determinants of the degree to which import tariffs affect consumer prices, and the differences of these effects across retailers and goods, including: firms' expectations of tariff duration (Section 5.1), pricing behaviour (Section 5.2), tariff visibility (Section 5.3), exposure to U.S. imports (Section 5.4), and inventories (Section 5.5).

5.1 Firms' expectations about tariff persistence

In Section 4.2, we conjecture that the U.S. April 2 announcement of the global tariffs may have influenced Canadian firms' expectations about the duration of Canadian retaliatory tariffs on U.S. imports, leading to discrete retail price increases on or around April 2 for some of the retailers. To assess how firms' expectations of tariff duration influence their price adjustments, we analyze firms' responses to hypothetical scenarios in the Business Leaders Pulse, an online survey of Canadian firms for the Bank of Canada (Chernis et al., 2022).

In the survey conducted in September 2025, 205 respondents were randomly presented with one of two hypothetical scenarios that differ in how long the tariffs between the United States and Canada will last before they are removed (1 vs 3 years):

Scenario 1 *Suppose that tariffs between the US and Canada remained in place for the next year and were then removed.*

Scenario 2 *Suppose that tariffs between the US and Canada remained in place for three years and were then removed.*

The text of the scenario is followed by the question:

What portion of the tariff cost increases would you pass through to Canadian customers?
If you plan to pass on all of the tariff cost increases, insert 100. If you do not plan to pass on any of the tariff cost increases, insert 0.

Using survey responses, we estimate the following specification:

$$PT_i = a + b \cdot D_i^{3YR} + \epsilon_i, \tag{2}$$

where PT_i is tariff pass-through reported by firm i, D_i^{3YR} is a dummy variable that equals 1 if respondent i was assigned scenario with a tariff duration of 3 years, and 0 if respondent i was assigned scenario with tariff duration of 1 year. Specification (2) is estimated by Huber robust regression to reduce the influence of outliers and influential observations.

Estimation results are presented in Table 2. Firms that expect tariffs to be removed after one year report passing through 59.4% of the tariff cost. Firms that expect tariffs to last three years report a 20.4 p.p. higher pass-through than the firms in Scenario 1, corresponding to a total expected pass-through of 79.8%. This result suggests a change in tariff policies that alters expectations of tariff duration can significantly influence the pass-through to firms' prices. Such policy changes include announcements and news of future changes to already existing tariffs—like those made by the U.S. administration on April 2, 2025.

Table 2. Estimation results for pass-through for firms

	Pass-through
D_i^{3YR}	20.4**
	(7.9)
Constant	59.4***
	(5.8)
Observations	205
R^2	0.03

Notes: Estimation results from Huber robust regression of specification (2). Dependent variable is the tariff pass-through reported by firm i. Standard errors in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

The effect of expected tariff duration on the firm's price can be attributed to nominal price rigidities. In Appendix H, we provide an example using a simple Calvo model, where the firm's optimal reset price is the weighted sum of its future marginal costs.[18] When a tariff is introduced at date 0 and is fully reversed at date T, the firm's optimal price response at date 0 is increasing with the expected tariff duration T, reflecting a higher present value of future marginal costs due to longer tariff duration. Assuming a reasonable 10% average monthly frequency of price changes, this simple model predicts that increasing tariff duration T from 12 months to 36 months implies a 34% higher price response, which is what we find in the survey (i.e., 79.8%/59.4%=1.34). Gödl-Hanisch and Menkhoff (2024) use hypothetical scenarios in the ifo Institute Business Survey of German firms to estimate the effect of the expected duration of a marginal cost shock on firms' prices, finding significantly higher pass-through in the permanent shock scenario relative to the temporary shock duration scenario.

5.2 Pricing behaviour

Retailers' ability to adjust prices quickly may influence the speed of the tariff pass-through. Because pass-through can occur either through more frequent price adjustments or through larger conditional price changes when adjustments occur, it is useful to distinguish between these two margins of adjustment. We therefore decompose the tariff pass-through effect into components that reflect more frequent adjustments versus larger magnitudes of those adjustments, and separately, into price increases versus decreases.

Following Klenow and Kryvtsov (2008), daily inflation can be decomposed as

$$\pi_s = fr_s^+ \cdot dp_s^+ - fr_s^- \cdot dp_s^- ,$$

where fr_s^+ (fr_s^-) is the fraction of items with price increases (decreases) on day s, and dp_s^+ (dp_s^-) is the average absolute size of those increases (decreases). For simplicity, we will ignore cross-sectional heterogeneity here.

Let $j \in \{-, +\}$, and define the cumulative sum of the differences in the frequency of price changes between treatment (T) and control (C) groups over horizon h since the treatment date t^*:

$$\delta FR_h^j = \sum_{s=t^*}^{t^*+h} \left(fr_s^{j,T} - fr_s^{j,C} \right) .$$

Similarly, define the cumulative sum of the differences in the size of price changes

$$\delta DP_h^j = \sum_{s=t^*}^{t^*+h} \left(dp_s^{j,T} - dp_s^{j,C} \right) .$$

[18] We thank our discussant, Kunal Sangani, for proposing this example.

The total treatment effect β_h estimated using (1) can be decomposed as

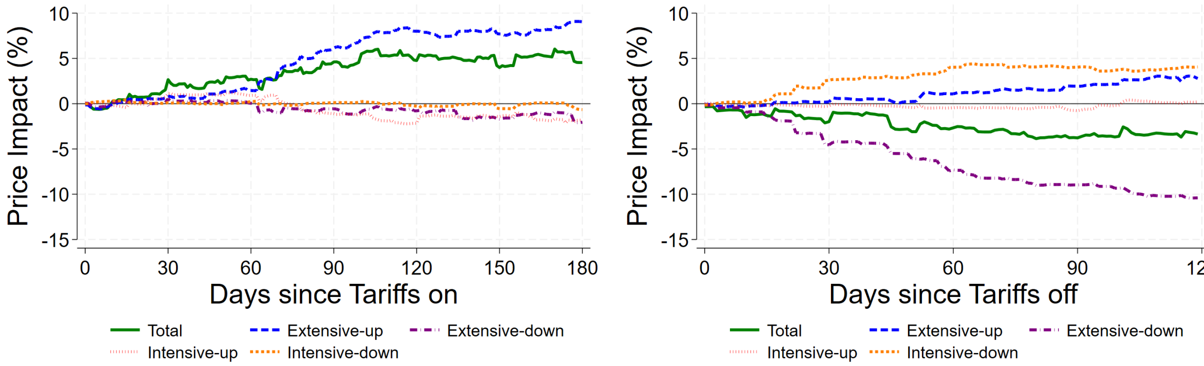
$$\beta_h = \underbrace{\overline{dp^+}\,\delta FR_h^+}_{\text{extensive–up}} - \underbrace{\overline{dp^-}\,\delta FR_h^-}_{\text{extensive–down}} + \underbrace{\overline{fr^+}\,\delta DP_h^+}_{\text{intensive–up}} - \underbrace{\overline{fr^-}\,\delta DP_h^-}_{\text{intensive–down}} + \text{interactions}, \tag{3}$$

where bars denote sample means, and "interactions" denotes second-order terms capturing comovement between frequency and size margins. Decomposition (3) is an identity that attributes the tariff's cumulative price effect β_h to four margins. **Extensive–up/–down** show the degree to which tariffed products experience more frequent price increases/decreases than control products. **Intensive–up/–down** show whether price increases/decreases on tariffed products were larger. Appendix I provides the details of the derivations and explains the estimation of the contributions of price adjustment margins to the price effect of import tariffs.

Figure 6 plots the contribution of each margin estimated at horizon h. To highlight the key results, we split the LP-DiD estimation into two parts: the effect of the introduction of Canadian tariffs on March 4, 2025 (panel a), and the effect of their removal on September 1, 2025 (panel b). The main result is that the tariff pass-through occurs almost entirely through the extensive margin. When the tariffs were in place, the relative price increases of the tariffed products occurred via the increase in the frequency of price increases relative to the frequency of increases for the control group. After the tariffs were removed, the decline in relative prices was introduced by the higher rate of price decreases for tariffed products relative to the products in the control group.

To our knowledge, this is the first evidence of how different margins of product-level price adjustment contribute to tariff pass-through. We demonstrate that firms actively use the extensive margin of price adjustments to accommodate tariff effects. This evidence points to models with state-dependent price adjustments, in which firms vary the timing of their price changes to respond to large aggregate or sectoral shocks, as they did, for example, during the post-pandemic inflation surge (Cavallo and Kryvtsov, 2024; Montag and Villar, 2025). Using German firms' survey and hypothetical scenarios of global supply shocks, Gödl-Hanisch and Menkhoff (2024) show that the pass-through of the cost changes to prices is driven mainly by an extensive margin.

Figure 6. Decomposition of the price effects of tariffs



(a) Tariffs on (March 4, 2025) **(b)** Tariffs off (September 1, 2025)

Note: Decomposition of total price effects of tariffs into four margins: extensive (increases and decreases) and intensive (increases and decreases). Panel (a) provides the decomposition of tariffs introduced on March 4, 2025. Panel (b) provides the decomposition of tariff removal on September 1, 2025.

Notably, after the tariffs were removed, the relative size of price decreases was *smaller*, i.e., the intensive margin of price adjustment "worked against" lowering the pass-through. The asymmetry of price increases and decreases is typical in state-dependent models with positive trend inflation (Ball and Mankiw, 1994). Previous studies have documented that prices tend to respond faster or more fully to cost increases than to cost decreases, due to factors like capacity constraints, non-linear adjustment costs, or firms' reluctance to cut nominal prices (Peltzman, 2000). A related literature on the incidence of sales taxes generally finds larger pass-through of tax increases relative to tax decreases (Benzarti et al., 2020; Karadi and Reiff, 2019), although the results vary with the magnitude and duration of tax changes and depend on geographic and sectoral details.

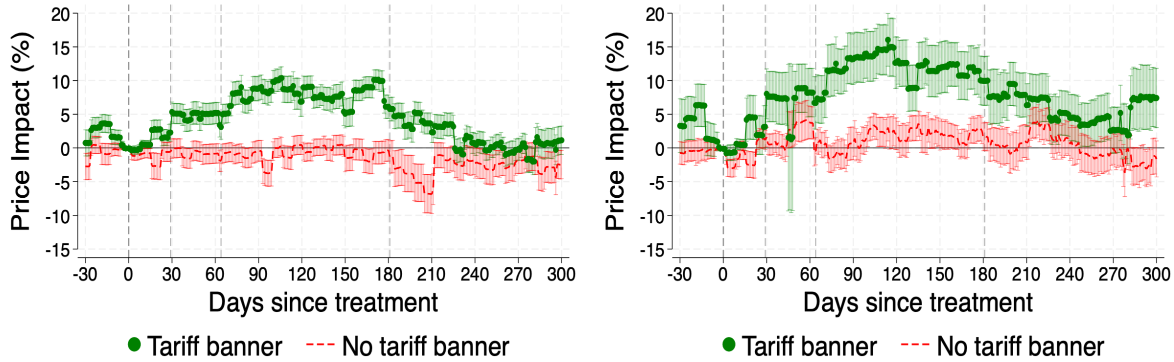
5.3 Tariff visibility

A distinctive feature of some Canadian retailers in our sample is the use of explicit *tariff banners* on shelf tags (e.g., a "Tariff" banner) that make the policy origin of cost increases salient at the point of purchase. To understand whether tariff banners affect the pass-through, we modify specification (1) and estimate:

$$\Delta_h \ln p_{it} = \beta_{0,h} D_{it} + \beta_{tb,h} \left(D_{it} \times \mathbb{1}\{TB_i = 1\} \right) + \delta_{rt}^{(h)} + \delta_{ct}^{(h)} + \varepsilon_{it}^{(h)}, \quad (4)$$

only using observations for the two retailers that used tariff banners, where a product that (at any time) exhibited a tariff banner has $TB_i = 1$. We observe 1,192 unique tariffed products in these two retailers, of which 671 displayed a tariff banner.

Figure 7. Price impact estimates conditional on tariff banner



(a) Within retailers **(b)** Across retailers

Note: The price impact of tariffs is estimated by the difference-in-differences linear projections of the March 4 effect using specification (4). Each plot provides the estimates for each of the two subgroups (with/without tariff banner) of the price impact on Tariffed goods relative to the control group (Domestic Non-substitutes). Panel (a) uses variation for bannered vs non-bannered products in retailers that use tariff banners. Panel (b) uses products of the same brand sold both in retailers that use tariff banners and retailers that do not. Vertical lines refer to March 4, April 2, May 7, and September 1, 2025, respectively.

Figure 7(a) shows that tariffed imported products with a tariff banner exhibit substantially larger and faster retail price responses than tariffed imported products without a banner: the estimated treatment effect becomes positive shortly after implementation and climbs to economically meaningful magnitudes within a few days, while the corresponding series for tariffed imports without the banner is insignificant and considerably noisier. The effect peaks at around 10% between 3 and 4 months after the tariffs were introduced. This pattern suggests that tariff *visibility* may materially affect pass-through.

Interpreting the banner split causally requires care. Banner use is likely endogenous: retailers may choose to display a tariff tag precisely when larger price changes are anticipated or when they expect consumers to be particularly sensitive. Moreover, banner status may correlate with product category, competitive conditions, or the size of the underlying cost shock, all of which could independently affect pass-through.[19]

To help address concerns about endogeneity of the tariff banner, we analyze relative prices for the *same* product across retailers, comparing those that display the banner vs

[19] Another potential caveat is that misclassifications of the country of origin (the U.S.) and/or HS8 category could have caused products to be misclassified into the tariffed group. However, it is also possible that the retailer has not raised prices on some of the tariffed products and has not marked them with a tariff banner because it has negotiated with suppliers such that suppliers absorbed the tariffs without affecting the retail price. Furthermore, the composition of the products may also play some role: food and beverages account for about 84% of products in the group with a tariff banner, which is higher than in the group classified as tariffed but without a tariff banner (48%).

those that do not. Using fuzzy matching of product names and LLM-assisted filtering, we create 58 match groups (302 unique products), with each group containing products of the same brand sold at different retailers. We then estimate the effect of tariffs on the products in these groups using specification (4) and *Domestic non-substitutes* as the control group. Figure 7(b) shows a positive effect of the tariff banner on prices in this case. For example, approximately 4 months after tariffs were introduced, bannered products experienced a 12% price increase, which is close in both the timing and the magnitude to the effect estimated using price variation across products within the same retailer (Figure 7(a)). For the same products sold in retailers that do not use the tariff banner, the price effect is close to zero.

Why would visibility matter for pass-through? A central (but often implicit) friction in retail pricing is the fear of antagonizing customers. A classic starting point in the literature is the evidence that consumers impose fairness norms on firms' pricing decisions and view some price increases as illegitimate (Kahneman, Knetsch, and Thaler, 1986). Building on this idea, Rotemberg (2005) formalizes "customer anger" as a real economic cost that can rationalize price rigidity: firms may delay or smooth price adjustments because nominal price increases trigger scrutiny about whether the firm is behaving fairly. In related theoretical work, Rotemberg (2011) emphasizes that firms may avoid pricing patterns that could be interpreted as opportunistic, because customers who reject the "benevolent firm" hypothesis become angry and impose penalties on the firm. These mechanisms line up with direct evidence from firm surveys that customer considerations loom large in managers' pricing decisions and can dominate literal menu costs (Blinder et al., 1998; Zbaracki et al., 2004). Complementing the survey evidence, Anderson and Simester (2010) provide experimental evidence that customers react adversely to pricing outcomes they perceive as unfair: customers who observe that the same retailer later sells a product at a lower price reduce subsequent purchases.

In this framework, a tariff is not only a cost shock; it is also an *explanation* for why posted prices change. When the tariff is not salient, a retailer raising prices risks being perceived as raising markups, which can trigger fairness-based punishment (e.g., in the form of lower loyalty, reduced demand, reputational harm) and thereby dampen pass-through even if costs rise. A visible "Tariff" banner can shift attribution away from the retailer and toward government policy, reducing perceived unfairness and the associated anger cost. Recent theory makes this inference channel explicit: when consumers care about fairness and form beliefs about firms' costs and motives, equilibrium prices can display incomplete and delayed pass-through that depends on what consumers infer from observed price changes and available information (Eyster, Madarász, and Michaillat, 2021). Tariff banners can be interpreted as providing precisely the information that changes consumers' inferences about why prices are rising, thereby relaxing a reputational constraint on price adjustment.

Tariff salience has important policy implications. Targeted tariffs, paired with clear, credible disclosure may accelerate retail price adjustment by reducing retailers' concern about customer backlash. Conversely, when there is uncertainty about the products affected by the tariffs, firms may absorb more of the shock in their margins (at least temporarily) or adjust more slowly, muting observed pass-through. Whether transparency is normatively desirable depends on the objective (revenue, protection, inflation management), but our evidence suggests that the information environment around a tariff can be a first-order determinant of pass-through dynamics.

5.4 Exposure to U.S. imports

The effects of tariffs on final prices in a given category may depend on the degree to which that category relies on imports from the United States. Categories with greater pre-tariff dependence on U.S. suppliers are likely to have fewer readily available untariffed alternatives in the short run, leading to larger pass-through of tariffs into retail prices. More generally, if retailers face constraints on shifting sourcing towards alternative suppliers, tariffed products in categories with greater U.S. import exposure should experience larger price increases following the introduction of tariffs.

To test this hypothesis, we compute the share of U.S. imports in total imports from all countries for each HS8 category using Canadian International Merchandise Trade data. We classify HS8 categories according to whether their U.S. import share is above or below the median and estimate specification (1) augmented with an interaction between the tariff indicator and the high-U.S.-share indicator. Details are provided in Appendix J.

We find that price effects for HS8 categories with high exposure to U.S. imports peak at around 9% four months after tariffs are introduced, compared to roughly 5% for products with low exposure. This difference is not driven by average differences in retailer or COICOP-category composition across the two groups. This result suggests that categories with greater pre-tariff dependence on U.S. suppliers are likely to have fewer readily available untariffed alternatives in the short run, leading to larger pass-through of tariffs into retail prices. The upshot is that tariffs primarily affected the prices of directly exposed products rather than generating category-wide price increases.

5.5 Inventories

Since retailers sell final goods from their inventory stocks, the cost of maintaining and replenishing inventories are material for retailers' pricing decisions.[20] After import tariffs are introduced, retailers initially sell from existing inventory stocks, some of which were purchased before tariffs were imposed (Cavallo et al., 2021). This allows them to temporarily smooth cost increases and hold off raising prices. As inventories are depleted and retailers replenish at tariff-inclusive costs, price effects should become more visible. We would therefore expect larger or faster estimated price effects of import tariffs for those retailers and products associated with leaner inventory stocks.

Using Statistics Canada retail-trade data, we construct measures of days of inventory and show that 1-digit COICOP categories associated with leaner inventories, such as food, beverages, and gasoline, tend to experience faster price responses to tariffs than categories with deeper inventories, such as recreation, furniture, or household goods (Appendix K). In another exercise, we compare price sensitivity for food products with different shelf life from USDA FoodKeeper data. We find that more perishable products (e.g., dairy) tend to reach peak price effects sooner than products with longer shelf life (e.g., oils or confectionery). This evidence supports the hypothesis that tariff effects on prices materialize sooner for retailers and products operating with leaner inventories and shorter inventory cycles.

6 Conclusions

This paper studies the retail-price transmission of Canada's 2025 retaliatory tariffs on U.S. imports. The episode combines clear timing, substantial product-level tariff variation, and a partial reversal within the sample period. Linking daily posted prices from seven Canadian retailers to HS8 tariff exposure and country of origin allows us to trace both pass-through and its unwinding at the product level.

We document five broad patterns. First, retaliatory tariffs raise the prices of directly affected goods, but pass-through is gradual and incomplete: the relative price effect peaks at about 6%, roughly one quarter of the 25% tariff, and there is little evidence of systematic spillovers to untariffed substitutes or other imported goods. Second, the response is highly heterogeneous across retailers, more than across product categories, and is larger

[20] Aguirregabiria (1999) estimates that inventory dynamics may account for a large fraction of variation in retail markups. Kryvtsov and Midrigan (2013) show that lower inventories increase the responsiveness of prices to cost shocks to contain the risk of stocking out. Cavallo and Kryvtsov (2024) show that unexpected increases in stockouts have significant inflationary effects that materialize within three months, with larger and more persistent effects for imported goods and import-intensive sectors.

where exposure to U.S. imports is higher and inventories are leaner. Third, expectations matter: price effects jump around policy news even after the Canadian tariffs were in force, and survey responses show higher intended pass-through when tariffs are expected to last longer. Fourth, when most tariffs are removed, most price effects unwind. Both the increase and the reversal operate mainly through the extensive margin of price adjustment: more frequent price increases when tariffs are imposed and more frequent price decreases when they are removed. Fifth, products labeled "Tariff" at the point of sale exhibit faster and larger price responses, consistent with visibility reducing the reputational or fairness costs of raising prices.

Taken together, the results show that tariff pass-through is shaped by expectations and information, not only by tariff rates and coverage. The visibility result points to a related margin: when tariffs are explicitly labeled at the point of sale, retailers can more easily attribute price increases to policy, and pass-through is higher. The limited spillovers to untariffed goods are also consistent with an information channel: when tariff exposure is salient to consumers, domestic producers may have less scope to raise prices without drawing scrutiny, dampening opportunistic spillovers. More broadly, the inflationary consequences of trade policy depend on the clarity of the policy path and on how policy changes are communicated to firms and consumers. In this sense, the sharper price responses we observe in Canada may reflect a comparatively clearer and less volatile sequence of policy changes than in recent U.S. episodes, where tariff announcements and implementation have often been murkier and more variable.

Several questions remain for future work. A natural next step is to connect retail pricing responses more directly to upstream cost changes, inventories, and sourcing adjustments to distinguish price-setting from supply-chain avoidance. Another is to examine how consumer demand and substitution respond when tariffs are explicitly labeled, which would clarify the welfare and incidence consequences of visibility. More broadly, cross-country evidence beyond the United States remains scarce; the Canadian episode provides a benchmark for understanding how trade shocks propagate to inflation in other advanced economies.

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Online Appendix
"The Price Impact of Canadian Retaliatory Tariffs"

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Appendix Table of Contents

A Additional Tables and Figures

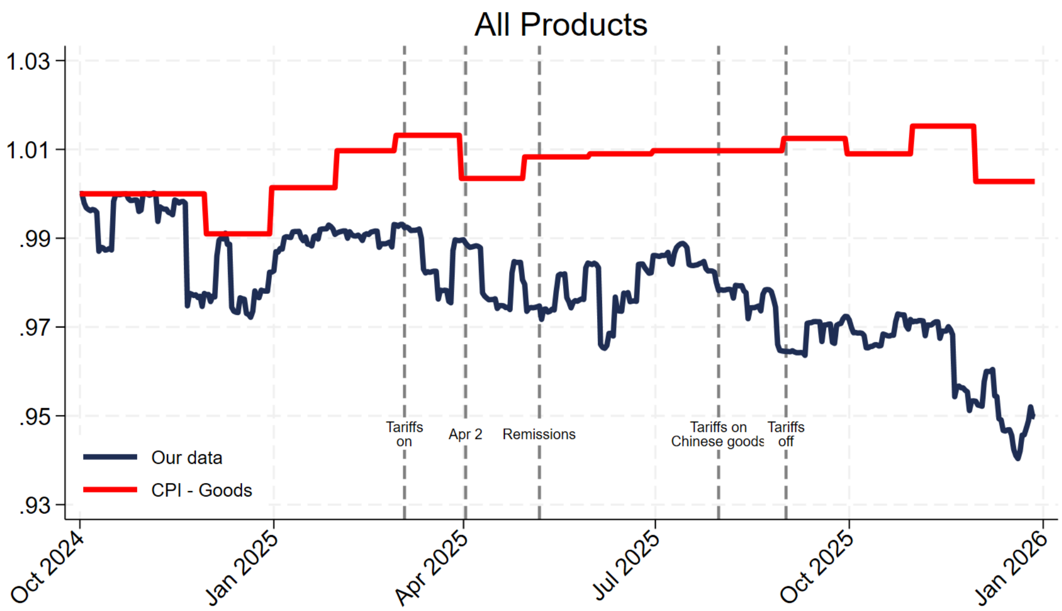
Table A1 provides inflation rates across different groups and categories of products. Overall, tariffed products reported an inflation rate of 1.8% over the period between December 1, 2024 and December 1, 2025, driven by the household goods (4.5%) and other goods, such as electronics and recreation equipment (3.0%). The prices of third-country substitutes and imported non-substitutes have declined by 1.7% and 3.3%, respectively, mostly because of the decline in the prices of other goods such as clothing and footwear.

Table A1. Inflation rates and the number of observations

	All goods	Food & bev.	Household	Other
Inflation rates by product groups, Dec 1, 2024–Dec 1, 2025				
Tariffed	1.8	0.8	4.5	3.0
Domestic non-subs	1.3	1.2	2.8	1.4
Domestic subs	2.4	2.5	3.3	2.0
Third-country subs	-1.7	1.0	1.4	-3.3
Imported non-subs	-3.3	2.0	2.7	-6.3
Number of observations				
Tariffed	1,193,291	370,570	362,707	460,014
Domestic non-subs	6,540,705	4,384,535	884,159	1,272,011
Domestic subs	1,003,184	517,561	214,185	271,438
Third-country subs	5,722,704	309,146	2,500,406	2,913,152
Imported non-subs	27,220,823	3,293,002	10,381,004	13,546,817
Total	41,680,707	8,874,814	14,342,461	18,463,432

Note: The number of observations is for the period between October 1, 2024 to December 28, 2025. "Other" goods include clothing and footwear, health and personal care, electronics, recreation, and transport.

Figure A1. Price movement in our data (with clothing) in comparison with CPI.



Note: The index with our data is constructed as a weighted geometric mean of observed product-level price changes, using CPI expenditure weights at the 1-digit COICOP level. This version includes COICOP 300 (Clothing and footwear). In the CPI, clothing prices are quality-adjusted (often using hedonic methods), whereas our matched-model index uses posted prices without quality adjustment. Because apparel items typically enter at higher prices and are discounted over their life cycle, and because we do not link discontinued items to replacement models, the apparel component mechanically drifts downward over time. As a result, including COICOP 300 induces a persistent downward trend in the index compared to the more stable quality-adjusted CPI.

Figure A2. Price movement in PS in comparison with CPI by COICOP.

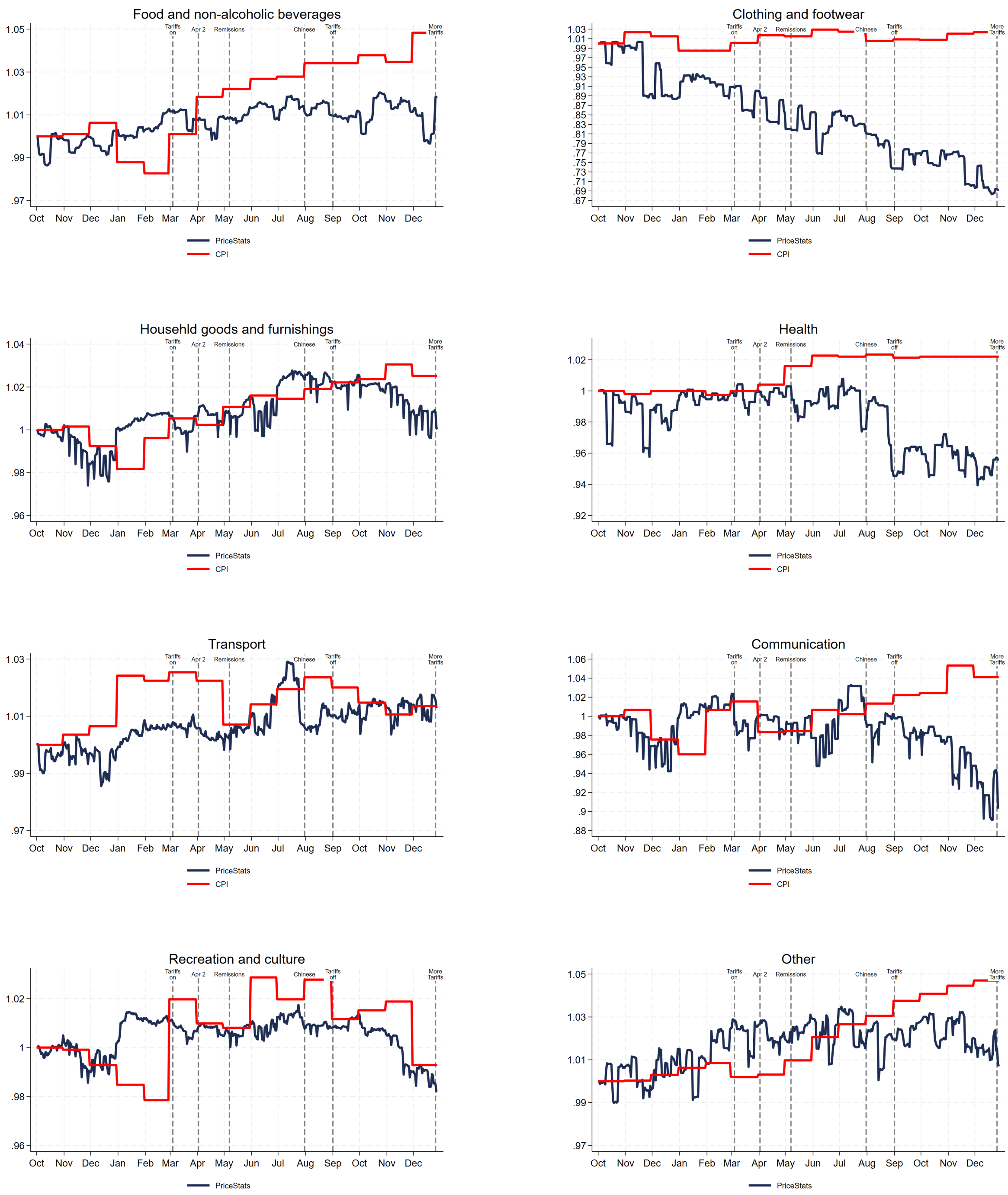
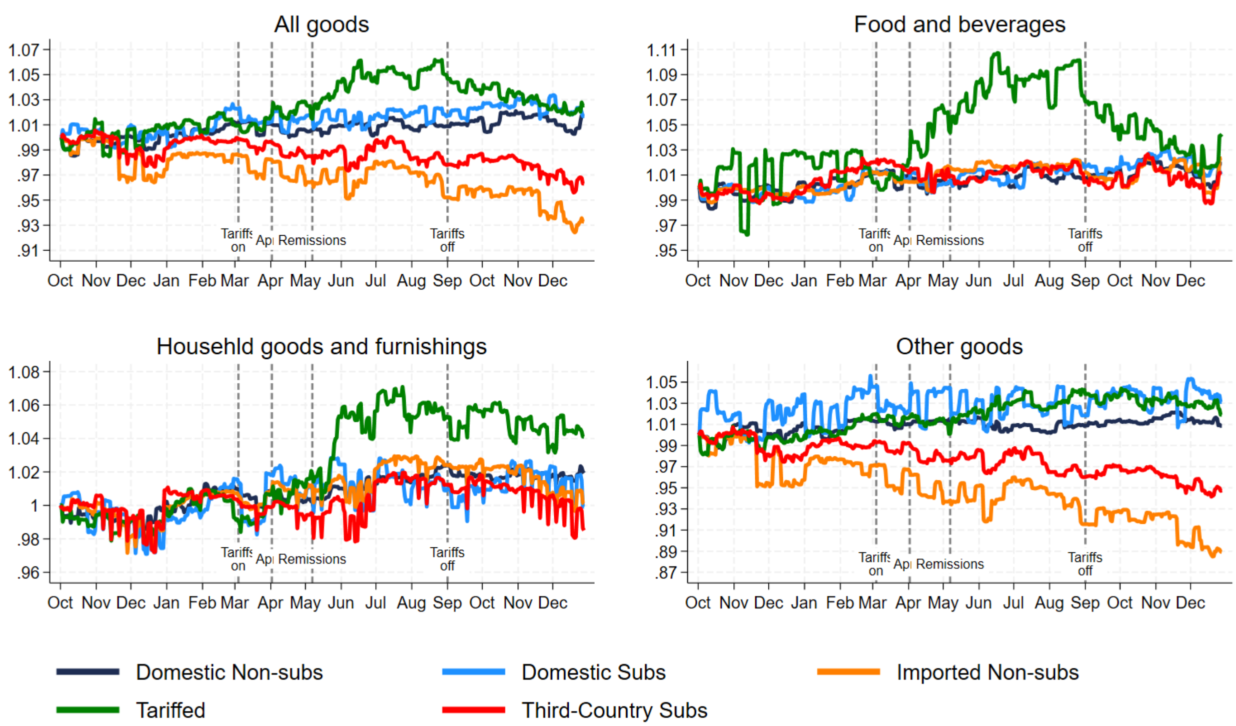
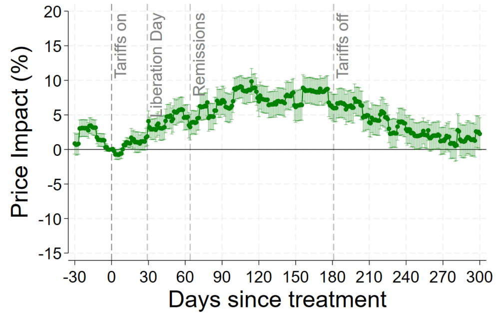


Figure A3. Price movements by product groups - Including Sales

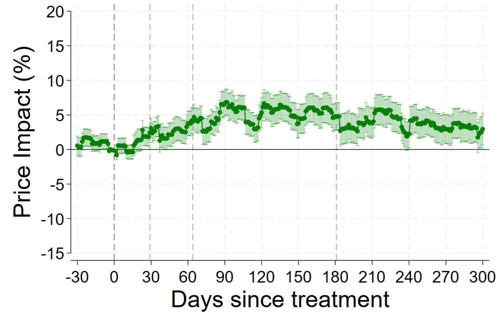


Note: Price indexes are weighted geometric means of price changes, with COICOP 1-digit weights. Tariffed are goods imported from the US subject to Canadian tariffs; Domestic substitutes are domestic goods in the tariffed HS8 categories; Third-Country substitutes are goods imported from third countries in tariffed HS8 categories; Imported Non-substitutes are goods imported from the US or third countries in non-tariffed HS8 categories; and Domestic Non-substitutes are domestic goods in non-tariffed HS8 categories. Canadian retaliatory tariffs are imposed at HS8 level.

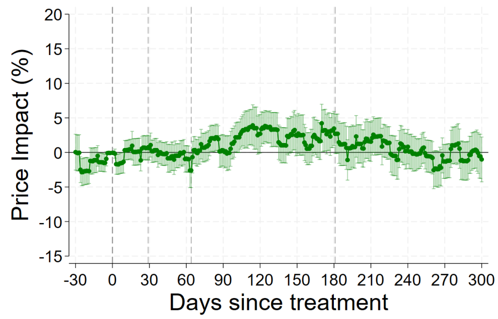
Figure A4. Price impact estimates across CPI categories



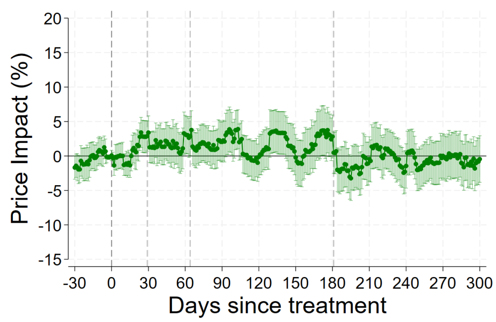
(a) Food and beverages



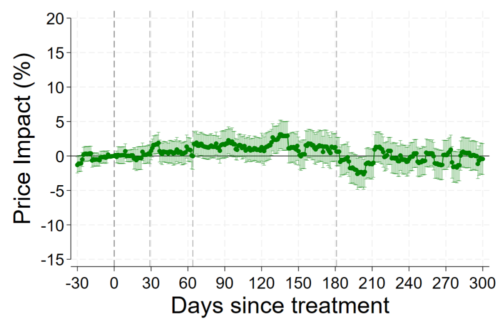
(b) Household operations, furniture, and equipment



(c) Health and personal care



(d) Transportation



(e) Recreation, culture, and reading

Note: The price impact of tariffs is estimated by the difference-in-differences linear projections of the March 4 effect using specification (1). Each plot provides the estimates for each of the CPI categories of the price impact on Tariffed goods relative to the control group (Domestic Non-substitutes). Vertical lines refer to March 4, April 2, May 7, and September 1, 2025, respectively. Coefficients are averaged across retailers using the weights of Footnote 13.

Figure A5. USD/CAD exchange rate

Note: Top line shows the evolution of the exchange rate from October 1, 2024 to January 31, 2026, expressed in USD per CAD. Bottom bars show the daily log change of the exchange rate. Vertical lines refer to March 4, April 2, and September 1, 2025, respectively.

B Canadian import tariffs: timeline and sources

Table B1 provides the timeline for Canadian tariffs in 2025.

List of U.S. products subject to Canadian tariffs effective March 4, 2025: https://www.canada.ca/en/department-finance/news/2025/03/list-of-products-from-the-united-states-subject-to-25-per-cent-tariffs-effective-march-4-2025.html. List of U.S. products subject to Canadian tariffs effective March 13, 2025: https://www.canada.ca/en/department-finance/news/2025/03/list-of-products-from-the-united-states-subject-to-25-per-cent-tariffs-effective-march-13-2025.html.

On May 7, a remission order was published to provide temporary tariff relief for goods used in manufacturing or processing, food and beverage packaging, agricultural production, public health, healthcare, public safety, and medical supplies and critical industrial inputs, reducing the effective tariff rate to zero for eligible imports through October 16, 2025 (later extended to December 16, 2025, and further into 2026): https://gazette.gc.ca/rp-pr/p2/2025/2025-05-07/html/sor-dors122-eng.html. Canadian government made an announcement about remissions on April 15, 2025, the publication of the remissions order on May 7, 2025, provided legal and regulatory implementation of the remissions. The remissions were for "the products imported for processing—not for direct retail sale" according to the Retail Council of Canada (www.retailcouncil.org/tariffs-and-trade), and the government guidelines stated that remissions will be considered on a "case-by-case basis, other exceptional circumstances that could have severe impacts on the Canadian economy" (https://www.canada.ca/en/department-finance/programs/international-trade-finance-policy/process-requesting-remission-tariffs-that-apply-on-certain-goods-us.html).

On September 1, 2025, Canada removed retaliatory tariffs on most products, while steel, aluminum, and automobiles remained subject to tariffs. List of the U.S. products subject to tariffs efffective September 1, 2025: https://www.canada.ca/en/department-finance/programs/international-trade-finance-policy/canadas-response-us-tariffs/complete-list-us-products-subject-to-counter-tariffs.html

As of October 2025, the effective Canadian tariff rate on U.S. goods was about 1% (2.6% in July), and the average U.S. tariff rate on Canadian goods was 5.9% (4.4% in July 2025). 2025 tariffs apply primarily to products that do not meet rules-of-origin requirements or fall under specific national security tariffs. See Bank of Canada (2025), Monetary Policy Report, October 29, Section 8: https://www.bankofcanada.ca/wp-content/uploads/2025/10/mpr-2025-10-29.pdf.

Table B1. Canadian Tariffs in 2025

Date	Measure	Tariff/Action	Product Scope	Policy Details
A. Tariffs and actions on U.S. imports				
March 4	Retaliatory Tariffs	25% surtax	Groceries, appliances, furniture, electronics, household goods	First wave of retaliatory tariffs targeting approximately C$30 billion in U.S. imports
March 13	Retaliatory Tariffs	25% surtax	Steel, aluminum, consumer durables	Expanded list worth about C$29.8 billion; intended to increase pressure on key U.S. exports
April 9	Auto Tariffs	25% surtax	U.S.-origin vehicles and auto parts (non-USMCA-compliant)	Strategic focus on autos; subject to exemptions and future quota arrangements (announced on April 3)
May 7	Remission Order: General Sectors	0% effective rate (relief)	Medical, public safety, packaging, manufacturing, and food processing inputs	Temporary surtax relief for eligible goods imported on or before October 16, 2025; must meet CBSA criteria (announced on April 15)
Sep 1	Canadian retaliatory tariffs are removed		Tariffs removed on most of the products	Tariffs on steel, aluminum and cars remain
B. Tariffs on non-U.S. imports				
July 31	Steel and Aluminum Goods Tariffs	25% surtax	Goods with steel melted/poured and aluminum smelted/cast in China	Addresses global overcapacity and non-market policies; exempts U.S.-origin goods (CUSMA), casual goods, and shipments under C$5,000
Dec 26	Steel Derivative Products Tariffs	25% tariff	Steel derivative products (structures, fasteners, chains, springs, furniture, prefab buildings)	Applies to full value from all countries; exemptions for motor vehicle/aircraft parts (until July 1, 2026), western wind towers, and goods in transit

C AI methods for classifying affected products

To determine which of the products in the scraped data are affected by tariffs, we employ AI methods to 1) identify each product's country of origin, and 2) assign each product to an 8-digit HS category. Since Canadian tariffs are imposed on products that fall within certain HS8 categories and are imported from the United States, this classification allows us to determine which products are tariffed. Among the products that are not tariffed we will also know which ones are close substitutes to the tariffed products, and which of the substitutes are supplied domestically versus imported from other countries.

C.1 AI-assisted Country-of-Origin Identification at the Individual Product Level

We develop an AI-assisted procedure to assign a *country of origin* (COO) to individual retail products using a large language model (LLM) with integrated web-search capabilities. The method takes as inputs (i) a product name and (ii) a URL to the product page on a Canadian retailer website. Rather than relying on a pre-labeled training set, the procedure uses targeted retrieval and a structured decision rule embedded in the prompt to produce a single COO label for each product.

For each product, we submit an API request consisting of a fixed system prompt and a short user query that references the product name and instructs the model to begin with the provided URL. The system prompt defines a step-by-step protocol:

1. **Inspect the retailer product page** (starting from the provided URL) and extract an explicit COO statement when available (e.g., "Made in X" or "Country of origin: X").

2. If the page indicates only that the item is **"Imported"** without naming a country, treat this as incomplete and **continue searching**.

3. **Search other trusted sources** (e.g., other retailers' listings and/or the manufacturer) using the product name to find an explicit COO.

4. If no explicit COO is found, **infer the most likely single country** using brand knowledge and typical production locations for the product category.

5. Return **"Imported"** only as a last resort when the item is clearly not produced in Canada but no specific country can be found or inferred; return **"Unknown"** if no usable information is available and no reasonable inference can be made.

The API call uses the following structured message template:

```
System: [Fixed instructions defining the COO protocol and strict output format]

User: Tell me the country of origin of this item: {product_name}.
      Begin your search with this URL: {product_url}.
```

We assess the accuracy of this approach using a validation sample of 8,941 products from three large retailers. For these products, COO was obtained either by scraping it directly from the product description on the retailer's website (Retailers 2 and 4) or by using the product's UPC to scrape COO from other retailers' websites (UPC codes were also scraped from Retailer 7's website). These latter products allow us to test not only the accuracy of AI predictions when COO information is available directly on the retailer's website, but also when the AI must rely on external sources to infer it. Table C1 summarizes performance along these two margins. First, the model correctly distinguishes domestic from imported items 85% of the time. Second, restricting attention to products for which a specific COO can be benchmarked against directly observed COO, it identifies the correct country in 88% of cases. Accuracy is broadly similar across the most common origin countries in our sample.

Table C1. AI-Based Validation of Country-of-Origin Classification

	Products	Accuracy (%)
Panel A: Overall Accuracy		
Domestic/Imported	8941	85.0
Imported	1194	99.8
Domestic	7747	82.8
Country of Origin	8211	87.9
Canada	7146	89.7
China	584	84.8
Mexico	72	61.1
United States	57	71.9
Italy	45	97.8
Taiwan	39	84.6
India	18	94.4
Other countries	250	52.8
Panel B: Accuracy by Retailer		
Retailer 2	1166	96.1
Retailer 4	6149	88.7
Retailer 7	896	71.5

Note: This table reports the number of products and prediction accuracy for AI-based country-of-origin classification. Accuracy rates are computed using three validation samples from three distinct retailers present in the dataset. Predictions were generated in July 2025 and January 2026 using an OpenAI retrieval-augmented large language model with web-search capabilities (gpt-4o-mini-search-preview).

Based on COO classifications, we define a product as **Domestic** if its country of origin is Canada, or if the price banner had "Prepared in Canada" on it in 2025. On the other hand, if a retailer had a "Tariff" banner on the product's price banner in 2025, we label its COO as the United States. We drop products for which COO was not classified and which did not have "Prepared in Canada" or "Tariff" banner in 2025. All remaining 98,644 products not tagged as **Domestic** are tagged as **Imported**.

Table C2 provides the country of origin for imported products in the data. For 41,011 of imported products (44.8%), we could not classify the country of origin—we will assume those are not U.S. imports. Among the remaining imported products, 15,945 (17.4%) are imported from the United States. The biggest number of imported non-U.S. products come from China (18,781), Mexico (2,791), Italy (2,039), Taiwan (1,674), Vietnam (1,321), Japan (984), and Korea (1,005). The remaining imports from 93 countries amount to 7,094 unique products.

Table C2. Country of origin for imported products

Country of origin	**Products**	**%**
Imported	41,011	44.8
China	18,781	20.5
United States	15,945	17.4
Mexico	2,791	3.0
Italy	2,039	2.2
Taiwan	1,674	1.8
Vietnam	1,321	1.4
Korea	1,005	1.1
Japan	984	1.1
Other (93 countries)	7,094	7.7
Total	91,615	100.0

C.2 AI-based HS-8 Classifications at the Individual Product Level

We develop an AI-based method to classify individual retail products directly into the HS hierarchy at the 8-digit level. This method has recently been used by Cavallo, Llamas, and Vazquez (2025) for classifying individual products in PriceStats micro data for retailers in the United States. Our approach uses large language models (LLMs) in a hierarchical and iterative manner: rather than assigning a product to an HS code in a single step, the algorithm moves sequentially through the HS tree, refining the classification one level at a time. This mirrors how a human expert would classify goods, starting from broad distinctions and progressively narrowing the choice set until reaching a unique HS8 code.

At each stage, the model is provided with (i) the product description and (ii) the list of valid HS subcategories at the current level of the hierarchy. The prompt, submitted via API, is simple and structured to minimize ambiguity. It takes the following form:

```
Classify the following item into one of these subcategories: {list}
Item: "{product description}"
Return exactly one code from the list.
```

Once a category is selected, we retrieve its immediate subcategories and repeat the procedure. This process continues recursively until the model reaches a terminal node of the HS tree at the 8-digit level. Each decision is therefore local, constrained, and conditioned on all previous choices.

Figure C1 illustrates this process using the example of *roasted, non-decaffeinated cof-*

fee. At the top level, the model distinguishes between broad HS sections such as *Live animals and animal products* and *Vegetable products*, correctly selecting the latter. Within *Vegetable products*, it identifies *Chapter 09: Coffee, tea, maté and spices*. In the next iteration, it selects *Heading 0901: Coffee, whether or not roasted or decaffeinated*. It then chooses *Subheading 0901.21: Coffee, roasted, not decaffeinated*. Finally, it assigns the product to the relevant national subheading—*0901.21.10: Certified organic*—from the set of valid national subheadings under 0901.21.

A key advantage of this approach over traditional machine-learning classifiers is that it does not require a labeled training dataset. Instead, it leverages the ability of large language models to perform structured, coarse-to-fine reasoning over hierarchical taxonomies. These distinctions are made without task-specific training and rely instead on the model's general semantic reasoning. By limiting the choice set at each step, the method reduces classification errors that often arise when models are asked to choose among thousands of HS codes simultaneously.

In practice, many standard HS descriptions are ambiguous or too vague to support reliable classification, particularly for retail products. To address this, we augment the original HS hierarchy with enriched labels and clarifying annotations that make category boundaries more explicit. These refinements improve accuracy in cases where the official HS text lacks the specificity needed to classify consumer goods in our sample.

We apply this classification procedure uniformly to both imported and domestic products. This allows us not only to identify goods directly subject to tariffs, but also to map domestic products into the same HS categories, facilitating comparisons between imported goods and their domestic competitors. The resulting HS8 assignments provide a consistent and scalable bridge between high-frequency retail price data and tariff schedules, enabling precise measurement of tariff exposure at the product level.

Figure C1. Structure of the Harmonized System classification, illustrated for roasted, non-decaffeinated, certified organic coffee

```
HS System
|
+-- Section I: Live animals; animal products
|
+-- Section II: Vegetable products
|   |
|   +-- ...
|   |
|   +-- Chapter 07: Edible vegetables and certain roots and tubers
|   |
|   +-- Chapter 08: Edible fruit and nuts; peel of citrus fruit or melons
|   |
|   +-- Chapter 09: Coffee, tea, maté and spices
|   |   |
|   |   +-- Heading 0901: Coffee, whether or not roasted or decaffeinated;
|   |   |               coffee husks and skins; coffee substitutes
|   |   |               containing coffee in any proportion
|   |   |
|   |   +-- Coffee, not roasted:
|   |   |    |
|   |   |    +-- Subheading 0901.11: Not decaffeinated
|   |   |    |
|   |   |    +-- Subheading 0901.12: Decaffeinated
|   |   |
|   |   +-- Coffee, roasted:
|   |        |
|   |        +-- Subheading 0901.21: Not decaffeinated
|   |        |    |
|   |        |    +-- National subheadings:
|   |        |        +-- 0901.21.10: Certified organic
|   |        |        +-- 0901.21.90: Other
|   |        |
|   |        +-- Subheading 0901.22: Decaffeinated
|   |   |
|   |   +-- Heading 0902: Tea, whether or not flavoured
|...|...|...
```

D The perceptions about the duration of the tariffs in the media

This Section provides examples from the contemporaneous media coverage of counter-tariffs.

Canadian government introduces its tariffs on the US imports as retaliatory and conditional, with the goal to keep them in place until US tariffs were lifted. On March 4, 2025, Department of Finance published: "The tariffs imposed by the U.S. administration are unjustified, and detrimental to both Americans and Canadians. Working with provincial, territorial and industry partners, our singular focus is to get them removed as quickly as possible."[1] And the Prime Minister's website state: "Canada has responded to the U.S. imposition of tariffs on Canadian goods by introducing a suite of countermeasures designed to compel the U.S. to remove the tariffs as soon as possible."[2] Royal Bank of Canada [commercial bank] wrote: "Canada's retaliatory measures appear aimed at reducing the duration of U.S. tariffs."[3] The Canadian government made an announcement about the remission process to mitigate the impact of tariffs at the same time as it announced its tariffs on March 4, 2025, also pointing to the expectations of tariffs being temporary.

The views about the trade environment changed after the announcements about the U.S. tariffs on April 2, 2025. The statements from Canadian officials convey the revision of their beliefs about the nature and structure of the economic environment. For example, on April 3, 2025, Canadian Prime Minister Mark Carney said: "The global economy is fundamentally different today than yesterday."[4] On April 4, 2025, Canada's Foreign Affairs Minister Mélanie Joly said: "The relationship between the United States and Canada will never be the same again after President Donald Trump announced a sweeping new tariff regime on Wednesday."[5] Scotiabank wrote on May 8, 2025: "Our last official forecast, published on April 16th, assumes that tariffs in effect as of that date are permanent."[6]

[1] https://www.canada.ca/en/department-finance/news/2025/03/canada-announces-robust-tariff-package-in-response-to-unjustified-us-tariffs.html

[2] https://www.pm.gc.ca/en/news/news-releases/2025/04/03/canada-announces-new-countermeasures-response-tariffs-from-united-states.

[3] https://www.rbc.com/en/economics/canadian-analysis/featured-analysis/insights/a-us-canada-trade-shock-first-economic-takeaways/

[4] https://www.pm.gc.ca/en/news/news-releases/2025/04/03/canada-announces-new-countermeasures-response-tariffs-from-united-state

[5] https://globalnews.ca/video/11116615/canada-us-relationship-will-never-be-the-same-after-trump-tariffs-joly-warns.

[6] https://www.scotiabank.com/ca/en/about/economics/economics-publications/post.other-publications.insights-views.temporary-vs-permanent-tariffs--may-8--2025-.html

Bank of Canada Governor Macklem described U.S. protectionism as one of the structural changes that Canada undergoes in his speech in 2026 (Macklem, 2026).

Furthermore, when remissions were announced in May 2025, some economists interpreted them as almost entirely removing Canadian tariffs on U.S. goods. For example, a Financial Post, May 14, 2025 article said: "Canada's new tariffs on U.S. drop to "nearly zero" with exemptions." In an interview, Tony Stillo, Oxford's director of Canada economics, said: "It's a very strategic approach from a new prime minister to really say, 'We're not going to have a retaliation.'[...] It's a strategic play on the government's part to not damage the Canadian economy."[7] This reduction of the tariffs through remissions for a broad range of industries and inputs suggested to some that Canada might scale back the tariffs in the future. Indeed, while initially, remissions were announced to be a temporary 6-month measure (until October 16, 2025), they were extended to December 16, 2025 and then to February or July 2026 for different goods.

E Pre-trends in the LP-DiD specification

This appendix documents three robustness exercises on our main LP-DiD specification (1), with log price as the dependent variable. Each variant retains the main fixed-effects structure and the same interaction terms for retailers and product categories, but modifies the pre-treatment horizon, the lag-control set, or the construction of the pre-period reference price. We estimate each variant for all treatment groups; for brevity we report only the imported-tariffed (IT) group below, but the conclusions are unchanged for the other groups.

1. Extended pre-treatment horizons. We re-estimate the baseline specification using 150 pre-treatment lags (instead of the 30 lags used in the main text). This extends the pre-trend window by five months and provides a long-horizon test for parallel trends prior to the tariff announcement.

2. Adding lags as controls. We augment the regression with 30 lagged first differences of log price, $\Delta \ln p_{i,t-1}, \ldots, \Delta \ln p_{i,t-30}$, following the covariate-augmented LP-DiD specification of Dube et al. (2025). This absorbs short-run pre-treatment price dynamics under conditional parallel trends.

[7] https://financialpost.com/commodities/canadas-new-tariffs-on-us-drop-to-nearly-zero-with-exemptions-oxford-says.

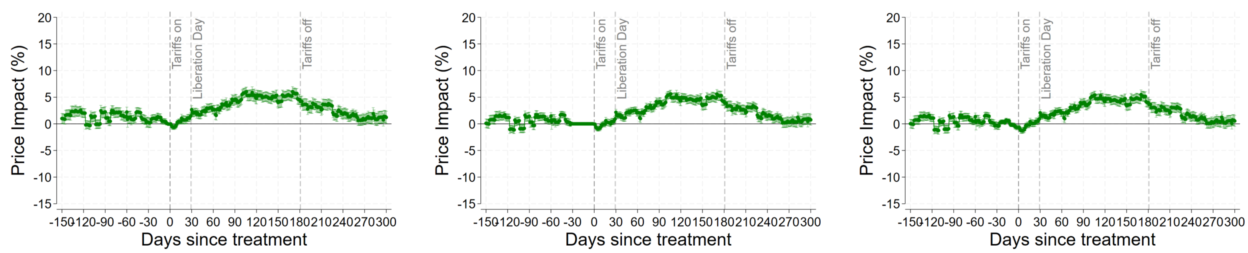
3. Pre-mean-differenced reference. We replace the one-day lag reference price with the average of available log prices over the 30 days preceding treatment, so the dependent variable becomes:

$$\ln p_{i,t+h} - \frac{1}{|\mathcal{L}_{i,t}|} \sum_{k \in \mathcal{L}_{i,t}} p_{i,t-k}, \qquad \mathcal{L}_{i,t} \subseteq \{1, \ldots, 30\},$$

where $\mathcal{L}_{i,t}$ collects the non-missing lags. This dampens day-specific noise in the reference price and tests whether results are sensitive to using a single pre-period day as the benchmark.

Results. Figure E1 reports the average IT price impact for each variant. Across all three robustness checks the pre-trends show no systematic deviations from zero, and the dynamic post-treatment path closely tracks the estimates in our main specification, confirming that the headline result is not driven by the length of the pre-window, omitted short-run price dynamics, or the choice of a single-day pre-period reference.

Figure E1. LP-DiD robustness: average IT price impact



(a) Extended pre-trends (150 lags) **(b)** Adding 30 lags as controls **(c)** Pre-mean-differenced reference

Note: Each plot provides the estimated average pass-through for Tariffed products relative to the control group (Domestic Non-substitutes), from the robustness variant indicated in its subcaption. Bands denote 95% confidence intervals based on standard errors clustered at the product level. Vertical lines refer to March 4, April 2, May 7, and September 1, 2025, respectively. Results for the remaining treatment groups are available on request.

F Non-random assignment of tariffs

In this Section, we address the concern that tariffs may not be randomly assigned to countries or to HS codes.[8]

[8] We thank our discussant, Kunal Sangani, for illuminating this point to us.

Notation. Indices:

- i: product-retailer observation (the panel unit).
- $H(i)$: HS8 code of product i.
- $c(i)$: COICOP category of product i.
- $r(i)$: retailer of product i.
- $o(i) \in \{\text{US}, \text{CAN}, \text{other}\}$: country of origin of product i.
- $t^* =$ March 4, 2025; $h \in \{0, 1, \ldots, 300\}$ is the horizon.

Outcomes and shocks:

- $\Delta p_{i,h} \equiv \log p_{i,t^*+h} - \log p_{i,t^*-1}$: log price change of product i from the pre-treatment day to horizon h.
- $\Delta mc_{i,h}$: log marginal cost change for product i over the same window.
- $\delta_{H,h}$: HS-code-specific component of the marginal cost change at horizon h, common to all products in HS code H.
- $\alpha_{o,h}$: country-of-origin-specific component of the marginal cost change at horizon h.
- $\tau_{i,h}$: tariff component of $\Delta mc_{i,h}$, equal to the statutory tariff rate for products with $o(i) = \text{US}$ and $H(i) \in \mathcal{T}$, and zero otherwise.
- $\varepsilon_{i,h}$: idiosyncratic cost shock to product i, mean zero conditional on $(H(i), o(i))$.

Sets and indicators:

- $\mathcal{T}$: set of HS8 codes targeted by the March 4, 2025 Canadian retaliatory tariffs.
- $T_i \equiv \mathbf{1}\{H(i) \in \mathcal{T}\}$: indicator that product i's HS code is on the tariff list. Varies at the HS8 level.

Structural parameters:

- $\rho \in (0, 1]$: pass-through of own marginal cost to price (cost-side elasticity).
- $\Omega \in [0, 1)$: strategic complementarity in price-setting — the elasticity of firm i's price to the average price in its HS code, holding own cost fixed.

Cell averages:

- $\overline{\Delta p}_{H,h} \equiv \mathbb{E}[\Delta p_{j,h} \mid H(j) = H]$: equilibrium average log price change in HS code H at horizon h, taken across all countries of origin in the cell.

Fixed effects:

- $\gamma_{c,h}$: COICOP × horizon (or COICOP × day) fixed effect.
- $\zeta_{r,h}$: retailer × horizon fixed effect.

Pricing equation. The marginal cost change for product i decomposes as

$$\Delta mc_{i,h} = \delta_{H(i),h} + \alpha_{o(i),h} + \tau_{i,h} + \varepsilon_{i,h}, \tag{F.1}$$

and prices reflect own marginal cost and the equilibrium price in the firm's competitive set, which we take to be its HS code:

$$\Delta p_{i,h} = \rho \cdot \Delta mc_{i,h} + \Omega \cdot \overline{\Delta p}_{H(i),h}. \tag{F.2}$$

Substituting (F.1) into (F.2) gives

$$\Delta p_{i,h} = \rho\,\delta_{H(i),h} + \rho\,\alpha_{o(i),h} + \rho\,\tau_{i,h} + \Omega\,\overline{\Delta p}_{H(i),h} + \rho\,\varepsilon_{i,h}. \tag{F.3}$$

Identification strategy. We now show that ρ is identified by a double-difference-in-differences using all four cells of the product taxonomy.

Taking expectations within each cell at horizon h, (F.3) gives the structural equations for the four cells:

$$\mathbb{E}[\Delta p_{i,h} \mid o(i) = \text{US},\, H(i) \in \mathcal{T}] = \rho\,(\bar{\delta}_{\mathcal{T},h} + \alpha_{\text{US},h} + \tau) + \Omega\,\overline{\Delta p}_{\mathcal{T},h}, \tag{F.4}$$

$$\mathbb{E}[\Delta p_{i,h} \mid o(i) = \text{US},\, H(i) \notin \mathcal{T}] = \rho\,(\bar{\delta}_{\neg\mathcal{T},h} + \alpha_{\text{US},h}) + \Omega\,\overline{\Delta p}_{\neg\mathcal{T},h}, \tag{F.5}$$

$$\mathbb{E}[\Delta p_{i,h} \mid o(i) = \text{CAN},\, H(i) \in \mathcal{T}] = \rho\,(\bar{\delta}_{\mathcal{T},h} + \alpha_{\text{CAN},h}) + \Omega\,\overline{\Delta p}_{\mathcal{T},h}, \tag{F.6}$$

$$\mathbb{E}[\Delta p_{i,h} \mid o(i) = \text{CAN},\, H(i) \notin \mathcal{T}] = \rho\,(\bar{\delta}_{\neg\mathcal{T},h} + \alpha_{\text{CAN},h}) + \Omega\,\overline{\Delta p}_{\neg\mathcal{T},h}, \tag{F.7}$$

where $\bar{\delta}_{\mathcal{T},h} \equiv \mathbb{E}[\delta_{H,h} \mid H \in \mathcal{T}]$ and $\bar{\delta}_{\neg\mathcal{T},h}$ defined analogously. We refer to the four cells, in order, as Tariffed (T), US NonSubstitutes (USNS), Domestic Substitutes (DS), and Domestic NonSubstitutes (DNS).

The baseline LP-DiD comparison in our main specification uses Tariffed as treatment and Domestic NonSubstitutes as control. The cell-mean difference is

$$\begin{aligned} \mathbb{E}[\Delta p_{i,h} \mid \text{T}] - \mathbb{E}[\Delta p_{i,h} \mid \text{DNS}] = \rho\tau \; + \; & \underbrace{\rho\,(\alpha_{\text{US},h} - \alpha_{\text{CAN},h})}_{\text{country-of-origin gap}} \\ & + \underbrace{\rho\,(\bar{\delta}_{\mathcal{T},h} - \bar{\delta}_{\neg\mathcal{T},h})}_{\text{HS-selection gap}} + \underbrace{\Omega\,(\overline{\Delta p}_{\mathcal{T},h} - \overline{\Delta p}_{\neg\mathcal{T},h})}_{\text{spillover}}. \end{aligned} \tag{F.8}$$

The single-DiD coefficient $\hat{\beta}_h^{\text{Tariffed}}$ recovers a sum of $\rho\tau$ and three additional terms, due to non-random assignment of country of origin, non-random assignment of HS category, and strategic pricing complementarities.

The four-cell structure allows construction of a difference-in-differences that nets out both nuisance terms simultaneously. Define

$$\Delta_{\mathcal{T},h} \equiv \mathbb{E}[\Delta p \mid \text{T}] - \mathbb{E}[\Delta p \mid \text{DS}], \qquad \Delta_{\neg\mathcal{T},h} \equiv \mathbb{E}[\Delta p \mid \text{USNS}] - \mathbb{E}[\Delta p \mid \text{DNS}].$$

From (F.4)–(F.7):

$$\Delta_{\mathcal{T},h} = \rho\tau + \rho\,(\alpha_{\text{US},h} - \alpha_{\text{CAN},h}), \tag{F.9}$$

$$\Delta_{\neg\mathcal{T},h} = \rho\,(\alpha_{\text{US},h} - \alpha_{\text{CAN},h}). \tag{F.10}$$

The within-HS differences $\bar{\delta}_{\mathcal{T},h}$ and $\bar{\delta}_{\neg\mathcal{T},h}$ cancel within each bracket because both terms share the same HS code. The spillover terms $\Omega\,\overline{\Delta p}_{\mathcal{T},h}$ and $\Omega\,\overline{\Delta p}_{\neg\mathcal{T},h}$ also cancel within each bracket, because the cell average depends only on $H(i) \in \mathcal{T}$, not on $o(i)$. The double-difference is then

$$\boxed{\Delta_{\mathcal{T},h} - \Delta_{\neg\mathcal{T},h} = \rho\tau.} \tag{F.11}$$

ρ is identified as $\hat{\rho}_h = (\Delta_{\mathcal{T},h} - \Delta_{\neg\mathcal{T},h})/\tau$, with τ taken as the known statutory tariff rate.

The identifying assumption. Equation (F.11) is exact under the framework's structural equations (F.4)–(F.7) together with one substantive assumption: the country-of-origin gap is common across HS codes,

$$(\alpha_{\text{US},h} - \alpha_{\text{CAN},h}) \mid (H \in \mathcal{T}) \;=\; (\alpha_{\text{US},h} - \alpha_{\text{CAN},h}) \mid (H \notin \mathcal{T}). \tag{PT$'$}$$

Assumption (PT′) permits arbitrary US-Canada gaps in price dynamics — FX pass-through, boycott effects, sourcing differentials — as long as they operate uniformly across tariffed and non-tariffed HS categories.

The LP-DiD specification. The double-DiD (F.11) maps directly into a triple-interaction LP-DiD regression on the four-cell sample. Define $T_i \equiv \mathbf{1}\{H(i) \in \mathcal{T}\}$ and $U_i \equiv \mathbf{1}\{o(i) = \text{US}\}$. The estimating equation is

$$\Delta p_{i,h} = \beta_h \cdot (T_i \times U_i) + \gamma_{c(i),h} + \zeta_{r(i),h} + \kappa_{o(i),h} + \eta_{H(i)} + \varepsilon_{i,h}, \tag{F.12}$$

estimated separately by horizon, with the sample restricted to $i \in \text{T} \cup \text{USNS} \cup \text{DS} \cup \text{DNS}$. The fixed effects play distinct roles:

- $\gamma_{c(i),h}$ (coicop×horizon): absorbs coicop-level common shocks, as in the main specification.
- $\zeta_{r(i),h}$ (retailer×horizon): absorbs retailer-level common shocks.
- $\kappa_{o(i),h}$ (country×horizon): absorbs $\rho\,\alpha_{o(i),h}$, the country-of-origin gap.
- $\eta_{H(i)}$ (HS-code): absorbs time-invariant HS-code level effects.

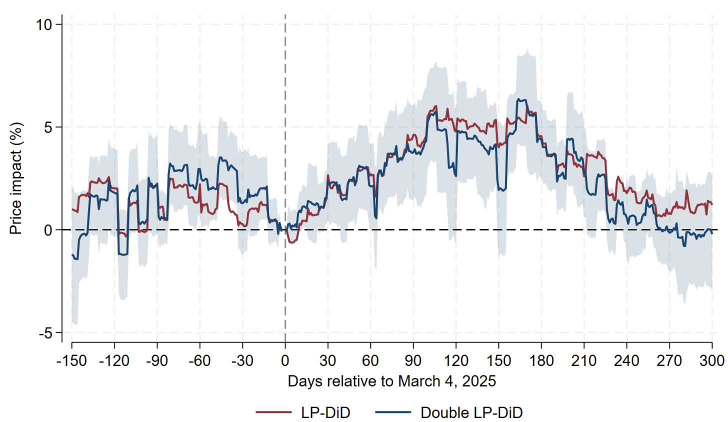
The coefficient $\hat{\beta}_h$ on the interaction $T_i \times U_i$ is the double-DiD estimate from (F.11), and the pass-through parameter is recovered as

$$\hat{\rho}_h = \frac{\hat{\beta}_h}{\tau}. \tag{F.13}$$

We cluster standard errors at the HS8 level.

Estimation results. Figure F1 compares the estimates of the price effects of tariffs using LP-DiD estimation in the paper (from Figure E1(b)) and using double LP-DiD specification (F.12). The differences in the estimates are small across all horizons, indicating that bias from the additional terms in equation (F.8) are small.

Figure F1. Estimated price effects of tariffs, double LP-DiD specification



Note: The price impact of tariffs is estimated by the double difference-in-differences linear projections of the March 4 effect using specification (F.12).

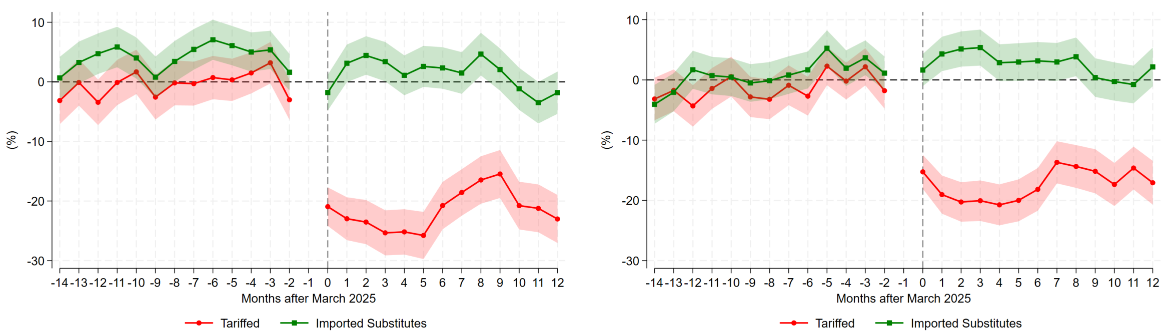
G Impact on the values and quantities of the U.S. imports

While we have provided evidence about the impact of tariffs on the prices, we would also like to shed some light on the impact of the Canadian countertariffs on the quantities of goods imported from the U.S. into Canada. We use monthly data on Canadian International Merchandise Trade at HS10 level on both the dollar value and quantity of goods by country of origin and by province of destination for the period from January 2024 to March 2026.[9] Using these data, we estimated the LP-DiD specification:

$$\Delta_h \text{ihs}(y_{it}) = \beta_{0,h} D_{it} + \delta_{ot}^{(h)} + \delta_{ct}^{(h)} + \varepsilon_{it}^{(h)}, \tag{G.1}$$

with tariffed and imported substitutes as treatment groups, and with imported non-substitutes as a control group. We perform estimations both for the values and the quantities of imports. We transform the dependent variable using the inverse of the hyperbolic sine ihs(y), as in Amiti, Redding, and Weinstein (2019), to keep zeros in the estimation, although dropping zeros and using log yields very similar results. In the regression, the observation is imports at HS10 category by country of origin and by province of destination, with standard errors clustered at this level. We control for fixed effects at HS2 level and country of origin. Regressions are unweighted. The results of the estimations are presented in Figure G1.

Figure G1. Impact on the value and quantity of imports



(a) Values **(b)** Quantities

Note: The price impact of tariffs is estimated by the difference-in-differences linear projections of the March 4 effect using specification (G.1). Each plot provides the estimates of the impact on the value of the U.S. (left panel) and the quantity of the U.S. (right panel) for tariffed and imported substitutes relative to control group of imported non-substitutes. Vertical line refers to March 2025.

As expected, tariffs significantly reduce trade flows. There is a negative effect of 21% on value and 15% on quantity of tariffed goods in March 2025, indicating a rapid effect of the tariffs introduced on March 4. The effect reaches its peak impact of 26% for value and

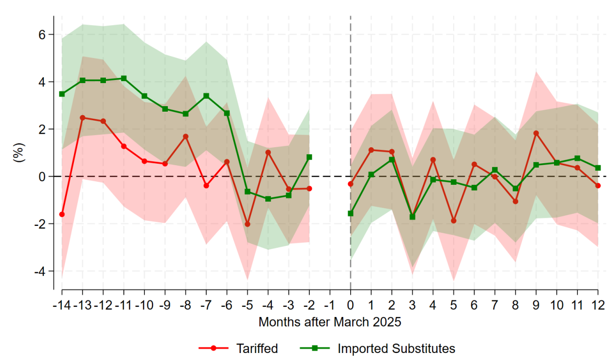
[9] The values of taxes, duties, and tariffs, including countervailing and anti-dumping duties, required on importation into Canada are not included in the value of imports: https://www150.statcan.gc.ca/n1/pub/13-605-x/2024001/article/00001-eng.htm.

21% for quantity in July 2025, five months after the imposition of the tariffs. A large immediate response to tariffs somewhat differs from the smoother adjustment in trade flows documented by Cavallo et al. (2021). One possible explanation is that the U.S.–Canada trade conflict effectively began before the official March 2025 tariff implementation, as trade tensions, announcements, and policy uncertainty were already elevated in preceding months. Firms may therefore have adjusted sourcing and purchasing decisions by the time of the formal tariff changes.

There is no significant impact of the tariffs on third-country substitutes (green line), i.e., for the goods in the tariffed categories but imported from countries other than the U.S. The negative impact starts to reverse after six months, in August 2025, when the removal of the tariffs on most consumer goods starting September 1 was announced. While the negative impact of tariffs has moderated, it has not reversed as of March 2026.

Average unit values—defined as the ratio between corresponding values and quantities at HS10 levels—respond little (Figure G2). Since unit values do not include tariffs, these results imply the prices received by exporters did not change significantly, and most of the adjustments of prices to the tariffs took place within Canada.

Figure G2. Impact on the unit prices



Note: The price impact of tariffs is estimated by the difference-in-differences linear projections of the March 4 effect using specification (G.1). Each plot provides the estimates of impact on unit price for tariffed and imported substitutes relative to control group of imported non-substitutes. Vertical line refers to March 2025.

These results are in line with findings elsewhere. For example, Amiti, Redding, and Weinstein (2019), using U.S. customs data at the ten-digit level of Harmonized Tariff Schedule by country-month, report import values falling 25% to 30% after the imposition of the U.S. tariffs on Chinese imports (with rates varying between 10% to 25%). Amiti, Redding, and Weinstein (2019) also find little effect on pre-tariff import prices.

H Pass-through of temporary cost changes: a simple model

In this Section, we provide a simple example of how a model with nominal price rigidities predicts a positive relationship between the expected duration of a temporary tariff and the pass-through to a firm's optimal reset price.[10]

In a Calvo (1983) model, a monopolistically competitive firm gets a random opportunity to adjust its price whenever it gets a signal, drawn independently from a Poisson stochastic process with parameter λ. This means that in any period with probability λ the firm will adjust its price and otherwise its price will remain the same as last period.

For the firm that resets its price in period t, let $mc_{\tau,t}$ denote the marginal cost expected at $\tau \geq t$. The first-order condition for this firm's optimal reset price p_t^* implies

$$d \ln p_t^* = \rho^* \sum_{\tau=t}^{\tau=\infty} \omega_{\tau,t} d \ln mc_{\tau,t}, \tag{H.1}$$

where ρ^* is a constant and weights $\omega_{\tau,t} = [1 - \beta(1-\lambda)][\beta(1-\lambda)]^{\tau-t}$, with β denoting the discount factor.

Consider a tariff Δ introduced in $t = 0$ and removed in period $t = T$, and assume the firm has perfect foresight. The tariff-induced change in the reset price (keeping all else equal) is

$$d \ln p_0^*(T) = \rho^* \Delta [1 - \beta(1-\lambda)] \left(1 - [\beta(1-\lambda)]^T\right) \tag{H.2}$$

Taking the ratio of (H.2) for $T = T_1$ and $T = T_3$ gives

$$\frac{d \ln p_0^*(T_3)}{d \ln p_0^*(T_1)} = \frac{1 - [\beta(1-\lambda)]^{T_3}}{1 - [\beta(1-\lambda)]^{T_1}} \tag{H.3}$$

Given T_1 and $T_3 > T_1$, the right-hand side is an increasing function of T_3, i.e., the adjusting firm's response to a temporary tariff in period 0 increases with tariff duration.

In a monthly model with $\beta = 0.95^{1/12}$ for monthly discount factor and a monthly frequency of price changes $\lambda = 0.1$, the predicted reset price increase corresponding to increasing tariff duration from $T_1 = 12$ months to $T_3 = 36$ months goes up by 34%, in line with the survey findings documented in Section 5.1.

I Decomposition of price effects of Canadian tariffs

Following Klenow and Kryvtsov (2008), daily inflation can be decomposed as

$$\pi_s = fr_s^+ \cdot dp_s^+ - fr_s^- \cdot dp_s^-, \tag{I.1}$$

[10] We thank our discussant, Kunal Sangani, for proposing this example.

where fr_s^+ (fr_s^-) is the fraction of items with price increases (decreases) on day s, and dp_s^+ (dp_s^-) is the average absolute size of those increases (decreases). For simplicity, we will ignore cross-section heterogeneity here.

Cumulative inflation from day t to day $t+h$ is

$$\Pi_{t:t+h} = \sum_{s=t}^{t+h} \pi_s = \sum_{s=t}^{t+h} \left(fr_s^+ \cdot dp_s^+ - fr_s^- \cdot dp_s^- \right). \tag{I.2}$$

Let $\overline{fr^+}, \overline{fr^-}, \overline{dp^+}, \overline{dp^-}$ denote full-sample daily means. For each $j \in \{+, -\}$, write

$$fr_s^j = \overline{fr^j} + \widetilde{fr}_s^j, \qquad dp_s^j = \overline{dp^j} + \widetilde{dp}_s^j, \tag{I.3}$$

where tildes denote deviations from the mean. Expanding the product:

$$fr_s^j \cdot dp_s^j = \overline{fr^j}\,\overline{dp^j} + \overline{dp^j}\,\widetilde{fr}_s^j + \overline{fr^j}\,\widetilde{dp}_s^j + \widetilde{fr}_s^j\,\widetilde{dp}_s^j. \tag{I.4}$$

Summing from $s = t$ to $s = t + h$ and letting $H = h + 1$ denote the number of days:

$$\begin{aligned} \Pi_{t:t+h} = H &\left(\overline{fr^+}\,\overline{dp^+} - \overline{fr^-}\,\overline{dp^-} \right) \\ &+ \overline{dp^+} \sum_{s=t}^{t+h} \widetilde{fr}_s^+ - \overline{dp^-} \sum_{s=t}^{t+h} \widetilde{fr}_s^- \\ &+ \overline{fr^+} \sum_{s=t}^{t+h} \widetilde{dp}_s^+ - \overline{fr^-} \sum_{s=t}^{t+h} \widetilde{dp}_s^- \\ &+ \sum_{s=t}^{t+h} \widetilde{fr}_s^+\,\widetilde{dp}_s^+ - \sum_{s=t}^{t+h} \widetilde{fr}_s^-\,\widetilde{dp}_s^-. \end{aligned} \tag{I.5}$$

Define cumulative deviations:

$$\Delta FR^j \equiv \sum_{s=t}^{t+h} \widetilde{fr}_s^j, \qquad \Delta DP^j \equiv \sum_{s=t}^{t+h} \widetilde{dp}_s^j. \tag{I.6}$$

Then the decomposition can be written compactly as

$$\begin{aligned} \Pi_{t:t+h} = &\underbrace{H \left(\overline{fr^+}\,\overline{dp^+} - \overline{fr^-}\,\overline{dp^-} \right)}_{\text{mean inflation}} \\ &+ \underbrace{\overline{dp^+}\,\Delta FR^+}_{\text{extensive–up}} - \underbrace{\overline{dp^-}\,\Delta FR^-}_{\text{extensive–down}} + \underbrace{\overline{fr^+}\,\Delta DP^+}_{\text{intensive–up}} - \underbrace{\overline{fr^-}\,\Delta DP^-}_{\text{intensive–down}} + \text{interactions}. \end{aligned} \tag{I.7}$$

The LP-DiD estimand at horizon h is the difference in cumulative post-tariff inflation:

$$\beta_h \equiv \Pi^T_{t^*:t^*+h} - \Pi^C_{t^*:t^*+h}, \tag{I.8}$$

where t^* is the treatment date, and $T(C)$ denote treatment (control) groups. Use the decomposition (I.7) to obtain decomposition of the estimand in (I.8).

In the data, the mean values of the frequency and size of price changes are very similar for tariff and control groups. We use the common mean across treated and control groups.

$$\overline{fr^{j,T}} = \overline{fr^{j,C}} \equiv \overline{fr^j}, \qquad \overline{dp^{j,T}} = \overline{dp^{j,C}} \equiv \overline{dp^j}, \qquad j \in \{+,-\}. \tag{I.9}$$

Since the mean values are common, the mean inflation terms cancel:

$$H\left(\overline{fr^+}\,\overline{dp^+} - \overline{fr^-}\,\overline{dp^-}\right) - H\left(\overline{fr^+}\,\overline{dp^+} - \overline{fr^-}\,\overline{dp^-}\right) = 0. \tag{I.10}$$

Define the differences of cumulative deviations:

$$\delta FR^j \equiv \Delta FR^{j,T} - \Delta FR^{j,C} = \sum_{s=t^*}^{t^*+h} \left(\widetilde{fr}_s^{j,T} - \widetilde{fr}_s^{j,C}\right), \qquad j \in \{+,-\}, \tag{I.11}$$

$$\delta DP^j \equiv \Delta DP^{j,T} - \Delta DP^{j,C} = \sum_{s=t^*}^{t^*+h} \left(\widetilde{dp}_s^{j,T} - \widetilde{dp}_s^{j,C}\right), \qquad j \in \{+,-\}. \tag{I.12}$$

Since the pre-tariff means are equal, the tildes for each group are deviations from the *same* mean value: $\widetilde{fr}_s^{j,g} = fr_s^{j,g} - \overline{fr^j}$, $g = \{T, C\}$. Therefore, δFR^j and δDP^j simplify to cumulative differences in levels (instead of deviations from the means):

$$\delta FR^j = \sum_{s=t^*}^{t^*+h} \left(fr_s^{j,T} - fr_s^{j,C}\right), \qquad \delta DP^j = \sum_{s=t^*}^{t^*+h} \left(dp_s^{j,T} - dp_s^{j,C}\right). \tag{I.13}$$

The decomposition of the treatment effect therefore is

$$\beta_h = \underbrace{\overline{dp^+}\,\delta FR^+}_{\text{extensive–up}} - \underbrace{\overline{dp^-}\,\delta FR^-}_{\text{extensive–down}} + \underbrace{\overline{fr^+}\,\delta DP^+}_{\text{intensive–up}} - \underbrace{\overline{fr^-}\,\delta DP^-}_{\text{intensive–down}} + \text{interactions}. \tag{I.14}$$

This decomposition is an identity that attributes the tariff's cumulative price effect β_h to four margins:

- **Extensive–up** ($\bar{dp}^+\,\delta FR^+$): Did tariffed products experience more frequent price increases than control products? (Valued at the pre-tariff average increase size.)
- **Extensive–down** ($\bar{dp}^-\,\delta FR^-$): Did tariffed products experience less frequent price decreases? (Valued at the pre-tariff average decrease size.)
- **Intensive–up** ($\bar{fr}^+\,\delta DP^+$): Were price increases on tariffed products larger? (Scaled by the pre-tariff average increase frequency.)

- **Intensive–down** ($\bar{fr}^- \, \delta DP^-$): Were price decreases on tariffed products smaller? (Scaled by the pre-tariff average decrease frequency.)

The margin components can be estimated using LP-DiD regressions at the product level as follows.

Define the following product-level dependent variables constructed over the post-tariff window from $s = t^*$ to $s = t^* + h$:

Extensive margins. For each product i, construct the cumulative count of daily price adjustments:

$$N_i^+(h) \equiv \sum_{s=t^*}^{t^*+h} \mathbf{1}\{p_{i,s} > p_{i,s-1}\}, \qquad N_i^-(h) \equiv \sum_{s=t^*}^{t^*+h} \mathbf{1}\{p_{i,s} < p_{i,s-1}\}. \tag{I.15}$$

Run the LP-DiD regression

$$N_i^j(h) = \alpha^j + \gamma^j \cdot \mathbf{1}\{i \in T\} + \varepsilon_i^j, \qquad j \in \{+,-\}. \tag{I.16}$$

The coefficient γ^j estimates δFR^j, the DiD in cumulative adjustment frequencies.

Combined extensive–intensive margins. For each product i, construct the cumulative positive and negative contributions to inflation:

$$C_i^+(h) \equiv \sum_{s=t^*}^{t^*+h} \max(p_{i,s} - p_{i,s-1},\ 0)\,, \qquad C_i^-(h) \equiv \sum_{s=t^*}^{t^*+h} \max(p_{i,s-1} - p_{i,s},\ 0)\,. \tag{I.17}$$

By construction, $p_{i,t^*+h} - p_{i,t^*-1} = C_i^+(h) - C_i^-(h)$.

Run the LP-DiD regression

$$C_i^j(h) = \alpha^j + \lambda^j \cdot \mathbf{1}\{i \in T\} + \varepsilon_i^j, \qquad j \in \{+,-\}. \tag{I.18}$$

The coefficient λ^j estimates the combined contribution of extensive and intensive margins for each j:

$$\lambda^j = \overline{dp^j}\,\delta FR^j + \overline{fr^j}\,\delta DP^j + \text{interaction}^j. \tag{I.19}$$

Backing out the intensive margins. Given γ^j and λ^j, recover the intensive margin residually:

$$\overline{fr^j}\,\delta DP^j = \lambda^j - \overline{dp^j}\,\gamma^j - \text{interaction}^j. \tag{I.20}$$

In practice, if the interaction terms are small, the approximation

$$\overline{fr^j}\,\delta DP^j \approx \lambda^j - \overline{dp^j}\,\gamma^j \tag{I.21}$$

is sufficient. The overall interaction residual can be computed as a diagnostic:

$$\text{interactions} = \beta_h - \overline{dp^+}\gamma^+ + \overline{dp^-}\gamma^- - \overline{fr^+}\,\delta DP^+ + \overline{fr^-}\,\delta DP^-. \tag{I.22}$$

In sum, estimation of contribution of extensive and intensive price adjustment margins to the price effects of import tariffs require five LP-DiD regressions for each horizon h:

1. $p_{i,t^*+h} - p_{i,t^*-1}$ on $\mathbf{1}\{i \in T\} \longrightarrow \beta_h$ (total pass-through),
2. $N_i^+(h)$ and $N_i^-(h)$ on $\mathbf{1}\{i \in T\} \longrightarrow \gamma^+, \gamma^-$ (extensive margins),
3. $C_i^+(h)$ and $C_i^-(h)$ on $\mathbf{1}\{i \in T\} \longrightarrow \lambda^+, \lambda^-$ (combined margins).

The intensive margins are then obtained residually using $\overline{dp^j}$ and $\overline{fr^j}$ computed from the pre-tariff period.

J U.S.-import exposure

When Canadian imports of a given product from the United States are tariffed, Canadian retailers may have less scope to substitute toward third-country suppliers. If that is the case, the tariff is expected to push retail prices up by more. Conversely, products with a low U.S. share of imports already have non-U.S. alternatives that can absorb the shock, so the tariff should translate into a smaller retail price response. In this Section, we analyze this channel by comparing the effects of the retaliatory tariffs on retail prices of products with high vs. low pre-tariff exposure to U.S. imports.

For each HS8 product code, we measure the U.S. share of total Canadian imports pre-tariff (variable `share_value_hs8` in the panel) based on Canadian International Merchandise Trade data.[11] We define U.S.-import exposure dummy as

$$d_i^{\text{US}} = \mathbb{1}\{\texttt{share\_value\_hs8}_i \geq \text{median}(\texttt{share\_value\_hs8})\},$$

with the median taken across the set of unique HS8 codes that appear in the panel (so each HS8 enters the cutoff once, regardless of how many products map to it). Products with $d_i^{\text{US}} = 1$ are the "high U.S. share" subgroup—those that, pre-tariff, sourced an above-median share of Canadian imports from the United States. The remaining treated products form the "low U.S. share" subgroup with $d_i^{\text{US}} = 0$. Observations with `share_value_hs8` missing are excluded.

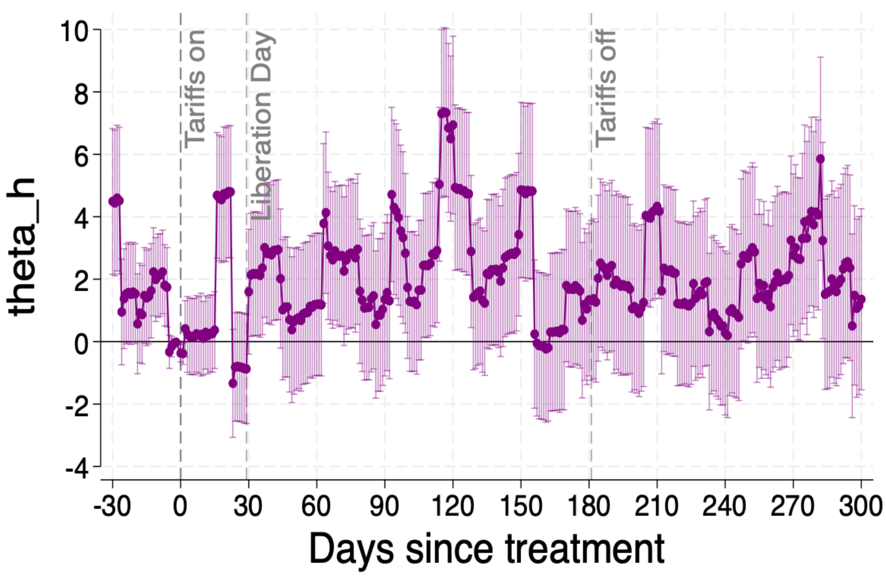
[11]Data are available here: https://www150.statcan.gc.ca/n1/pub/71-607-x/2021004/imp-eng.htm.

We estimate the main paper's specification (1) augmented with an interaction term for d_i^{US}:

$$100\left[\ln p_{i,t+h} - \ln p_{i,t-1}\right] = \beta_{0,h}\, D_{it} + \theta_h\, D_{it} \cdot d_i^{\mathrm{US}} + \varphi_h d_i^{\mathrm{US}} + \sum_{r\in\mathcal{R}} \beta_{r,h}\, D_{it} \cdot \mathbb{1}\{R_i = r\} + \sum_{c\in\mathcal{C}} \gamma_{c,h}\, D_{it} \cdot \mathbb{1}\{C_i = c\} + \delta_{rt}^{(h)} + \delta_{ct}^{(h)} + \varepsilon_{i,t}^{(h)}. \tag{J.1}$$

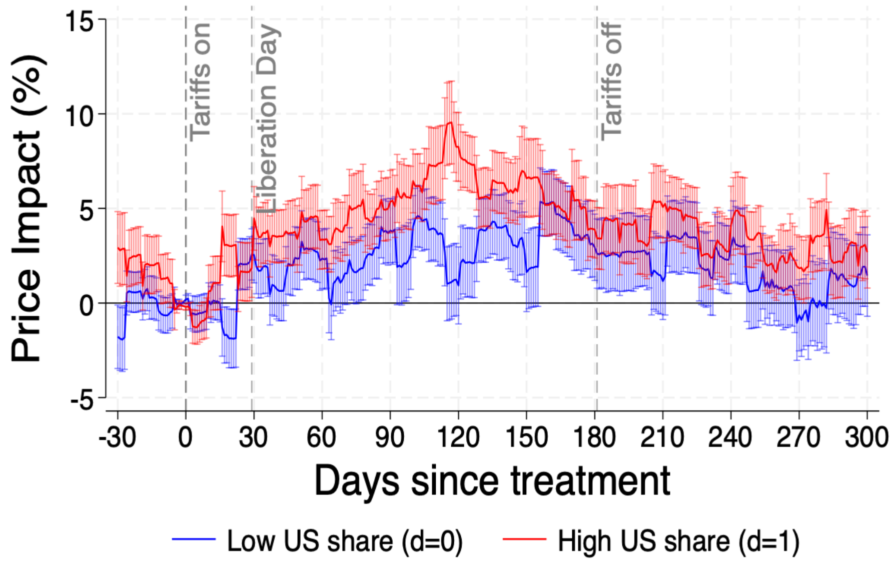
The only modification relative to (1) is the term $\theta_h\, D_{it} \cdot d_i^{\mathrm{US}} + \varphi_h d_i^{\mathrm{US}}$. The retailer- and CPI-category-specific coefficients $\beta_{r,h}$ and $\gamma_{c,h}$ are common to both subgroups, and the retailer×day and category×day fixed effects are also shared. The treatment indicator D_{it} identifies the Imported Tariffed group; the control group is Domestic Non-Substitutes, as in the main paper. Figure J1 plots the interaction coefficient $\hat{\theta}_h$ across horizons, and Figure J2 plots the two pass-through curves with their 95% confidence bands.

Figure J1. Additional price effect of tariffs on HS8 products with high exposure to U.S. imports



Note: Figure plots the estimated interaction coefficient $\hat{\theta}_h$ from equation (J.1): the difference in pass-through between high- and low-U.S.-share subgroups, holding the retailer and COICOP composition fixed at the regression averages. Horizontal solid line at zero: where the 95% CI band does not cross zero, the additional pass-through to the high-U.S.-share subgroup is statistically significant.

Figure J2. Pass-through by U.S.-import-share subgroup



Note: Figure plots estimated price effects $\hat{\beta}_h^{d=0}$ (low U.S. share, blue) vs. $\hat{\beta}_h^{d=1}$ (high U.S. share, red), with 95% confidence intervals. The high-share curve sits clearly above the low-share curve from $h \approx 30$ onwards. Vertical dashed lines: March 4 (tariff onset), April 2 (U.S. "Liberation Day"), and September 1 (tariff removal).

Quantitatively, the high-U.S.-share subgroup (red) shows markedly stronger pass-through: it peaks at about 9.5% around $h \approx 115$ (roughly four months after the tariff), against a much more muted response for the low-U.S.-share subgroup (blue), which peaks around 5% and somewhat later. The gap is largest near the high-share peak, where the interaction coefficient $\hat{\theta}_h$ in Figure J1 reaches about 7 percentage points ($t \approx 5.3$): the additional pass-through to products that were already heavily sourced from the U.S. pre-tariff is large and statistically significant. After the tariff is removed (September 1), both subgroup curves converge and $\hat{\theta}_h$ falls back toward zero, consistent with the heterogeneity being driven by the active retaliatory tariff rather than by a permanent compositional difference.

K Inventories and tariff effects

This section relates inventory statistics at the NAICS retail-trade level and at the product level (within Food) to the time-to-peak of pass-through.

K.1 Data and constructed variables

NAICS retail trade. Statistics Canada's Annual Retail Trade Survey, Table 20-10-0083-01 (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2010008301), reports annual financial estimates for 2022–2024 by NAICS retail category. For each category c and year y, let $\text{open}_{c,y}$ denote the opening inventory, $\text{close}_{c,y}$ denotes the closing inventory, and $\text{cogs}_{c,y}$ denotes the cost of goods sold (COGS). We construct:

$$\text{avg\_inventory}_{c,y} = \tfrac{1}{2}\big(\text{open}_{c,y} + \text{close}_{c,y}\big), \tag{K.1}$$

$$\text{turnover}_{c,y} = \text{cogs}_{c,y} \; / \; \text{avg\_inventory}_{c,y}, \tag{K.2}$$

$$\text{days\_of\_inventory}_{c,y} = 365 \; / \; \text{turnover}_{c,y}, \tag{K.3}$$

where days of inventory measures the average number of days a unit of stock remains in the pipeline before being sold. Table K1 reports the raw and constructed series for 2024, the most recent year available.

K.2 Cross-category evidence: pass-through and inventory cycles

For each of NAICS retailer category (Table K1), we assign a 1-digit COICOP category. For each COICOP, we then compute the average (mean) days of inventory (each retailer's value averaged over 2022–2024). Table K2 reports the days of inventory and the corresponding time to the peak of the tariff effect (h_{peak}) in Figure 5 in the main text.

We exclude COICOP 600 (Health) as a strong outlier (low DOI but very late peak) and COICOP 800 (Communication) due to the lack of a clean NAICS retail match. Figure K1 plots the relationship for the six remaining categories, with Pearson correlation of $\rho = +0.354$, indicating that categories with larger inventory stocks had longer time to the peak of the tariff price effect.

Table K1. Retail trade statistics by NAICS category, 2024.

	Raw financial variables (B CAD)								Margins (%)		Constructed		
NAICS retail category	Sales	Revenue	Open. inv.	Purch.	Close. inv.	COGS	Labour	Op. exp.	Gross	Op. prof.	Avg inv. (B CAD)	Turn. (x)	Days inv.
Automotive parts, accessories and tire retailers	15.5	16.5	3.2	10.5	3.2	10.4	2.7	5.0	37.0	6.5	3.2	3.2	113
Beer, wine and liquor retailers	24.9	25.1	2.7	14.8	2.7	14.8	2.0	3.6	40.8	26.3	2.7	5.5	66
Building material and garden equipment and supplies dealers	47.5	49.0	9.9	32.6	9.6	32.9	7.1	13.2	32.8	5.9	9.8	3.4	108
Cannabis retailers	–	5.6	–	–	–	–	–	–	–	–	–	–	–
Clothing and clothing accessories retailers	36.7	37.4	6.5	19.3	6.5	19.3	6.2	14.8	48.4	8.7	6.5	3.0	124
Convenience retailers and vending machine operators	8.8	9.0	0.7	7.2	0.6	7.2	0.8	1.5	19.9	3.8	0.7	11.1	33
Electronics and appliances retailers	20.0	20.7	2.2	15.2	2.3	15.1	2.3	4.6	27.0	4.7	2.3	6.6	55
Floor covering, window treatment & home furnishing	9.0	9.4	1.4	5.2	1.4	5.2	1.7	3.6	44.8	6.6	1.4	3.6	102
Fuel dealers	6.8	6.9	0.2	5.4	0.2	5.4	0.5	1.2	21.5	4.8	0.2	25.8	14
Furniture retailers	14.6	15.0	2.5	8.7	2.4	8.8	2.0	5.2	41.4	6.6	2.5	3.6	102
Gasoline stations	76.2	77.8	3.5	66.3	4.1	65.7	2.5	7.0	15.5	6.5	3.8	17.2	21
General merchandise retailers	106.3	108.1	11.8	82.1	11.7	82.2	9.6	19.2	23.9	6.1	11.8	7.0	52
Health and personal care retailers	78.4	80.8	7.8	51.5	8.1	51.2	11.3	25.2	36.6	5.4	8.0	6.4	57
Jewellery, luggage and leather goods retailers	5.7	5.8	1.7	3.2	1.7	3.2	0.8	2.1	45.7	10.5	1.7	1.9	196
Miscellaneous retailers	31.5	32.7	3.9	19.5	3.9	19.5	5.2	10.8	–	–	3.9	5.0	72
New car dealers	178.0	186.7	28.8	160.4	29.7	159.5	11.7	20.9	14.6	3.4	29.2	5.5	67
Other motor vehicle dealers	13.9	14.8	6.4	11.3	6.6	11.2	1.6	2.9	24.5	4.9	6.5	1.7	213
Shoe retailers	4.6	5.1	1.3	2.7	1.4	2.5	0.9	2.0	50.7	10.7	1.4	1.8	197
Specialty food retailers	11.8	12.1	0.7	7.3	0.7	7.3	2.3	4.2	39.9	5.4	0.7	9.8	37
Sporting goods, hobby, musical instrument & book retailers	16.4	16.7	4.8	10.0	4.6	10.2	2.6	5.5	38.9	6.0	4.7	2.2	167
Supermarkets and other grocery retailers	108.6	113.3	5.5	81.8	3.7	83.5	12.4	26.3	26.3	3.0	4.6	18.2	20
Used car dealers	21.9	22.2	3.4	19.1	3.2	19.4	1.1	2.4	13.0	2.3	3.3	5.9	61

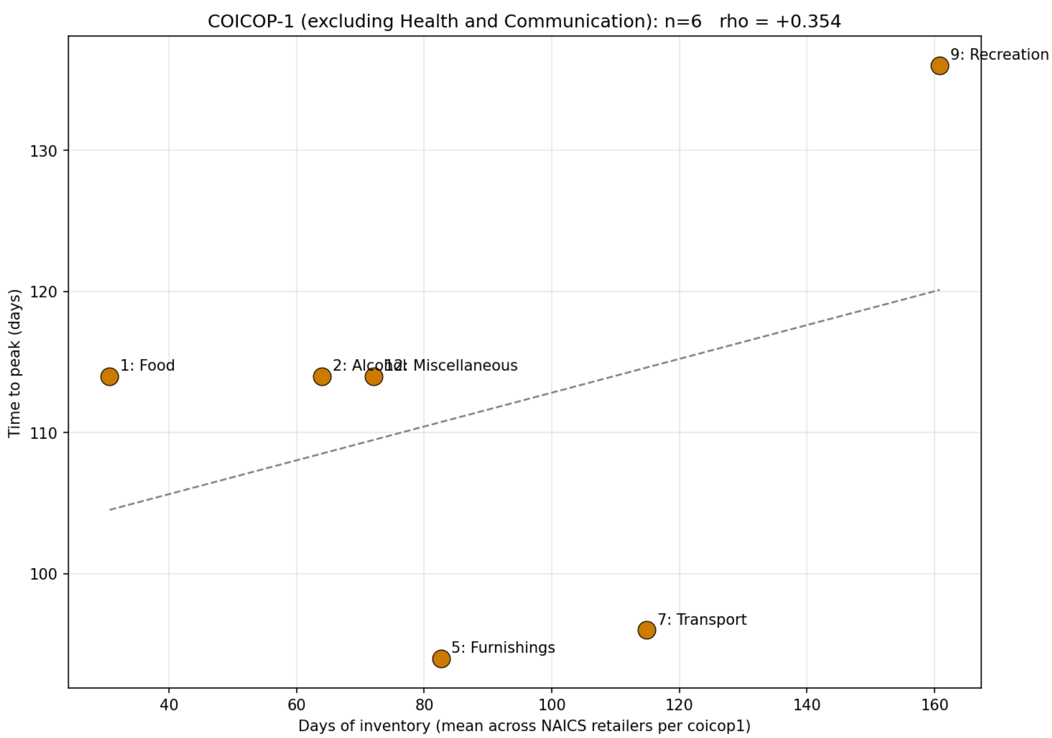
Note: 2024 values from Statistics Canada Table 20-10-0083-01 and are flagged as preliminary by the source. Dollar amounts converted from thousands to billions of CAD (divided by 10^6). Sales = Sales of goods for resale; Revenue = Total operating revenue; Open./Close. inv. = Opening/Closing inventory; Purch. = Purchases; COGS = Cost of goods sold; Labour = Total labour remuneration; Op. exp. = Total operating expenses (excluding COGS); Gross = Gross margin; Op. prof. = Operating profit margin. Avg inv., Turn., and Days inv. are constructed as defined in equations (K.1)–(K.3). "–" denotes values suppressed (x) or unreliable (F) in the source.

Table K2. Pass-through timing by COICOP category and matched retail trade inventory cycle.

COICOP	Category	NAICS retailers (days of inventory)	Mean DOI	h_{peak}
100	Food and non-alcoholic bev.	Convenience retailers & vending (30); Specialty food retailers (39); Supermarkets (23)	30.7	114
200	Alcoholic bev., tobacco, narcotics	Beer, wine and liquor retailers (64)	64.0	114
500	Furnishings and household equip.	Building material & garden (105); Electronics & appliances (55); Floor covering, window treatment & home furnishing (102); Furniture (96); General merchandise (54)	82.6	94
700	Transport	Automotive parts, accessories & tire retailers (115)	114.9	96
900	Recreation and culture	Sporting goods, hobby, musical instrument, book retailers & news dealers (161)	160.8	136
1200	Miscellaneous goods and services	Miscellaneous retailers (72)	72.1	114
Categories excluded from the cross-section analysis (see notes):				
600	Health	Health & personal care retailers (57)	57.3	180
800	Communication	— (no clean NAICS retail match)	—	157

Note: h_{peak} is the horizon (in days from March 4, 2025) at which the LP-DiD coefficient reaches its maximum in Figure 5. "Mean DOI" is the simple mean of days of inventory across the assigned NAICS retailers in the third column.

Figure K1. Time-to-peak pass-through versus days of inventory: COICOP categories.



Note: Horizontal axis: mean days of inventory across the NAICS retailers assigned to each COICOP (Table K2). Vertical axis: h_{peak} (horizon at which the LP-DiD coefficient reaches its maximum in Figure 5). Sample excludes COICOP 600 (Health) and 800 (Communication). Pearson correlation $\rho = +0.354$ ($n = 6$).

K.3 Within-Food evidence: product-level shelf life from USDA FoodKeeper

So far, we used variation in average inventory stocks for retailers selling goods in different 1-digit COICOP categories. In this Section, we exploit variation of perishability of food products, i.e., we use variation across products within a 1-digit COICOP category for Food. We use a product-level proxy of perishability from the USDA FoodKeeper dataset (https://www.foodsafety.gov/keep-food-safe/foodkeeper-app), which reports recommended shelf life for 661 individual food products in three storage modes (pantry, refrigerate, freeze). We classified each product to one of the eleven food 3-digit COICOP categories using its name, sub-category, and keywords.

For each 3-digit food COICOP we compute the mean refrigerate shelf life across its products. COICOP 121 (Coffee, tea and cocoa) is excluded throughout because no FoodKeeper product has refrigerate data for this category; we report the cross-section both with and without COICOP 118 (Sugar/preserves), whose mean rests on a single product.

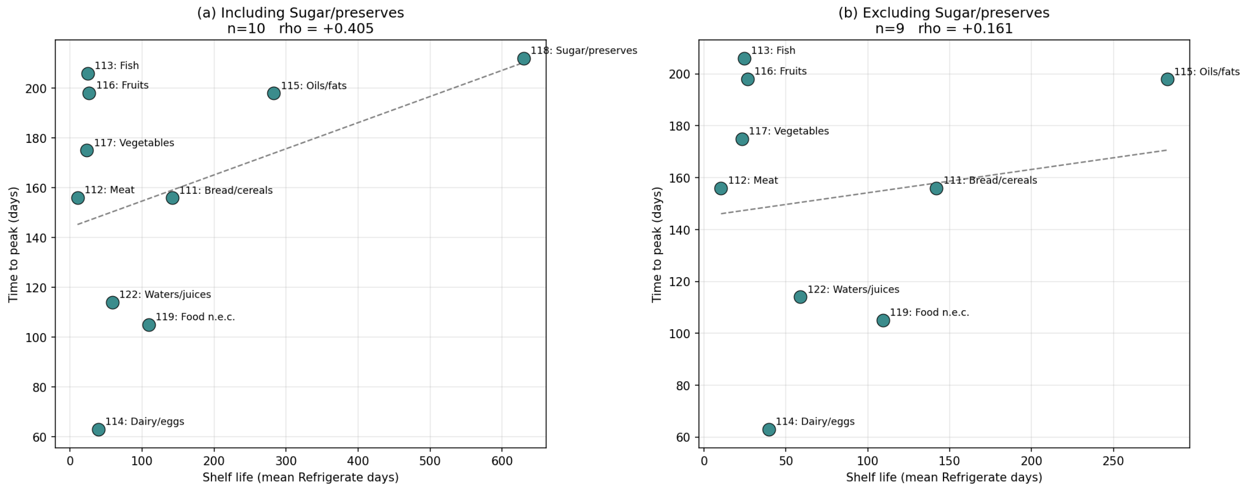
Table K3. Within-Food (COICOP=100): product-level refrigerate shelf life and time-to-peak.

COICOP	Sub-category	# products	Mean refrig. shelf (days)	h_{peak}
112	Meat	117	10.4	156
117	Vegetables	60	23.2	175
113	Fish and seafood	27	24.5	206
116	Fruits	35	26.5	198
114	Milk, cheese and eggs	34	39.5	63
122	Mineral waters, soft drinks and juices	6	58.8	114
119	Food products n.e.c.	65	109.3	105
111	Bread and cereals	11	141.9	156
115	Oils and fats	6	282.9	198
118†	Sugar, jam, honey, chocolate and confectionery	1	630.0	212
Excluded throughout (no FoodKeeper products with refrigerate shelf life):				
121	Coffee, tea and cocoa	0	—	104

Note: Shelf life by 3-digit COICOP for Food, computed from USDA FoodKeeper as the mean refrigerate-storage shelf life across products in each category. Categories are sorted by ascending shelf life. The # products column reports the number of FoodKeeper products in that category that have a non-missing refrigerate shelf-life value. COICOP 121 (Coffee, tea and cocoa) is excluded throughout because FoodKeeper provides no refrigerate shelf life for these products. The dagger (†) on COICOP 118 marks that the category-level mean rests on a single product; we present the cross-section both with COICOP 118 and without it (Figure K2). h_{peak} is the days to peak response computed for each 3-digit COICOP using specification 1 in the main text.

Figure K2 plots h_{peak} against the mean refrigerate shelf life: $\rho = +0.405$ with all ten categories (panel (a)) and $\rho = +0.161$ when Sugar/preserves is dropped (panel (b)).

Figure K2. Time-to-peak versus FoodKeeper refrigerate shelf life for food.



Note: Panel (a) all ten 3-digit food COICOP categories with refrigerate data (excludes only 121 Coffee/tea), Pearson correlation $\rho = +0.405$ ($n = 10$). Panel (b) restricts the sample to the nine categories with at least six FoodKeeper products with refrigerate data (also drops 118 Sugar/preserves), Pearson correlation $\rho = +0.161$ ($n = 9$). COICOP 118 (Sugar/preserves) is the rightmost point in panel (a) and contributes substantially to the slope.

The relationship is positive in both samples: price effects for short-shelf products (Dairy, shelf-life $\sim$ 40 days, peak at 63 days) peak earlier than for long-shelf products (Sugar, shelf-life $\sim$ 630 days, peak at 212 days; Oils/fats, shelf-life $\sim$ 283 days, peak at 198 days).