The Latest Evidence of Tariff Incidence

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Since early 2025, US trade policy has experienced a profound shift towards protectionism, characterised by expansive new tariffs aimed at geopolitical and domestic economic objectives. A central claim driving this policy is that foreign producers absorb the majority of the tariff burden, thereby limiting the pain felt domestically. This paper challenges that narrative by analysing trade data, customs revenues, and consumer prices to trace the incidence of the current tariff wave. We find that while tariffs have generated substantial customs revenue, there is minimal evidence to suggest that they have caused foreign exporters to reduce their prices and that around 16% of recent tariffs may have been circumvented. Instead, export volumes have declined without corresponding price adjustments, indicating limited foreign price absorption. Furthermore, despite theoretical expectations of a notable inflationary effect of close to +0.9pp, we calculate a modest consumer price pass-through of around +0.25pp to date. Collectively, our findings suggest that the immediate economic burden of US tariffs falls predominantly on domestic producers and consumers rather than on foreign exporters, calling into question a core justification of the current trade policy stance.

1. Introduction

US trade policy has undergone a once-in-a-generation transformation since early 2025, marked by a significant resurgence of protectionist measures. The current wave of tariffs, which is broader in scope and scale than previous episodes, has been implemented by the US administration with multiple objectives in mind, ranging from geopolitical leverage to domestic industrial policy (Davies and Wales, 2025). Previous research has examined the broader macroeconomic implications of this policy shift (Benigno et al., 2025), which is associated with a transitory inflationary effect and slowing activity growth, consistent with the recent theoretical response to a permanent tariff increase (Schmitt-Grohe and Uribe, 2025). Tariffs have also significantly influenced financial markets, as unilateral tariff announcements tend to strengthen the dollar, while retaliatory measures are typically followed by depreciation (Corsetti et al., 2025). Here, however, we focus on a specific, and central, claim underpinning the policy narrative: that foreign producers will absorb the majority of the tariff burden (Miran, 2024).

The argument that tariffs operate chiefly as a tax on foreign exporters has been echoed by prominent political figures such as Donald Trump, Scott Bessent, and JD Vance.[1] Yet, as we demonstrate in this paper, this view does not hold up to scrutiny,

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[1]Trump and Vance: CNN fact check https://edition.cnn.com/2024/09/09/politics/fact-check-trump-vance-tariffs. Bessent: Transcript of interview with Tucker Carlson https://home.treasury.gov/news/press-releases/sb0073, April 7 2025.

either in theory or in the data. The previous round of tariffs between 2018 and 2019 showed little evidence that foreign exporters bore the brunt of these costs. And the evidence emerging from the current episode points in a strikingly similar direction. Simply put: the burden of US tariffs is not falling on foreign producers, and likely never will. This finding directly contrasts with the conclusions of recent analysis from the White House Council of Economic Advisors, (Council of Economic Advisers, 2025).

In what follows, we document the transmission of announced tariff rates through three critical channels: observed trade data, customs revenue, and consumer prices. First, we show that the tariff shock is real and measurable. Announced increases are clearly visible in the trade data and have resulted in substantial customs revenue, which is currently on track to exceed $300 billion annually, close to 1% of US nominal GDP. This represents a genuine fiscal benefit but does not tell us who is ultimately bearing these costs.

Second, we examine how trade diversion has mitigated the effective tariff burden. Exporters have partially circumvented US tariffs by shifting supply from high-tariff country-product pairs to those facing lower or no tariffs. We estimate that roughly 16% of the announced tariffs have been avoided through such diversion. The remaining 84% has passed through cleanly into customs revenue, with this adjustment process proving relatively swift and complete.

Third, and critically, we find little evidence that foreign exporters have adjusted their dollar-denominated prices in response to the tariffs. This mirrors behaviour observed during the previous Trump tariff episode in 2018–2019, and persists despite observable declines in trade volumes (Amiti et al., 2019). As in the previous shock, foreign firms have largely maintained pricing levels even as their US-bound export quantities fell, which is consistent with limited price-based adjustment and low foreign absorption of the tariff burden. Nonetheless, this remains a somewhat surprising result, given the incomplete pass-through of other international cost shocks, such as exchange rate movements (Amiti et al., 2014; Campa and Goldberg, 2005).

Turning to domestic price dynamics, we find that some tariffs have already passed through meaningfully into consumer prices. Our theoretical framework implies a long-run effect of approximately +0.9pp on the level of US core PCE, consistent with structural estimates obtained both in prior analyses and in related contributions to the macroeconomic literature Benigno et al. (2025). Our model incorporates an input-output structure.[2] However, using empirical methods drawn from Barbiero and Stein (2025) and Silva (2024) at the Federal Reserve Bank of Boston, and pass-through estimation techniques from the Federal Reserve Board (Minton and Somale, 2025), we find that only around +0.25pp has materialised to date. While historical evidence suggests the full effect could take between 3 and 6 months to unfold (Cuba-Borda et al., 2025), this modest pass-through is nonetheless striking, especially given the scale of the underlying shock.

Bringing these strands of evidence together, we conclude that the immediate burden of US tariffs is falling primarily on domestic agents, specifically, on US producers. This burden may reallocate over time, as domestic margins adjust, but the early data suggests that claims of foreign absorption are, once again, largely unfounded. The majority of the cost, thus far, has landed on the US side of the border.

2. Background and Setup

Since the start of his second presidency, Donald Trump has issued a series of executive orders increasing tariffs on various trade partners. Beginning in February 2025, these tariffs were implemented under the International Emergency Economic Pow-

[2] Input-output linkages play a key role in transmitting shocks from the micro to the macro level, as demonstrated in recent research (Baqaee and Rubbo, 2023; Carvalho et al., 2020), and are well-established in the trade literature (Bussière et al., 2013).

ers Act (IEEPA), citing an emergency related to illegal immigration and drug trafficking, including the influx of deadly fentanyl. Initial tariffs targeted Canada, Mexico, and China.[3] While tariffs on China remained, those on Canada and Mexico were temporarily suspended.

On 2 April (often referred to as 'Liberation Day'), the administration expanded tariffs to a broader set of countries under the so-called 'reciprocal tariff' policy, aimed at eliminating bilateral trade deficits. These country-specific tariffs were enacted under IEEPA, Section 604 of the Trade Act, and Section 301 of Title 3. Tariff rates ranged from a baseline of 10% for many countries to as high as 50% on imports from Lesotho. Concurrently, tariffs were levied on key product categories, including aluminium and steel (from 5 February), automotives (14 February), and copper and lumber (17 April), often stacking on top of country-level tariffs.

In addition, several tariffs appeared to be politically motivated. For example, those tariffs introduced against Colombia in response to a migrant deportation dispute (on 26 January), Venezuelan oil citing criminal and terrorist concerns (24 March); and Brazil to counter the so-called 'Witch Hunt' against former President Bolsonaro (9 July).[4] Other announcements have addressed trade flows that were formerly de minimis. A key feature of the 2025 announcements has been the frequent reversals and suspensions, most notably regarding the fentanyl emergency and the 2 April tariffs, as the administration has allowed time for negotiations and repeatedly extended the delayed implementation of Chinese tariffs.

2.1. Measuring Tariff Changes

To analyse these policies, we have tracked every tariff announcement at a highly detailed country-product level. This data has been compiled using executive orders, press statements, and official communications on public platforms (including social media). We combine this information into an overall tariff announcement metric. Specifically, for country c, product j, and time t, the tariff rate is denoted τ_t^{cj}. Collecting these into a $J \times C$ matrix, $\mathbf{T}_t$, where J and C represent the product and country dimensions respectively, this matrix may vary daily as announcements evolve.[5]

We define the change in the tariff matrix relative to a baseline as:

$$\hat{\mathbf{T}}_t = \mathbf{T}_t - \mathbf{T}_0 \tag{1}$$

where we will take the baseline values to represent the full 2024 average. The change in the average tariff rate, weighted by average 2024 import shares at the country-product level is then defined as:

$$\begin{aligned} \bar{\hat{T}}_t &= \sum_c \sum_j (\tau_t^{cj} - \tau_0^{cj}) s^{cj}, &(2) \\ &= \mathbf{1}' \big[\hat{\mathbf{T}}_t \odot \mathbf{S}\big] \mathbf{1}, &(3) \end{aligned}$$

where $\mathbf{S}$ is a $J \times C$ matrix of the 2024 import share weights (individual nominal imports as proportion of total US nominal imports) at the country-product level, $\odot$ denotes element-wise multiplication, and $\mathbf{1}$ is a vector of ones. Imports data are taken from the US Census Bureau at the HS10 level for all partner countries. Our methodology closely follows Amiti et al. (2019, 2020), although we use both announced tariff rates and implemented rates in this paper. This is an important distinction, to which we will return later.

[3] See, for instance the February 2025 White House Fact Sheet, here.

[4] See, for instance the Venezuela Executive Order, here.

[5] Although we abstract from intraday changes, these can be significant. For instance during the 9 April episode the announced tariff rates were enacted for less than a day.

[6] Our tariff tracker closely mirrors both the trajectory and magnitude of less granular and less timely alternatives, such as the measure developed by the Yale Budget Lab, available here, and compared in Appendix A.

The results of this exercise are shown in Figure 1.[6] As illustrated, the average announced US tariff rate, $\bar{\bar{\mathcal{T}}}_t$, has fluctuated significantly during 2025. Starting from approximately 2.5% in January, the average tariff rate peaked at 28% in early April (shown in Panel, a). As of the latest update, our estimate places the average tariff rate at around 16%. However, if previously announced, but currently paused, tariffs were to be reinstated, the rate could rise above 20%, as indicated by the dashed lines in Figure 1. The distribution of the tariff burden has also fluctuated over time. Panel (b) breaks down some components of the most recent tariff burden, highlighting that tariffs on Chinese goods remain a significant contributor to the overall US tariff rate, primarily imposed under the International Emergency Economic Powers Act (IEEPA). In contrast, although US auto tariffs have received considerable media attention as one of the key product specific changes, they represent only a small portion of the total US tariff burden, in part due to substantial exemptions.

2.1.1 Aggregation to Commodity Level

Trade and tariff data are initially expressed at the Harmonized System (HS) product level but need to be converted to commodity-level aggregates to merge with data consistent with National Income and Product Accounts (NIPA) tables. This aggregation is achieved via:

$$\hat{\mathcal{T}}_t = \mathbf{\Gamma}_1 \left[\hat{\mathbf{T}}_t \circ \mathbf{S} \right] \mathbf{1} \tag{4}$$

where $\mathbf{\Gamma}_1$ is an $N \times J$ translation matrix mapping HS products to BEA commodities. Entries of $\mathbf{\Gamma}_1$ correspond to weights of the consumption share for each HS product in a BEA commodity, while entries of $\mathbf{S}$ correspond to commodity and country level trade weights.

2.2. Trade Diversion & Customs Revenue

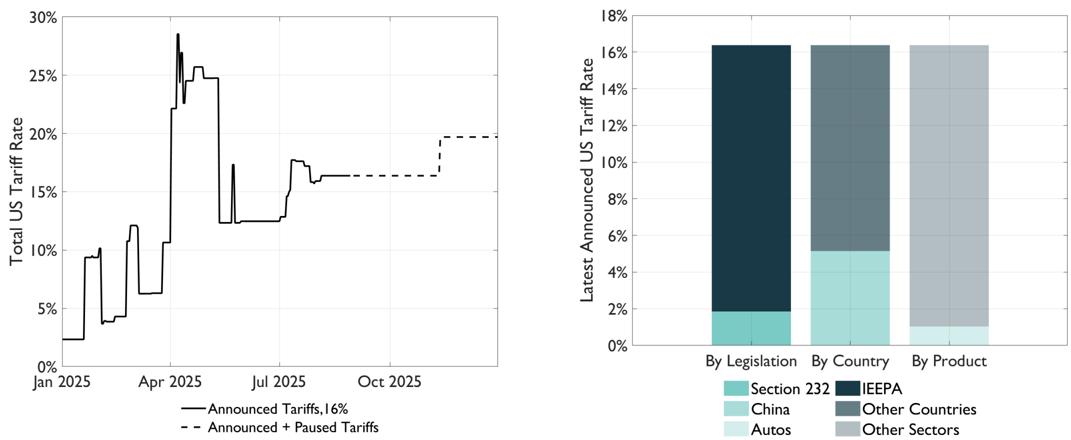
Announced tariff rates have passed through to observable increases in both effective tariff rates (from customs trade data) and revenue collections (from fiscal data). This confirms that tariffs are being paid, by someone. As shown in Figure 2, Panel (a), observed tariff rates, measured using both customs and fiscal authority data, have risen steadily in the early months of 2025, reaching just below 10% by June.

The customs and fiscal data are relatively consistent, shown as the similarities between the **blue** and **teal** bars in Figure 2 (a). This means that the flexibility usually granted to importers in the timing of their customs levy payments has typically resulted in payment within the same month, with relatively few lags. Revenue has therefore quickly flowed into the US Treasury as customs receipts. However, a persistent difference exists between these calculated tariff rates and the announced rates, represented in the **dark blue** bars. The effective rates in customs and fiscal data consistently fall short of the headline announced rates. This suggests substantial within-month tariff announcement reversals; delayed implementation; shifting trade patterns including from diversion; compliance gaps, or exploitation of tariff exemptions and re-routing. These issues are explored in more detail in the next section.

In Figure 2, Panel (b), we show that the increase in tariff revenue amounts to approximately $26 billion in monthly customs receipts. At the latest annualised rate, this equates to over $300 billion per year in tariff revenue, close to 1% of nominal GDP. This far exceeds the increases seen in the previous Trump administration's trade war with China.

Figure 1: US Tariff Tracker

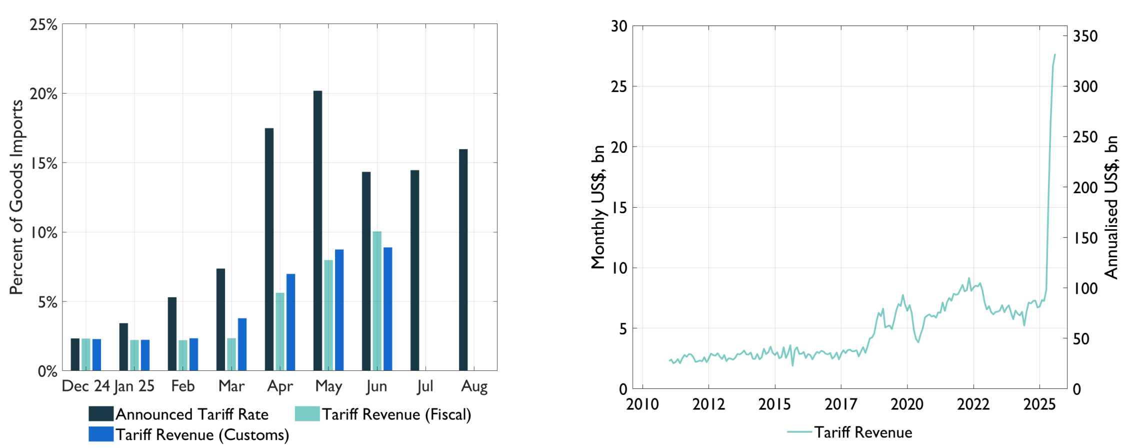
(a) Announced US Import Tariffs (b) Import Tariffs



Sources and Notes: Fulcrum Asset Management LLP, US Census Bureau, and US White House. Panel (a) shows high frequency tariff trackers based on announced policies, using methodology similar to Amiti et al. (2019). Panel (b) shows how these tariff announcements can be decomposed by legal authority; by importer country; and by sectors.

Figure 2: US Tariff Revenue

(a) US Tariff Rates (b) US Customs Receipts



Sources and Notes: Fulcrum Asset Management LLP, US Census Bureau, and BLS. In panel (a) the announced tariff rates refer to the monthly averages taken from our tariff tracker displayed in Figure 1. The customs revenue uses data from the US Census Bureau on total tariff duties due and total nominal goods imports. The fiscal revenue uses data from the US Treasury fiscal receipts, shown directly in panel (b), and deflates these by nominal total nominal goods imports from the US Customs data.

3. Diversion Means Tariffs Have Not Fully Landed

In this section we explore the role of trade diversion in partly offsetting the increase in announced tariff rates. Trade diversion is substantial and appears to be masking approximately 15% (–1.4pp) of the total observed increase in US tariff rates (+8.4pp) by June. This implies that a large proportion of the intended tariff shock has not directly transmitted into the US economy. Notably, of the change in trade patterns, the majority, roughly –2.0pp, is attributable to shifting patterns of Chinese trade, primarily via adjustments on the intensive margin of Chinese imports. That is, China's share of US imports has declined relative to other countries, and products that were previously imported directly from China are now arriving from alternative trade partners, notably Vietnam.

These compositional changes can be formally analysed using a shift-share decomposition. We implement this decomposition using monthly trade data, which allows us to separate movements in the observed aggregate US tariff rate into two main components: changes in individual **tariff rates**, and shifts in **import shares**. The latter itself breaks down into: **import composition** (intensive margin), reflecting trade diversion, and **total imports** (extensive margin), largely reflecting changes in overall demand or aggregate trade volumes. We first define the observed average tariff rate, T_t, as:

$$T_t \equiv \frac{\sum_{cj} r_t^{cj}}{\sum_{cj} m_t^{cj}}, \tag{5}$$

where c denotes country, j denotes product and t time, with r_t^{cj} representing tariff revenue and m_t^{cj} nominal imports. This definition expresses the average tariff rate as total tariff revenue divided by total nominal imports.

The change in the average tariff rate may then be defined as:

$$\hat{T}_t \equiv T_t - T_{24}, \tag{6}$$

$$= \frac{\sum_{cj} r_t^{cj}}{\sum_{cj} m_t^{cj}} - \frac{\sum_{cj} r_{24}^{cj}}{\sum_{cj} m_{24}^{cj}} + \left[\sum_{cj}\left(\frac{r_t^{cj}}{m_t^{cj}} \frac{m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right) - \sum_{cj}\left(\frac{r_t^{cj}}{m_t^{cj}} \frac{m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right)\right], \tag{7}$$

where a difference is taken and the added-and-subtracted term facilitates the decomposition of $\hat{T}_t$ into rate and share effects.

Then, the change in the tariff rate may then be decomposed as:

$$\hat{T}_t \equiv \underbrace{\sum_{cj}\left[\left(\frac{r_t^{cj}}{m_t^{cj}} - \frac{r_{24}^{cj}}{m_{24}^{cj}}\right)\frac{m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right]}_{\text{Change in Tariff Rate}} + \underbrace{\sum_{cj}\left[\frac{r_t^{cj}}{m_t^{cj}}\left(\frac{m_t^{cj}}{\sum_{cj} m_t^{cj}} - \frac{m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right)\right]}_{\text{Change in Imports Share}}, \tag{8}$$

where the first term sums over changes in individual country-product **tariff rates** but holding fixed import shares and the second term sums over changes in individual country-product **import shares** while holding the tariff rate fixed.

In a final step, the changes in the import shares themselves may be decomposed into changes stemming from the **intensive margin** and changes from the **extensive** trade share margin:

$$\begin{aligned}\hat{T}_t \equiv & \sum_{cj}\left[\left(\frac{r_t^{cj}}{m_t^{cj}} - \frac{r_{24}^{cj}}{m_{24}^{cj}}\right)\frac{m_{24}^{cj}}{\sum_{ij} m_{24}^{cj}}\right] \\ & + \sum_{cj}\left[\frac{r_t^{cj}}{m_t^{cj}}\left(\frac{m_t^{cj}}{\sum_{cj} m_t^{cj}} - \frac{m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right.\right. \\ & \left.\left. + \frac{m^{cj}}{\sum_c m_t^{cj}}\frac{\sum_c m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}} - \frac{m^{cj}}{\sum_c m_t^{cj}}\frac{\sum_c m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right)\right] \end{aligned} \tag{9}$$

$$\begin{aligned}\hat{T}_t \equiv & \underbrace{\sum_{cj}\left[\left(\frac{r_t^{cj}}{m_t^{cj}} - \frac{r_{24}^{cj}}{m_{24}^{cj}}\right)\frac{m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right]}_{\text{Change in Tariff Rate}} \\ & + \sum_{cj}\left[\frac{r_t^{cj}}{m_t^{cj}}\left(\underbrace{\left(\frac{m_t^{cj}}{\sum_c m_t^{cj}} - \frac{m_{24}^{cj}}{\sum_c m_{24}^{cj}}\right)\frac{\sum_c m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}}_{\text{Change in Intensive Margin}}\right.\right. \\ & \left.\left. + \underbrace{\left(\frac{\sum_c m_t^{cj}}{\sum_{cj} m_t^{cj}} - \frac{\sum_c m_{24}^{cj}}{\sum_{cj} m_{24}^{cj}}\right)\frac{m_t^{cj}}{\sum_c m_t^{cj}}}_{\text{Change in Extensive Margin}}\right)\right] \end{aligned} \tag{10}$$

This allows us to distinguish pure policy effects from trade diversion and overall supply and demand.

Figure 3 illustrates these effects. The observed rise in effective US tariff rates, represented by the **teal bars** in panels (a) and (b), has been partially offset by shifts in import shares, shown by the **terracotta bars**, as captured by equation (8). In the current episode, shown in panel (b), the latest data for June show an increase in tariff rates of around +8.4pp with the offsetting change in import shares contributing -1.7pp to leave the overall change in the aggregate tariff rate at +6.7pp.

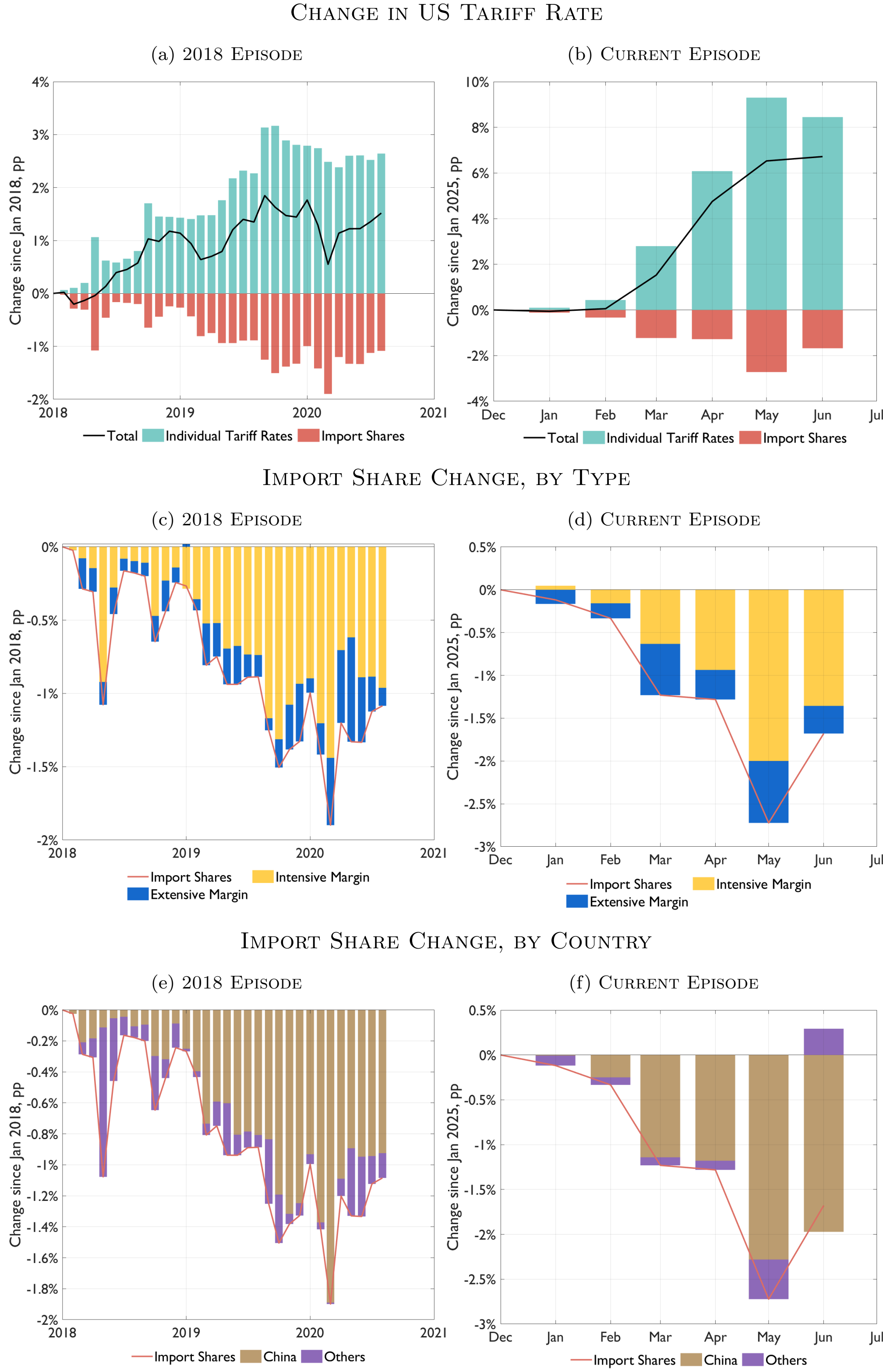
In panels (c) and (d) of Figure 3 these offsetting effects are decomposed further, using equation (10), to distinguish between changes in import shares resulting from changes in the intensive margin of imports, shown in the **yellow bars** and changes in the extensive margin shown in the **bright blue bars**. Again, focusing on the current episode, this highlights how the -1.7pp change in import shares is primarily attributable to a change in the **intensive margin** of imports. A change in the intensive margin of imports reflect trade diversion toward countries and products facing lower tariffs. For instance, this reflects imports from particular country–product pairs (e.g., mobile phones from China) decline, even as total imports of those products remain relatively stable (overall US mobile phone imports). The **extensive margin** effect is more modest, reflecting the overall fall in import volumes. Nonetheless, the bulk of the offset arises from intensive-margin reallocations across trading partners, which is the primary driver of this incomplete tariff rate pass-through.

Finally, an alternative decomposition partitions the second term in equation (8) into the components from China and all others. The results are shown in panels (e) and (f) of Figure 3, which highlights the shifts in import shares, the combined effect of intensive and extensive margins, by country of origin. The bulk of the adjustment is concentrated in trade with China, which has experienced a sharp decline in its share of US imports, represented by the **brown bars**. Other countries, shown in **lavender bars**, contribute only marginally. This highlights that China is the primary source of the trade diversion offsetting the headline increase in product-level tariffs. This decomposition can also identify countries which have helped in this offsetting effect, which shows the largest contributions from Vietnam and South Korea.

Panels (a), (c) and (e) replicate this analysis for the 2018 tariff episode and reveal strikingly similar dynamics. In that case, a comparable share of the announced tariff increase was offset via trade diversion along the intensive margin. These effects stabilised rapidly, within about a year, and showed little evidence of reversal thereafter. This historical precedent suggests that the current 15% offset is unlikely to unwind in the near term and may reflect a structural realignment of trade flows which could increase further in the coming months.

These findings challenge the notion that foreign exporters are simply absorbing the costs of US tariffs. While some firms may have lost market share in the US, others have gained, leading to a redistribu-

Figure 3: Trade Diversion and Substitution



Sources and Notes: Fulcrum Asset Management LLP, US Census Bureau, and BLS. Figure shows changes in US tariff rates during the 2018 and 2025 episodes. Panels (a) and (b) decompose these changes into two components: the effect of adjustments in individual tariff rates and the effect of shifts in import shares. Panels (c) to (f) provide a further breakdown of the import share component. Specifically, panels (c) and (d) distinguish between intensive and extensive trade margins, while panels (e) and (f) show the decomposition by country.

tion of trade flows rather than a reduction in overall import volumes. As a result, a significant share of the tariff burden is effectively avoided: it neither feeds through into higher US consumer prices nor generates increased fiscal revenue.

The speed and precision of the trade response also suggests that this adjustment is likely to be driven by spare capacity among alternative suppliers or trade routes. The evidence points to re-routing of trade through third countries. The main beneficiaries of this diversion appear to be Vietnam, South Korea, India, Mexico, Slovakia, and Austria, which have absorbed much of the trade previously flowing from China.

4. Producer Price Pass-Through

Having established substantial trade diversion directly from the trade data, we remain at the border and examine the impact of tariffs on producer prices paid by US importers. It is important to recall that tariffs are not included in standard price measures captured by the Bureau of Labor Statistics (BLS), such as the Import Price Index or the Producer Price Index (PPI).[7]

A widely cited approach to address this limitation is provided by Amiti et al. (2019), who link pre-tariff import prices to customs duty rates derived directly from trade data. Using this method, they examine the effect of the 2018 tariff increases on import prices, among other outcomes. Notably, they find no significant impact on producer prices. Their baseline regression specification is:

$$\Delta \ln z_{cjt} = \mu_j + \eta_{ct} + \beta \Delta \ln(1 + \tau_{cjt}) + u_{cjt} \quad (11)$$

where c indexes countries, j indexes products, and t indexes time. μ_j denotes product fixed effects, η_{ct} captures country-time effects, and u_{cjt} is the error term. The dependent variable z_{cjt} varies across specifications (described below), while the independent variable is the annual change in the gross tariff rate, $\Delta \ln(1 + \tau_{cjt})$. The estimation is conducted via Ordinary Least Squares (OLS), relying on the quasi-exogenous nature of the tariff shocks, which were largely unanticipated and hence suitable for causal inference.[8]

In the analysis that follows, we replicate this empirical framework and find that, to date, the current tariff episode also exhibits only limited producer price pass-through. Regression results are reported in Table 1.

Column (1) presents estimates where the dependent variable is the change in foreign export prices, $\Delta \ln(p_{cjt})$. Amiti et al. (2019) report a coefficient of –0.01 for the 2018 tariffs; we obtain the same estimate of –0.01 for this period, which is small and statistically insignificant, indicating minimal producer price response to tariff increases. In the current episode, the estimate is again identical to two decimal places, as –0.01, again suggesting that foreign producers have not significantly lowered their prices in response to higher US tariffs. Standard errors are clustered at the HS10 product level.

In contrast, columns (2) and (3) examine the response of import quantities, $\Delta \ln(m_{cjt})$. Here, the effect of tariffs is considerably larger. Across both episodes, import quantities decline significantly with higher tariffs, with elasticities ranging from –1.3% to –5.9% per one percentage point increase in tariff rates. This result suggests that quantities, rather than prices, bear the brunt of tariff adjustments, likely reflecting the trade diversion patterns discussed earlier.

Columns (4) and (5) show results for import values, defined as the change in the product of price and quantity, $\Delta \ln(p_{cjt} \times m_{cjt})$. The value responses

[7] Import prices exclude tariffs because they are constructed to deflate the net trade components of GDP. Taxes such as VAT or customs duties are instead incorporated into the government account under national accounting standards (Camp, 2020). Regarding the PPI, the BLS explicitly states: "PPI measures the average change in prices producers receive for the sale of their products. Since tariffs and taxes are not retained by producers as revenue, they are explicitly excluded from the PPI."

[8] Discussion of how this regression is efficiently operationalised is found in Appendix B.

Table 1: Impact of US Tariffs on Importing

	Dependent Variable:				
	log change foreign exporter prices $\Delta \ln(p_{cjt})$ (1)	log change import quantities $\Delta \ln(m_{cjt})$ (2)	log change import quantities $\Delta \ln(m_{cjt})$ (3)	log change import values $\Delta \ln(p_{cjt} \times m_{cjt})$ (4)	log change import values $\Delta \ln(p_{cjt} \times m_{cjt})$ (5)
Amiti et al. (2019)					
log change tariff	-0.01	-1.31***	-5.89***	-1.42***	-6.36***
SE	(0.02)	(0.09)	(0.59)	(0.09)	(0.77)
N	1647617	1647617	3318912	2487370	4461376
R^2	0.02	0.02	0.10	0.01	0.10
2018 Episode					
log change tariff	-0.01	-2.27***	-2.26***	-2.38***	-2.39***
SE	(0.01)	(0.06)	(0.06)	(0.07)	(0.07)
N	1499174	1499174	1499174	2252232	2252232
R^2	0.02	0.03	0.01	0.02	0.02
2025 Episode					
log change tariff	-0.01	-1.87***	-1.90***	-2.09***	-2.09***
SE	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)
N	1557199	1557199	1557199	2009821	2009821
R^2	0.02	0.04	0.01	0.03	0.03

Source and Notes: US Census Bureau, Amiti et al. (2019) and Fulcrum Asset Management LLP. Observations are at the HTS10-country-month level. The dependent variable in column 1 is the log change of prices (before US duties are applied) charged by foreign exporters. 2018 episode uses data for the period January 2017 to December 2018. 2025 episode uses data for the period February 2024 to June 2025. Variables are in twelve-month log change. All columns include HTS10 product fixed effects and country × year fixed effects. Standard errors are clustered at the HS10 product level. Columns (3) and (5) replace the dependent variable with the the inverse of the hyperbolic sine transformation, $\ln[x + (x^2 + 1)^{0.5})]$, to be able to estimate changes when import quantities or values are zero in period-t or $t - 12$. In this table *, **, and *** indicate significance levels of $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

mirror those of quantity, given the limited change in prices. The patterns during the 2025 episode are nearly identical to those observed following the 2018 Trump tariffs. The results in columns (3) and (5) adjust the dependent variable to a hyperbolic sine transformation to allow estimation for entries where trade flows collapse to 0 after the imposition of tariffs. The hyperbolic sine transformation is close to the log of the variable for small changes. Although Amiti et al. (2019) find substantially larger elasticity estimates when using this transformation, our results suggest trade collapsing in certain categories is not responsible for these elasticity estimates, at between -1.9% and -2.4%, being lower than some of the literature suggests. Using these elasticities we estimate the deadweight welfare losses to be in the region of \$5bn per month in the current episode, around 10 times the impact of the 2018 tariffs, as shown in Appendix C.

In a second exercise, we estimate the same regressions using Weighted Least Squares (WLS), applying import value weights to better capture the aggregate effect on import price inflation. The results, shown in Table 2, are remarkably consistent with the unweighted specifications. Even when accounting for import size, the conclusions are unchanged: producer price pass-through has been minimal, with import prices falling only slightly in response to higher tariffs. In contrast, import quantities and values have declined significantly, reinforcing the in-

Table 2: Weighted Impact of US Tariffs on Importing

	Dependent Variable:				
	log change foreign exporter prices $\Delta\ln(p_{cjt})$ (1)	log change import quantities $\Delta\ln(m_{cjt})$ (2)	log change import quantities $\Delta\ln(m_{cjt})$ (3)	log change import values $\Delta\ln(p_{cjt}\times m_{cjt})$ (4)	log change import values $\Delta\ln(p_{cjt}\times m_{cjt})$ (5)
2025 Episode (Unweighted)					
log change tariff	-0.01	-1.87***	-1.90***	-2.09***	-2.09***
SE	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)
N	1557199	1557199	1557199	2009821	2009821
R^2	0.02	0.04	0.01	0.03	0.03
2025 Episode (Import Weighted)					
log change tariff	-0.03***	-1.62***	-1.85***	-1.28***	-1.33***
SE	(0.01)	(0.03)	(0.03)	(0.04)	(0.04)
N	1557199	1557199	1557199	2009821	2009821
R^2	0.02	0.04	0.01	0.03	0.03

Source and Notes: US Census Bureau and Fulcrum Asset Management LLP. Observations are at the HTS10-country-month level. The dependent variable in column 1 is the log change of prices (before US duties are applied) charged by foreign exporters. Both 2025 unweighted and weighted episodes use data for the period February 2024 to June 2025. Variables are in twelve-month log change. All columns include HTS10 product fixed effects and country × year fixed effects. Standard errors are clustered at the HS10 product level. Columns (3) and (5) replace the dependent variable with the the inverse of the hyperbolic sine transformation, $\ln[x + (x^2 + 1)^{0.5})]$, to be able to estimate changes when import quantities or values are zero in period-t or $t - 12$. In this table *, **, and *** indicate significance levels of $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

terpretation that trade diversion, rather than lower producer prices, has been the main mechanism of adjustment.

We can extend the analysis of Amiti et al. (2019) by allowing for non-linearities, heterogeneity, and time variation in the tariff pass-through response. To begin, we focus on time dynamics by estimating a local projections framework, following Jorda (2005), which allows us to track the evolution of pass-through effects at different horizons.

Specifically, we modify the baseline specification in equation (11) to estimate monthly responses at horizon h:

$$\Delta\ln z_{cj(t+h)} = \mu_j + \eta_{ct} + \beta_h \Delta\ln(1+\tau_{cjt}) + u_{cjt}, \quad (12)$$

where $z_{cj(t+h)}$ again denotes the outcome of interest (e.g., import prices, quantities, or values), and β_h traces the response at horizon h months after the tariff change. Unlike the annual change specification in equation (11), this version uses monthly changes and cumulates responses over time.

The results, shown in Figure 4, confirm the earlier findings from Tables 1 and 2: producer prices exhibit minimal response to tariff changes, both in the short term and at longer horizons. The bulk of the adjustment again occurs through import quantities, and hence, import values.

Two additional findings emerge from this dynamic analysis. First, there is clear evidence of anticipatory behaviour prior to tariff implementation. We observe significant announcement effects, where import volumes spike before tariffs take effect. This likely reflects importers accelerating shipments to avoid higher costs, exploiting the lag between rumours, announcements, and formal implementation. The peak of this anticipatory import surge typically occurs in the month immediately preceding implementation, although some effects are also visible earlier. However, this temporary increase is more than offset by a sustained decline in imports following the imposition of tariffs, which remains statistically significant for at least 12 months.

Second, and perhaps most strikingly, the magnitude and time profile of responses in the current 2025 tariff episode closely mirror those observed during the 2018 trade war. This similarity persists despite the much larger scale of the current tariff shock, as discussed in earlier sections. The robustness of these patterns across two distinct episodes suggests that US importers have developed consistent behavioural responses to tariff policy, relying primarily on quantity adjustments and trade diversion, with little adjustment burden falling of foreign producers.

4.1. Non-Linearities

To assess the potential impact of non-linearities in the relationship between tariffs, producer prices, and import volumes, we implement two alternative specifications of equation (11). The first approach investigates the presence of threshold effects around zero by partitioning the tariff variable. Specifically, we estimate the following modified specification:

$$\Delta \ln z_{cjt} = \mu_j + \eta_{ct} + \beta_+ \Delta \ln(1+\tau_{cjt})\mathbf{1}\{\Delta\tau_{cjt} > 0\} + \beta_- \Delta \ln(1+\tau_{cjt})\mathbf{1}\{\Delta\tau_{cjt} < 0\} + u_{cjt}, \tag{13}$$

where, the indicator functions $\mathbf{1}\{\Delta\tau_{cjt} > 0\}$ and $\mathbf{1}\{\Delta\tau_{cjt} < 0\}$ separate positive and negative tariff changes, respectively. This specification allows us to test whether the effects of tariff increases differ from those of tariff reductions.[9]

The results of this exercise are presented in Figure 5, panels (a) and (b), and in Table 3. The findings suggest limited evidence for an asymmetry in response.[10] Estimates of β_+ and β_- are similar in magnitude, and for producer export prices, neither coefficient is statistically significant, indicating minimal differential effects between tariff increases and declines. Again, the experience of 2025 so far is strikingly similar to the 2018 episode. There is some significant evidence that higher tariffs are associated with a reduction in producer prices, but this is small in magnitude and significance is weak. In contrast import quantities fall across the board.

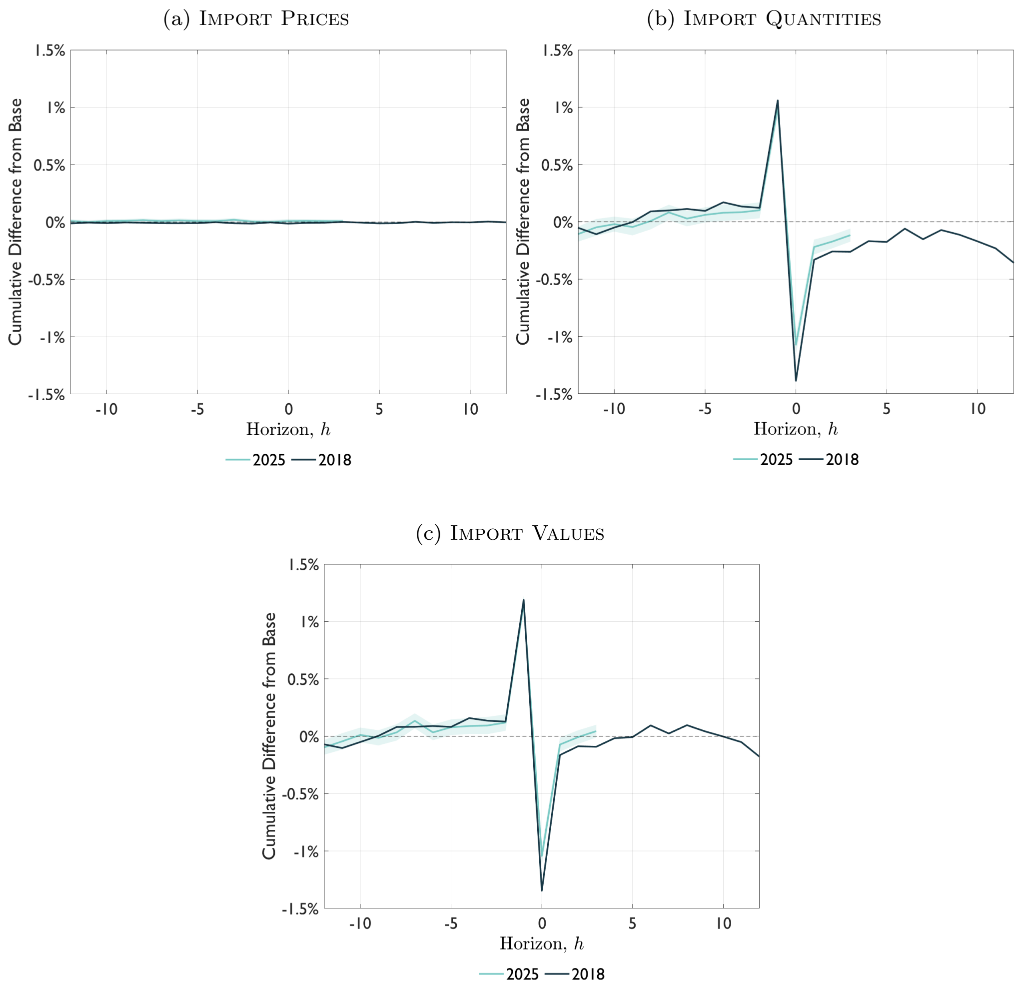
The second approach to assessing potential non-linearities in the relationship between tariffs, prices, and quantities involves a grouped regression specification. Specifically, we partition the distribution of tariff changes into several equally sized bins (for instance, deciles) and include indicators for each group within the specification. This approach allows us to estimate how the impact of tariff changes varies across the distribution, capturing potential non-linear effects.

In particular, we are interested in whether products experiencing larger tariff changes exhibit a disproportionate (non-linear) response in prices or quantities compared to the average marginal effect. This method enables us to test whether responses are stronger (or weaker) in the tails of the distribution than at the centre. Our specification continues to include two-way fixed effects, specifically, product fixed effects and country-time fixed effects, to control for unobserved heterogeneity across products and over time. Formally, we replace equation (11)

[9] Questions may arise regarding the presence of tariff declines observed in the dataset. A simple example can clarify how such declines occur. The dataset is constructed as an average at the product–country level. For instance, a product imported from Canada may be eligible for tariff exemptions under the United States–Mexico–Canada Agreement (USMCA). In cases where the standard (non-exempt) tariff rate is relatively low, firms may find that the administrative burden and costs associated with complying with USMCA rules outweigh the benefits of exemption, leading them to forego the necessary paperwork. However, as tariff rates increase, the cost savings from exemption become more substantial, incentivising more firms to comply with the required procedures. This shift in compliance behaviour can result in a greater proportion of exempt imports within a product–country category, thereby reducing the average tariff rate observed in the data.

[10] As shown in Appendix D these results help to resolve issues relating to the "missing intercept" in moving from a micro-econometric to a macro-econometric specification from the main specification.

Figure 4: Cumulative Impulse Response to Tariff Shocks



Sources and Notes: Fulcrum Asset Management LLP. Error bands show standard errors from the 2025 episode.

with the following modified specification:

$$\Delta \ln z_{cjt} = \mu_j + \eta_{ct} + \beta \Delta \ln(1+\tau_{cjt}) + \sum_{g=1}^{G} \delta_g D_{g,cjt} + u_{cjt}, \tag{14}$$

where $D_{g,cjt}$ are indicator variables for the tariff change falling into the $g-th$ group of the distribution (with G total number of groups). This means $D_{g,cjt}$ are constructed with knowledge of the full sample distribution of $\Delta\tau_{cjt}$ but are not interacted with it. The coefficient β captures the effect of tariff changes on averages across all groups, while each δ_g measures the differential effect relative to that average. Therefore the total effect of a tariff change in group g is given by $\beta + \delta_g$, allowing us to assess how the slope of the tariff relationship varies across the distribution.

The results of this exercise are presented in Figure 5, panels (c) and (d), and in Table 4. First concentrating on the impact of producer import prices, we find that the estimated coefficient for β, which now corresponds to the highest group of tariff changes, is small and positive, while most of the δ_g estimates are small in magnitude and several are statistically insignificant. This contrasts with

Table 3: Non-Linear Impact of US Tariffs on Importing

	Dependent Variable:			
	log change foreign exporter prices $\Delta \ln(p_{cjt})$ (1)		log change import quantities $\Delta \ln(m_{cjt})$ (2)	
2018 Episode	β_+	β_-	β_+	β_-
log change tariff	-0.02*	0.01	-2.21***	-2.35***
SE	(0.01)	(0.01)	(0.07)	(0.09)
N	1499174		1499174	
R^2	0.02		0.03	
2025 Episode				
log change tariff	-0.02**	0.00	-1.65***	-2.25***
SE	(0.01)	(0.01)	(0.04)	(0.06)
N	1557199		1557199	
R^2	0.02		0.04	

Source and Notes: US Census Bureau and Fulcrum Asset Management LLP. Observations are at the HS10-country-month level. The dependent variable in column 1 is the log change of prices (before US duties are applied) charged by foreign exporters. 2018 episode uses data for the period January 2017 to December 2018. 2025 episode uses data for the period February 2024 to June 2025. Variables are in twelve-month log change. All columns include HTS10 product fixed effects and country × year fixed effects. Standard errors are clustered at the HS10 product level. In this table *, **, and *** indicate significance levels of $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

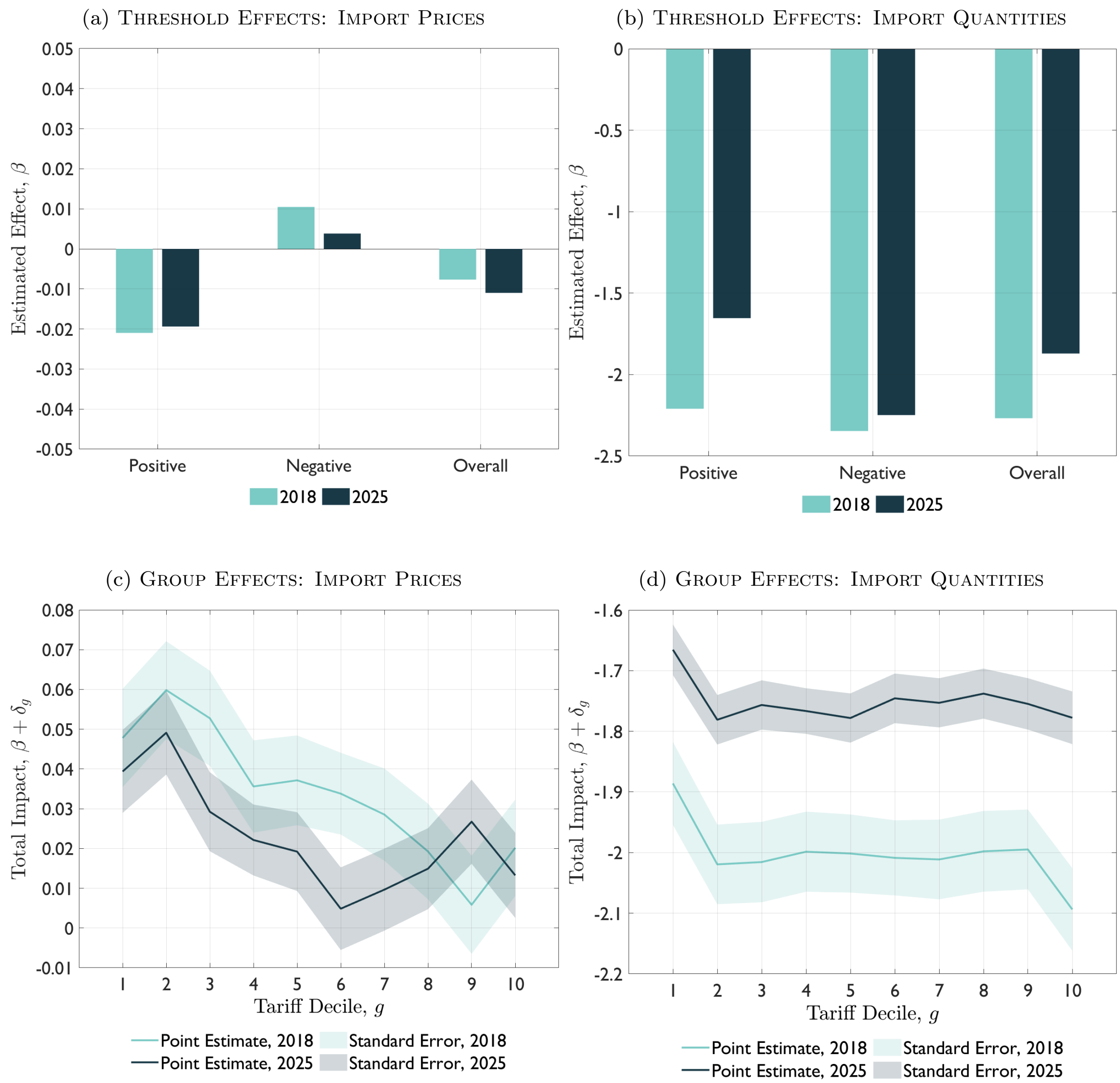
the baseline specification without bin interactions, where the estimated average effect of a tariff change is slightly negative and statistically insignificant.

The reversal in the sign of β for import prices may, at first glance, appear surprising. However, the difference in interpretation between the baseline and grouped regression is important as is the proximity to 0 and level of significance.

In the grouped specification, β represents a localised effect, specifically the marginal effect for observations in the highest group of tariff changes. The fact that this localised effect is small and positive, while the average effect is slightly negative, suggests that there is no strong evidence of nonlinear responses in price adjustments across the distribution and that the highest group (where β is estimated) does not exhibit significantly stronger responses compared to the remainder of the distribution. The change in sign likely reflects statistical noise or sampling variability, rather than a substantive shift in the underlying relationship while the inclusion of group identifiers absorbs some of the variation that was previously captured by the average effect in the baseline model, perhaps explaining the change in sign. Overall, these results suggest that there is no robust evidence of strongly nonlinear price responses to tariff changes in this context. The responses appear modest and relatively uniform across the distribution of tariff changes.

A similar conclusion, a lack of strong nonlinearities, emerges when examining the response of import quantities. In this case, the effect estimated for the highest bin aligns in both sign and magnitude with the average effect reported in Table 1. However, there is limited variation in the estimated effects across the distribution, with most bins showing small and statistically insignificant differences relative to the top group. This suggests that quantity responses to tariff changes are broadly consistent across the spectrum of tariff adjustments. Once again, the results are qualitatively similar across the 2018 and 2025 episodes, reinforcing the conclusion that there

Figure 5: Non-Linearities Tariff Impacts



Sources and Notes: Fulcrum Asset Management LLP. Figure shows the non-linear impact of tariffs on import prices and import quantities. Panels (a) and (b) show threshold effects while panels (c) and (d) show group effects. In panel (a) and (b) Positive refers to β_+ estimates from equation (13) while Negative refers to estimates of β_-. Overall refers to β estimates from regression equation (11). Error bands in panels (c) and (d) show standard errors from the respective tariff episodes episode.

Table 4: Grouped Impact of US Tariffs on Importing

	Independent Variable:												
	β	δ_1	δ_2	δ_3	δ_4	δ_5	δ_6	δ_7	δ_8	δ_9	δ_{10}	N	R^2
2018 Episode													
$\Delta\ln(p_{cjt})$	0.03***	0.02***	0.03***	0.02***	0.00***	0.01***	0.00***	-0.00	-0.01***	-0.03***	-0.01***	1499174	0.00
SE	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
$\Delta\ln(m_{cjt})$	-2.02***	0.13***	-0.00	0.00	0.02***	0.01***	0.01***	0.00	0.02***	0.02***	-0.08***	1499174	0.01
SE	(0.06)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)		
2025 Episode													
$\Delta\ln(p_{cjt})$	0.02**	0.02***	0.03***	0.01***	0.00**	-0.00	-0.02***	-0.01***	-0.01***	0.01***	-0.01***	1557199	0.00
SE	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
$\Delta\ln(m_{cjt})$	-1.77***	0.10***	-0.02***	0.01**	-0.00	-0.01***	0.02***	0.01***	0.03***	0.01*	-0.01*	1557199	0.01
SE	(0.04)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)		

Source and Notes: US Census Bureau and Fulcrum Asset Management LLP. Observations are at the HS10-country-month level. The dependent variable in rows 1 and 3 is the log change of prices (before US duties are applied) charged by foreign exporters. In rows 2 and 4 this is the log change in quantities. 2018 episode uses data for the period January 2017 to December 2018. 2025 episode uses data for the period February 2024 to June 2025. Variables are in twelve-month log change. All columns include HTS10 product fixed effects and country × year fixed effects. Standard errors are clustered at the HS10 product level.

is little evidence of non-linear adjustment patterns in either period.

4.2. Heterogeneity

We can also extend the analysis using simple heterogeneity through slope adjustments at the country and product level, using simple interactions and group indicators. For instance we can run regressions of the form:

$$\Delta \ln z_{cjt} = \sum_{c} \beta_k \Delta \ln(1+\tau_{kjt}) \cdot \mathbf{1}\{k \in c\} + \mu_j + \eta_t + u_{cjt}, \tag{15}$$

$$\Delta \ln z_{cjt} = \sum_{j} \beta_k \Delta \ln(1+\tau_{kjt}) \cdot \mathbf{1}\{k \in j\} + \mu_c + \eta_t + u_{cjt}, \tag{16}$$

where, again, c indicates countries, j indicates products and t indicates a time period. The setting with country-level indicators in equation (15) identifies differing country impact while equation (16) identifies differing impact by product. While, theoretically, it is possible to estimate these specifications across the universe of countries (or products) a more realistic specification partitions the countries (or products) into deciles according to their import shares, without resorting to thousands of indicators and their interactions directly.

The regression results are presented in Table 5. Panel A shows the impact when the slope varies by country import decile. The effect of tariffs on importer prices appears heterogeneous along the import quantity dimension: countries that export heavily to the United States (decile 10) lowered their prices only marginally during the 2018 episode and somewhat more in the current episode. In contrast, countries at the lower end of the import distribution (deciles 1 to 5) experienced larger declines in import prices, though the high volatility of these estimates renders most of them statistically indistinguishable from zero. For the key US trading partners (deciles 6 to 10), the impact remains small and rarely significant. A similar pattern holds for import quantities: countries with low export volumes to the US reduced imports slightly more (especially in deciles 4 to 10), though the effect in the lowest decile is insignificant. Many of these features parallel the 2018 episode, although in that instance, the decline in imports was more uniform across the distribution, particularly for countries exporting the least to the US.

Panel B of Table 5 presents results where the slope varies by product import decile. Here, the effects on importer prices are rarely significant and show no consistent pattern across the distribution in either the 2018 or 2025 episodes. For import

Table 5: Heterogeneous Impact of US Tariffs on Importing

	Independent Variable (Import Value Decile, 1 = lowest, 10 = highest)											
	1	2	3	4	5	6	7	8	9	10	N	R^2
Panel A: Slope, β_k, Varies By Country Import Value Decile												
2018 Episode												
$\Delta \ln(p_{cjt})$	3.94	-0.53	-2.56	-0.19	-0.19***	-0.01	0.02	0.01	-0.00	-0.01	1499174	0.02
SE	(8.72)	(0.37)	(1.64)	(0.22)	(0.07)	(0.04)	(0.04)	(0.02)	(0.02)	(0.01)		
$\Delta \ln(m_{cjt})$	-27.98	-8.78***	-5.97	-1.31**	-1.54***	-2.41***	-1.95***	-2.53***	-2.32***	-2.11***	1499174	0.03
SE	(26.99)	(1.69)	(5.02)	(0.53)	(0.24)	(0.23)	(0.16)	(0.09)	(0.09)	(0.05)		
2025 Episode												
$\Delta \ln(p_{cjt})$	-0.17	-0.53	-0.64***	-0.66*	0.00	-0.01	0.08***	-0.01	0.00	-0.04***	1557199	0.02
SE	(1.68)	(1.35)	(0.23)	(0.37)	(0.04)	(0.03)	(0.03)	(0.02)	(0.01)	(0.01)		
$\Delta \ln(m_{cjt})$	3.23	1.71	2.36**	-3.10***	-2.06***	-1.85***	-2.12***	-1.99***	-2.22***	-1.74***	1557199	0.03
SE	(4.09)	(2.65)	(0.93)	(1.10)	(0.18)	(0.19)	(0.14)	(0.08)	(0.07)	(0.03)		
Panel B: Slope, β_k, Varies By Product Import Value Decile												
2018 Episode												
$\Delta \ln(p_{cjt})$	-0.03	0.00	0.09***	-0.04	0.03	0.06***	0.02	-0.01	0.05***	0.02	1499174	0.00
SE	(0.04)	(0.04)	(0.03)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)		
$\Delta \ln(m_{cjt})$	-1.57***	-2.05***	-2.02***	-1.97***	-1.75***	-2.27***	-2.01***	-2.13***	-2.21***	-2.44***	1499174	0.01
SE	(0.22)	(0.13)	(0.19)	(0.15)	(0.11)	(0.10)	(0.11)	(0.10)	(0.08)	(0.08)		
2025 Episode												
$\Delta \ln(p_{cjt})$	0.03	0.06	0.01	0.01	0.03*	-0.03	-0.02	-0.06***	-0.01	-0.03**	1557199	0.00
SE	(0.04)	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)		
$\Delta \ln(m_{cjt})$	-0.66***	-1.39***	-1.65***	-1.74***	-1.98***	-1.89***	-2.07***	-1.99***	-1.84***	-1.94***	1557199	0.01
SE	(0.19)	(0.13)	(0.11)	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.06)	(0.05)		

Source and Notes: US Census Bureau and Fulcrum Asset Management LLP. Observations are at the HS10-country-month level. The dependent variable in rows 1 and 3 is the log change of prices (before US duties are applied) charged by foreign exporters. In rows 2 and 4 this is the log change in quantities. 2018 episode uses data for the period January 2017 to December 2018. 2025 episode uses data for the period February 2024 to June 2025. Variables are in twelve-month log change. All columns include HTS10 product fixed effects and country × year fixed effects. Standard errors are clustered at the HS10 product level.

quantities, the effects are similarly consistent across deciles, but in this case, they are uniformly statistically different from zero.

5. Who Pays? Incidence of the Tariff Shock

5.1. A Simple Pass-Through Theory

In this subsection, we introduce a simple, static partial equilibrium model designed to formalise two central claims made thus far: (1) the tariff shock is substantial, and (2) domestic producers have not borne the burden of this shock. The primary focus is on how tariffs affect domestic prices. The model includes four representative agents: households, domestic firms, foreign firms, and the domestic government. It is intended to provide a clear framework for analysing the distributional consequences of trade policy shocks, particularly in an economy characterized by both consumption and production linkages.

The model captures two key features of a modern, open economy. First, it allows for horizontal substitution between imported and domestically produced goods. Second, it incorporates vertical linkages across firms via an input-output network that includes both domestic and imported intermediate goods. This structure enables us to trace the direct and indirect effects of a tariff shock as it propagates through supply chains.

5.1.1 Households and Final Consumption

Households consume a composite final good C, composed of domestic and imported composites, C^D and C^M respectively. Preferences are represented by a Constant Elasticity of Substitution (CES) utility function :

$$C = \left[(1-\omega)(C^D)^{\frac{\sigma-1}{\sigma}} + \omega(C^M)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \quad (17)$$

where $\sigma > 0$ and $\sigma \neq 1$ is the elasticity of substitution between domestic goods and imported goods and $\omega \in (0,1)$ is the CES share parameter governing preference weights over domestic goods and imported goods. Households maximise utility subject to their nominal budget constraint:

$$p^D C^D + p^M C^M = PY, \quad (18)$$

where p^D and p^M are the prices of the domestic and imported composites, P is the ideal consumer price index, and Y is real income. Under these CES preferences, the corresponding ideal expenditure-based consumer price index is:

$$P = \left[(1-\omega)(p^D)^{1-\sigma} + \omega(p^M)^{1-\sigma}\right]^{\frac{1}{1-\sigma}}. \quad (19)$$

In this instance the optimal level of demand for each composite good will satisfy:

$$C^D = (1-\omega)\left(\frac{p^D}{P}\right)^{-\sigma} Y, \quad (20)$$

$$C^M = \omega\left(\frac{p^M}{P}\right)^{-\sigma} Y, \quad (21)$$

where composite quantities have been normalised to real income, with a Marshallian quantity ratio:

$$\frac{C^D}{C^M} = \frac{1-\omega}{\omega}\left(\frac{p^D}{p^M}\right)^{-\sigma}, \quad (22)$$

and corresponding *endogenous* expenditure shares:

$$s^D = \frac{(1-\omega)(p^D)^{1-\sigma}}{(1-\omega)(p^D)^{1-\sigma} + \omega(p^M)^{1-\sigma}}, \quad (23)$$

$$s^M = \frac{\omega(p^M)^{1-\sigma}}{(1-\omega)(p^D)^{1-\sigma} + \omega(p^M)^{1-\sigma}}, \quad (24)$$

which satisfy the budget constraint identity, with $s^D + s^M = 1$.[11]

However, both the domestic consumption goods bundle, C^D, and imported consumption, C^M, are themselves composites over a shared set of commodities, each modelled with a nested CES structure.

Assume a set of commodities $j \in [1 \ldots J]$ each with both a domestic consumption CES weight, $\alpha_j^D \geq 0$, and an elasticity across domestic consump-

[11] This ensures consumption shares endogenously respond to price changes, becoming constant at the preference weights as CES collapses to a Cobb-Douglas structure, with:

$$\lim_{\sigma \to 1} s^M = \omega.$$

tion given by $\sigma_D > 0$ and $\sigma_D \neq 1$. For imported commodities assume the same set of commodities each with an import CES weight, $\alpha_k^M \geq 0$, and an elasticity across imported varieties given by $\sigma_M > 0$ and $\sigma_M \neq 1$, such that the bundles can be written as:

$$C^D = \Big[\sum_{j=1}^{J} \alpha_j^D (C_j^D)^{\frac{\sigma_D - 1}{\sigma_D}}\Big]^{\frac{\sigma_D}{\sigma_D - 1}}, \tag{25}$$

$$C^M = \Big[\sum_{j=1}^{J} \alpha_j^M (C_j^M)^{\frac{\sigma_M - 1}{\sigma_M}}\Big]^{\frac{\sigma_M}{\sigma_M - 1}}, \tag{26}$$

and the corresponding price indices are given by:

$$p^D = \Big[\sum_{j=1}^{J} \alpha_j^D (p_j^D)^{1-\sigma_D}\Big]^{\frac{1}{1-\sigma_D}}, \tag{27}$$

$$p^M = \Big[\sum_{j=1}^{J} \alpha_j^M (p_j^M)^{1-\sigma_M}\Big]^{\frac{1}{1-\sigma_M}}, \tag{28}$$

and, likewise, a corresponding set of expenditure shares for the domestic and imported consumption baskets respectively satisfy:

$$\theta_j^D = \frac{\alpha_j^D (p_j^D)^{1-\sigma_D}}{\sum_j \alpha_j^D (p_j^D)^{1-\sigma_D}}, \tag{29}$$

$$\theta_j^M = \frac{\alpha_j^M (p_j^M)^{1-\sigma_M}}{\sum_j \alpha_j^M (p_j^M)^{1-\sigma_M}}, \tag{30}$$

where it is again clear that both sets of expenditure shares will sum to total expenditure, with $\sum_j \theta_j^D = \sum_j \theta_j^M = 1$. We allow the possibility of zero expenditure shares for either domestic or imported commodities which arises whenever $\alpha_j^D = 0$ or $\alpha_j^M = 0$, respectively.

Using equations (19), (23) and (24), we can show that the marginal impact of a change in either domestic or imported prices on the overall aggregate price index is equal to their share:

$$\frac{\partial \ln P}{\partial \ln p^D} = s^D, \tag{31}$$

$$\frac{\partial \ln P}{\partial \ln p^M} = s^M. \tag{32}$$

Alternatively put, this states that an incremental change in the aggregate price of imports (or domestic products) will affect the overall price index according to the share of imports. For small changes around a fixed equilibrium baseline we may log-linearise these effects to conclude that, taking log deviations of the CES price index yields a first-order weighted sum of log price differences:

$$\hat{P} \approx \bar{s}^D \hat{p}^D + \bar{s}^M \hat{p}^M, \tag{33}$$

where hats denote log changes and bars denote the shares having been evaluated at the baseline initial steady state. This logic can be symmetrically applied to the inner CES nests, with baseline expenditure shares given by the sets of $\bar{\theta}_j$ and $\bar{\theta}_j$. Defining prices changes in vector form, the corresponding results for the inner CES nests give:

$$\hat{p}^D \approx (\bar{\boldsymbol{\theta}}^D)^\top \hat{\mathbf{p}}^D, \tag{34}$$

$$\hat{p}^M \approx (\bar{\boldsymbol{\theta}}^M)^\top \hat{\mathbf{p}}^M, \tag{35}$$

where $\bar{\boldsymbol{\theta}}^D$ and $\bar{\boldsymbol{\theta}}^M$ are the vectors of expenditure shares, and $\hat{\mathbf{p}}^D$, $\hat{\mathbf{p}}^M$ are the vectors of individual log consumer price changes. Combining (33), (34) and (35) gives the resulting change in the overall price index as a function of changes in the individual price of both domestic and imported consumer products:

$$\hat{P} = \bar{s}^D (\bar{\boldsymbol{\theta}}^D)^\top \hat{\mathbf{p}}^D + \bar{s}^M (\bar{\boldsymbol{\theta}}^M)^\top \hat{\mathbf{p}}^M, \tag{36}$$

where $\hat{P}$ is the scalar change in the utility-based consumer price index, $\bar{s}^D$ and $\bar{s}^M$ are scalar endogenous spending shares evaluated at the baseline and $\bar{\boldsymbol{\theta}}^D$, $\hat{\mathbf{p}}^D$, $\bar{\boldsymbol{\theta}}^M$, and $\hat{\mathbf{p}}^M$ are $J \times 1$ vectors.

Similarly the CES setting implies that the marginal impact of a change in either domestic or imported prices on the overall aggregate level of consumption may be found using the definition of the equilibrium consumption share, through homotheticity. For instance, given the income expenditure shares:

$$s^D PY = p^D C^D, \quad (37)$$
$$s^M PY = p^M C^M, \quad (38)$$

the impact of any change, given that real income changes are taken as exogenous in this framework $\hat{Y} = 0$, may be written as:

$$\hat{C}^D = \hat{s}^D + \hat{P} - \hat{p}^D, \quad (39)$$
$$\hat{C}^M = \hat{s}^M + \hat{P} - \hat{p}^M. \quad (40)$$

Using, (23) and (24), the first order approximation of changes in consumption shares may be written as:

$$\hat{s}^D = (1-\sigma)\bar{s}^M(\hat{p}^D - \hat{p}^M), \quad (41)$$
$$\hat{s}^M = (1-\sigma)\bar{s}^D(\hat{p}^M - \hat{p}^D). \quad (42)$$

And, when (41) and (33) are combined with (39) or when (42) and (33) are combined with (40) we can write translate price changes into the impact on consumption aggregates:

$$\hat{C}^D = \sigma\bar{s}^M(\hat{p}^M - \hat{p}^D), \quad (43)$$
$$\hat{C}^M = \sigma\bar{s}^D(\hat{p}^D - \hat{p}^M). \quad (44)$$

These equations state that, given $\sigma > 0$, a rise in the relative price of imported goods $\hat{p}^M > \hat{p}^D$ will result in an increase in domestic consumption and a reduction in imported consumption. The strength of this effect increases as the elasticity of substitution between these goods increases, $\sigma \to \infty$. Equations (41) and (39) show that the direct price effect is reinforced by this substitution effect through changes in expenditure shares towards the cheaper product.

5.1.2 Foreign Firms and Import Distribution

Each imported commodity j is produced by a foreign firm under monopolistic competition. These firms face marginal costs, mc_j^f and charge a markup, μ_j^f, so their export price is:

$$p_j^F = \mu_j^f mc_j^f. \quad (45)$$

An ad valorem tariff τ_j is applied at the border, resulting in a landed import price:

$$p_j^{M,\text{border}} = p_j^F(1+\tau_j). \quad (46)$$

Before reaching final consumers or domestic firms, imported goods are distributed through a domestic wholesale/retail sector that applies a markup μ_j^d. The final price of the imported variety paid by domestic users is therefore:

$$p_j^M = \mu_j^d p_j^{M,\text{border}} = \mu_j^d \mu_j^f mc_j^f(1+\tau_j). \quad (47)$$

This expression shows that the final price of imports reflects the full set of production costs, foreign markup, tariff, and domestic distribution margin.

5.1.3 Domestic Firms and the Production Network

Intermediate Goods. We consider a continuum of domestic firms indexed by i, each producing a differentiated good used both as intermediate input and in final consumption. Each firm combines inputs from other domestic firms and imported inputs. Let p_i^I denote the gross output price of firm i, p_j^D the price of domestic input j, and p_k^M the price of imported input k. The cost shares of domestic input j and imported input k in the total cost of firm i are denoted b_{ij} and b_{ik}^M respectively.

Under constant returns to scale and cost minimisation, assumptions consistent with Cobb-Douglas or Leontief technologies, the unit cost function of firm i takes the multiplicative form:

$$p_i^I = \prod_j (p_j^D)^{b_{ij}} \prod_k (p_k^M)^{b_{ik}^M}, \quad (48)$$

with the adding-up constraint:

$$\sum_j b_{ij} + \sum_k b_{ik}^M = 1. \tag{49}$$

Applying Shephard's Lemma and log-differentiating the unit cost function yields:

$$\hat{p}_i^I = \sum_j b_{ij}\hat{p}_j^D + \sum_k b_{ik}^M \hat{p}_k^M, \tag{50}$$

where $\hat{p}_i^I = d\log p_i^I$ denotes the proportional change in the gross output price.

Collecting across all firms, define $\mathbf{B}$, with typical element $[b_{ij}]$, as the domestic input cost share matrix and $\mathbf{B}_M$, with typical element, $[b_{ik}^M]$, as the imported input cost share matrix. Then the matrix form is:

$$\hat{\mathbf{p}}^I = \mathbf{B}\hat{\mathbf{p}}^D + \mathbf{B}_M\hat{\mathbf{p}}^M, \tag{51}$$

where $\hat{\mathbf{p}}^I$, $\hat{\mathbf{p}}^D$ and $\hat{\mathbf{p}}^M$ are vectors of log changes in domestic gross intermediate outputs, domestic outputs, and imported input prices, respectively. This equation captures how cost shocks to either domestic or imported inputs propagate through the production network.

Final Goods. Final domestic consumption goods are produced as linear combinations of industry outputs. Let $\mathbf{D}$ be the "Make" matrix mapping industry gross output prices to domestic consumption prices. The matrix $\mathbf{D}$ may be rectangular or diagonal, reflecting the structure of production and aggregation. Then, by definition:

$$\hat{\mathbf{p}}^D = \mathbf{D}\hat{\mathbf{p}}^I. \tag{52}$$

where $\hat{\mathbf{p}}^D$ is the vector of log changes in domestic consumption prices. Substituting (52) into (51) yields:

$$\hat{\mathbf{p}}^D = \mathbf{D}\hat{\mathbf{p}}^I = \mathbf{D}\mathbf{B}\hat{\mathbf{p}}^D + \mathbf{D}\mathbf{B}_M\hat{\mathbf{p}}^M, \tag{53}$$

which, after rearranging to solve the fixed point problem for $\hat{\mathbf{p}}^D$, yields:

$$\left(\mathbf{I} - \mathbf{D}\mathbf{B}\right)\hat{\mathbf{p}}^D = \mathbf{D}\mathbf{B}_M\hat{\mathbf{p}}^M, \tag{54}$$

$$\hat{\mathbf{p}}^D = \left(\mathbf{I} - \mathbf{D}\mathbf{B}\right)^{-1}\mathbf{D}\mathbf{B}_M\hat{\mathbf{p}}^M. \tag{55}$$

This expression assumes that the matrix $\mathbf{I} - \mathbf{D}\mathbf{B}$ is invertible, corresponding to the Leontief inverse. It describes how changes in imported input prices propagate through domestic production linkages, ultimately influencing consumption prices.

5.1.4 Government

The government levies an ad valorem tariff τ_j on imports of commodity j. Tariff revenue is collected from both direct and indirect imports, and is therefore given as:

$$T = \sum_{j=1}^{J} \tau_j p_j^{M,\text{border}} \left(C_j^M + C_j^{M,\text{Indirect}}\right). \tag{56}$$

Our nested CES structure implies:

$$p_j^M C_j^M = \theta_j^M p^M C^M, \tag{57}$$

$$\mathbf{C}^M = \tilde{\boldsymbol{\theta}}_Q p^M C^M, \tag{58}$$

where $\mathbf{C}^M$ is a $J \times 1$ vector of direct import quantities, with typical element C_j^M, while $\tilde{\boldsymbol{\theta}}_Q$ is a $J \times 1$ quantity share vector with typical element $\frac{\theta_j^M}{p_j^M}$. The quantity duals of the Leontief intermediate structure (51) imply:

$$\mathbf{x} = \left(\mathbf{I} - \mathbf{B}\mathbf{D}\right)^{-1}\mathbf{B}\mathbf{C}^D, \tag{59}$$

$$\mathbf{C}^{M,\text{Indirect}} = \mathbf{B}_M^\top(\mathbf{p}^M \odot \mathbf{I}_J)^{-1}\mathbf{x}. \tag{60}$$

where $\mathbf{x}$ is the industry gross output value required to meet domestic final demand for each industry. Combining, total tariff revenue may be written as:

$$T = \left(\boldsymbol{\tau} \odot \mathbf{p}^{M,\text{border}}\right)^\top \left(\mathbf{C}^M + \mathbf{C}^{M,\text{Indirect}}\right), \tag{61}$$

where $\boldsymbol{\tau}$ and $\mathbf{p}^{M,\text{border}}$ are the $J \times 1$ vector forms of their scalar equivalents with typical elements τ_j and $p_j^{M,\text{border}}$ respectively. We abstract from general equilibrium effects here and the use of this revenue (e.g., transfers or spending), assuming instead that it is wastefully spent.

5.1.5 Aggregation of Consumption Prices

Let $\hat{\mathbf{p}}^C$ be an $J \times 1$ vector of commodity-level consumer prices. Then define a vector of final consumer prices as:

$$\hat{\mathbf{p}}^C = \boldsymbol{\omega}^D \hat{\mathbf{p}}^D + \boldsymbol{\omega}^M \hat{\mathbf{p}}^M, \tag{62}$$

where $\boldsymbol{\omega}^D$ is a $J \times J$ diagonal matrix with typical element $\omega^D_{j,j} = \frac{\bar{s}^D \bar{\theta}^D_j}{\bar{s}^D \bar{\theta}^D_j + \bar{s}^M \bar{\theta}^M_j}$, the expenditure share weights, such that $\boldsymbol{\omega}^M = \mathbf{I} - \boldsymbol{\omega}^D$.

Equation (62) is related to equation (36) through the commodity to CPI category relationships:

$$\hat{\mathbf{p}}^E = \boldsymbol{\Gamma} \hat{\mathbf{p}}^C \tag{63}$$

$$\hat{P} = \boldsymbol{\Pi} \hat{\mathbf{p}}^E, \tag{64}$$

where $\boldsymbol{\Gamma}$ is an $L \times J$ matrix mapping commodities into consumption aggregators categories and $\boldsymbol{\Pi}$ is a $1 \times J$ vector containing the official category weights, with $\sum \pi_j = 1$ and $\hat{\mathbf{p}}^E$ is a vector of expenditure contributions, with dimension below J. These equations state that $\hat{\mathbf{p}}^C$ is a re-expression of the scalar $\hat{P}$ in vector form, with each element a contribution towards the overall price index. In practise, where the number of consumer price index categories is fewer than the number of commodities the weighting matrix, $\boldsymbol{\Gamma}$, may be used to aggregate commodity combinations to their appropriate expenditure categories. This mapping is understood to use the final expenditure categories using the BEA bridge matrix.

We may then substitute in (55) into (62) to eliminate $\hat{\mathbf{p}}^D$ show how final consumer prices may be written as:

$$\hat{\mathbf{p}}^C = \boldsymbol{\omega}^D (\mathbf{I} - \mathbf{DB})^{-1} \mathbf{DB}_M \hat{\mathbf{p}}^M + \boldsymbol{\omega}^M \hat{\mathbf{p}}^M, \tag{65}$$

$$= \left[\boldsymbol{\omega}^D (\mathbf{I} - \mathbf{DB})^{-1} \mathbf{DB}_M + \boldsymbol{\omega}^M\right] \hat{\mathbf{p}}^M. \tag{66}$$

Hence, alternatively, using equations (64) and (66):

$$\hat{P} = \boldsymbol{\Pi\Gamma} \Big[\underbrace{\boldsymbol{\omega}^D (\mathbf{I} - \mathbf{DB})^{-1} \mathbf{DB}_M}_{\text{Indirect Effect}} + \underbrace{\boldsymbol{\omega}^M}_{\text{Direct Effect}}\Big] \hat{\mathbf{p}}^M. \tag{67}$$

5.1.6 Impact of a Tariff Shock

The impact of a tariff shock, on prices, can be seen by combining equations (36) with either (66) and (64) for the impact on aggregate final consumer prices or with (67) for the impact on a set of consumer prices.

The intuition starts for a given imported product variety, partially differentiating equation (47), the impact of a change in the tariff rate may be written as:

$$\hat{p}^M_j = \hat{\mu}^d_j + \hat{\mu}^f_j + \hat{mc}^f_j + \hat{\tau}_j, \tag{68}$$

$$\frac{\partial \hat{p}^M_j}{\partial \hat{\tau}_j} = \frac{\partial \hat{\mu}^d_j}{\partial \hat{\tau}_j} + \frac{\partial \hat{\mu}^f_j}{\partial \hat{\tau}_j} + \frac{\partial \hat{mc}^f_j}{\partial \hat{\tau}_j} + 1, \tag{69}$$

$$1 = \frac{\partial \hat{p}^M_j}{\partial \hat{\tau}_j} - \frac{\partial \hat{\mu}^d_j}{\partial \hat{\tau}_j} - \frac{\partial \hat{\mu}^f_j}{\partial \hat{\tau}_j} - \frac{\partial \hat{mc}^f_j}{\partial \hat{\tau}_j}. \tag{70}$$

where, in contrast to other definitions in the first line we define $\hat{\tau}_j \equiv \Delta \ln(1 + \tau_j)$. Alternatively put, a higher tariff $\tau_j \uparrow$ raises prices directly, but squeezes mark-ups:

$$p^M_j \uparrow = (\mu^d_j \downarrow)(\mu^f_j \downarrow) \bar{mc}_j \big(1 + \tau_j \uparrow\big). \tag{71}$$

Firms partially absorb higher costs by cutting margins. In theory size of margin compression depends upon scale of effective competition, and there is little reason to suspect that the imposition of a tariff will impact foreign marginal costs of production, particularly if the tariff applies to a small or less open economy.

For a series of tariff changes, after incorporating the input-output structure the total impact on the aggregate price index uses equation (36) to show, whenever foreign marginal costs and margins are constant:

$$\hat{P} = \mathbf{\Pi}\mathbf{\Gamma}\Big[\boldsymbol{\omega}^D\big(\mathbf{I}-\mathbf{D}\mathbf{B}\big)^{-1}\mathbf{D}\mathbf{B}_M + \boldsymbol{\omega}^M\Big] \underbrace{\Big[\hat{\boldsymbol{\mu}}^d + \hat{\boldsymbol{\mu}}^f + \hat{\mathbf{mc}}^f + \hat{\boldsymbol{\tau}}\Big]}_{\hat{\mathbf{p}}^M}, \quad (72)$$

and can distinguish four channels of transmission throughout the input-output structure.

To understand impact of a tariff shock on imported quantities, we can use these price effects in equations (34), (35), (43), (44) and (55) to show:

$$\hat{C}^D = \bar{s}^M(\bar{s}^M + \sigma\bar{s}^D) \Big[(\bar{\boldsymbol{\theta}}^M)^\top - (\bar{\boldsymbol{\theta}}^D)^\top\big(\mathbf{I}-\mathbf{D}\mathbf{B}\big)^{-1}\mathbf{D}\mathbf{B}_M\Big]\hat{\mathbf{p}}^M, \quad (73)$$

$$\hat{C}^M = \bar{s}^D(\bar{s}^D + \sigma\bar{s}^M) \Big[(\bar{\boldsymbol{\theta}}^D)^\top\big(\mathbf{I}-\mathbf{D}\mathbf{B}\big)^{-1}\mathbf{D}\mathbf{B}_M - (\bar{\boldsymbol{\theta}}^M)^\top\Big]\hat{\mathbf{p}}^M, \quad (74)$$

with $\hat{\mathbf{p}}^M$ still distinguished by the four channels outlined above.

5.2. Taking this to the data

As shown in Section 4, import prices, at the border, have exhibited limited responsiveness to the tariff shock. Specifically, as reported in Table 1, we estimate:

$$\hat{\beta} = \frac{\partial\hat{\mu}_j^f}{\partial\hat{\tau}_j} + \frac{\partial\hat{mc}_j^f}{\partial\hat{\tau}_j} \approx 0, \quad (75)$$

both in the short term (for this and the 2018 shocks) and in the longer term following the 2018 shock. This implies that foreign producers have absorbed little of the tariff burden. We therefore suppose that $\hat{\boldsymbol{\mu}}^f = \hat{\mathbf{mc}}^f = \mathbf{0}$. We also report values of $\sigma_M \in (1.3, 2.3)$ in the baseline results and therefore take $\sigma_M = 2$ in the subsequent results. This is slightly below the standard range between 4 and 8 suggested by some of the literature (Bajzik et al., 2020; Broda and Weinstein, 2006; Eaton and Kortum, 2002; Simonovska and Waugh, 2014) but within the bounds found in the broader literature review of Ahmad et al. (2021), which accounts for publication bias.

Consequently, the incidence of the tariff depends on the extent to which the shock is passed through to consumer prices. Since import prices including the tariff rates have risen approximately in line with the announced tariff rates themselves, the key remaining question is whether domestic producers absorb the shock or pass it on to domestic consumers.

5.3. Establishing a Benchmark

To address this, we rely on the theoretical framework introduced in Section 5.1, which provides a benchmark for interpreting the observed price responses at a highly disaggregated level.

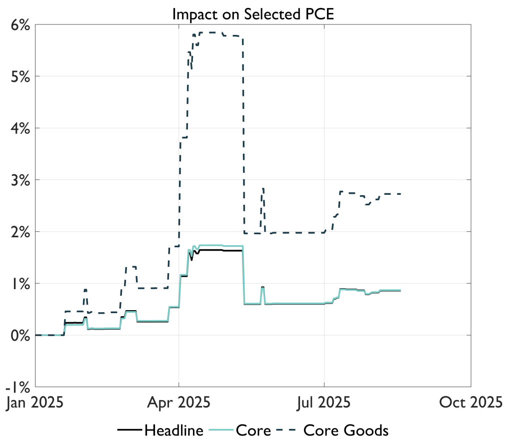
If domestic prices increase in proportion to the announced tariffs, this would indicate full pass-through and suggest that domestic margins have remained unaffected. In contrast, if consumer prices rise only modestly, then domestic producers must be absorbing a larger share of the cost, implying margin compression. This issue is examined in the final section, where we find evidence that domestic margins have, to a significant extent, absorbed the shock.

Using the Tariff Tracker introduced in Section 2, together with the model from Section 5.1 calibrated to the US input-output tables (both the make and use tables), we assess the theoretical impact of the announced tariff shocks on various measures of consumer price inflation. The results of this analysis are presented in Figure 6.

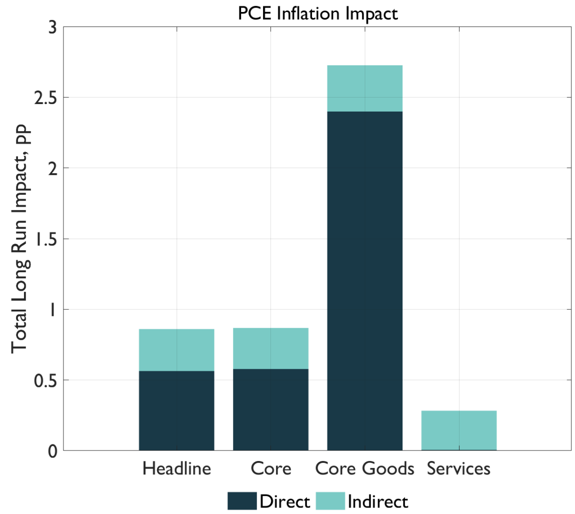
The aggregate results are straightforward and are presented in Figure 6, Panel (a). At the peak of the tariff shock, immediately following the announcements on 2 April, headline inflation was projected to rise by approximately 2 percentage points, with core goods inflation increasing by around +6pp. However, the subsequent reversal of many of these announcements, particularly after 9 April, substantially reduced the overall impact. The net effect is now estimated to be a more moderate increase of

Figure 6: Tariff Tracker Impact on Selected PCE Items

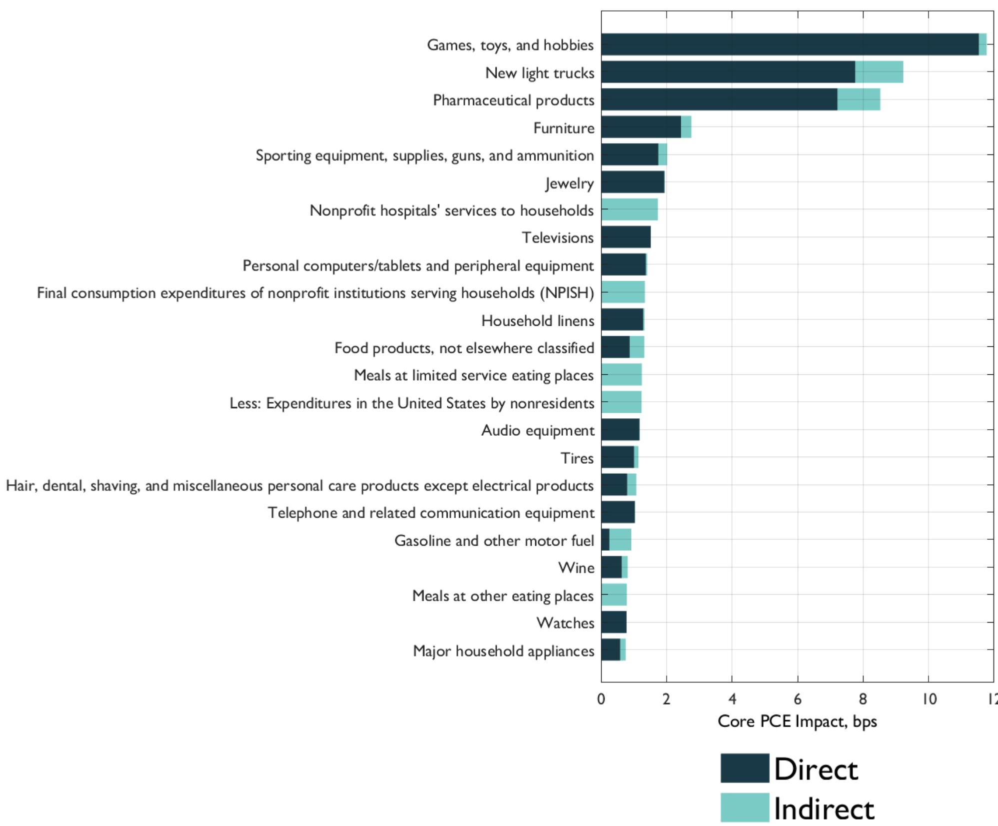
(a) Time Variation in Price Impact



(b) Contribution of Latest Impact, by Transmission



(c) Contribution of Latest Impact, by Product



Sources and Notes: Fulcrum Asset Management LLP, US Census Bureau, and BLS. Figure shows theoretical impact on inflation from announced tariff shocks approximately +0.9pp for both headline and core PCE inflation, and around +2.5pp for core goods inflation.[12]

The impact on individual product categories can also be examined, thanks to the highly disaggregated nature of both the tariff shock and the input-output modelling framework. These results are shown in Figure 6, Panel (c). The theoretical impact is most pronounced in categories facing the highest sectoral tariffs, such as new light trucks, and in those expenditure categories most exposed to country-level tariffs, including games, toys, and hobbies, which are exposed to Chinese import tariffs. For the core PCE components, the analysis shows that the largest theoretical effect falls on games, toys, and hobbies, driven primarily by the direct import channel, with smaller contributions from indirect channels.

Finally, Figure 6, Panel (b) shows that while the majority of the effect on consumer prices arises through direct import price changes, a substantial portion, around one third, results from indirect effects transmitted through input-output linkages in the production network.

5.4. Data Relative to the Benchmark

Given a vector of commodity-level theoretical benchmark price responses from the input-output model, $\hat{\mathbf{p}}^{C,\text{Theory}}$, we assess the extent of pass-through by estimating regressions of the form:

$$\hat{\mathbf{p}}^{C,\text{Observed}} = \alpha + \psi_p \hat{\mathbf{p}}^{C,\text{Theory}} + \varepsilon, \qquad (76)$$

where ψ_p measures the degree of pass-through from the theoretically implied price shocks to the observed consumer prices.

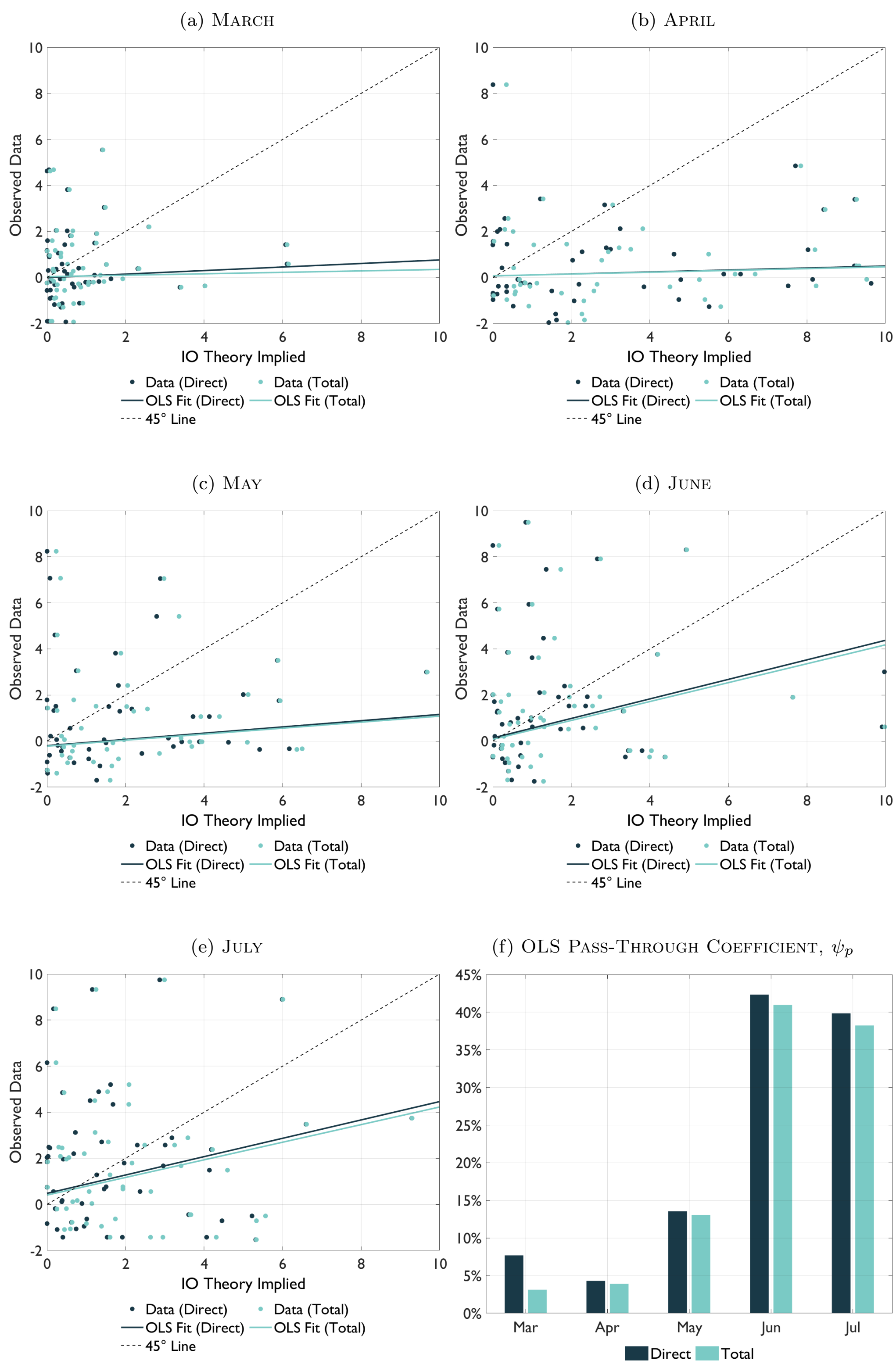
While $\hat{\mathbf{p}}^{C,\text{Theory}}$ is available at daily frequency, the observed PCE price data, $\hat{\mathbf{p}}^{C,\text{Observed}}$, are monthly. To reconcile these frequencies, we (i) fix the base period such that March to July represent 3-, 4-, 5-, 6- and 7-month cumulative changes, respectively; and (ii) normalise the observed changes by expressing them as deviations from their respective historical averages—i.e., the average 3-, to 7-month percentage changes over the 2000–2019 period.

The results are clear: there has initially been a minimal pass-through to consumer prices relative to what would be expected based on the theoretical benchmark. This is evident from the near-flat slopes in Panels (a) to (e) of Figure 7, particularly for March and April. In June this assessment started to shift as (i) more of the expected tariff pass-through was evident in the consumer price data and (ii) the size of the effective shock fell as several exemptions came into force. This continued in July. Therefore the overall impact increases, with more pronounced signs of tariff pass-through. However, the overall the observed response remains substantially below 100%.

Put differently, about $\beta = 40\%$ of the theoretical shock had passed through to consumer prices by July, as shown in Panel (f). This corresponds to roughly +0.25pp of the total +0.6pp inflationary impact predicted by the model by July, and the +0.9pp anticipated to date. While some additional pass-through may still occur due to timing lags, the evidence thus far suggests that domestic margins have absorbed the bulk of the tariff shock up to July 2025. Recall, these tariffs have been paid by someone. It does not appear to be either foreign firms or domestic consumers.

[12] This is broadly consistent with the estimated +0.4pp effect on core PCE inflation in 2025, based on the structural model in Benigno et al. (2025) and the prevailing tariff rate at that time.

Figure 7: Pass-Through Regression Results



Sources and Notes: Fulcrum Asset Management LLP. Figure shows domestic price pass through regressions from tariff announcements. In panels (a) to (e) we use the full dataset but restrict the visual range to [0,10] for plot comparability.

Table 6: Estimated Incidence of the Tariff Shock

	Foreign Markup $\beta = \frac{\partial \hat{\mu}_j^f}{\partial \hat{\tau}_j} + \frac{\partial \hat{mc}_j^f}{\partial \hat{\tau}_j}$	Domestic Markup $\psi_d = \frac{\partial \hat{\mu}_j^d}{\partial \hat{\tau}_j}$	Consumer Prices $\psi_p = \frac{\partial \hat{p}_j^M}{\partial \hat{\tau}_j}$
Waller (2025a,b)	33%	33%	33%
Goldman Sachs (to May): Peng (2025b)	20%	40%	40%
Goldman Sachs (to June): Peng (2025a)	14%	64%	22%
Goldman Sachs (Long Run): Peng (2025a)	25%	8%	67%
2025 Episode	1%	59%	40%

Notes: Table reports estimates of tariff pass-through from this paper and the existing literature. In our framework, we estimate β and ψ_p directly, while the domestic share is inferred as $\psi_d = 1 - \beta - \psi_p$.

6. Competing Views on Tariff Incidence

There are competing views regarding who ultimately bears the cost of tariffs, what economists refer to as tariff incidence. For instance, Federal Reserve Governor Waller (Waller, 2025a,b) has suggested that the burden is split relatively evenly between domestic and foreign producers. In contrast, Goldman Sachs (Peng, 2025a,b) both estimates that a smaller share of the burden is currently falling on foreign exporters, and that is likely to increase to only 25% in the longer term. They view domestic margins as unlikely to pick-up much of the residual balance.

Our estimates, however, paint an alternatively asymmetric picture. These are shown in Table 6 Based on the detailed decomposition of import price changes and margins, we find that domestic producers have absorbed the majority of the tariff shock to date, approximately 60%, with foreign exporters absorbing less than 1%. The remaining share reflects early-stage consumer pass-through, though this has so far been limited. These dynamics are similar to the 2018 episode, where producers never decreased their prices.

In the longer term, therefore, we estimate that if domestic margins normalise and firms seek to re-establish pre-shock markups, the majority of the tariff cost would be passed on to consumers. This assumes no further offsetting mechanisms and a full restoration of pricing power.

7. Robustness & Alternative Explanations

In this section, we consider alternative explanations that may help contextualize or qualify our findings.

One key perspective is the Dominant Currency Paradigm (DCP). All results in this paper have been presented in US dollar terms. According to Gopinath and Rigobon (2008), prices tend to be sticky in the currency of invoicing, typically the US dollar, with a median duration of around 11 months. This implies that the limited immediate impact of tariffs on prices is unsurprising under dollar pricing.

Moreover, incorporating exchange rate movements typically increases the incidence of tariffs on foreign producers. For example, Jeanne and Son (2024) estimate that roughly 30% of the 2018 tariff shock was offset by exchange rate adjustments. Cavallo et al. (2021) provide a somewhat smaller estimate of 20%, and notably find $\beta \approx 0$, consistent with our results and those of Amiti et al. (2019), suggesting limited pass-through to US consumer prices from foreign exporters.

However, in the current episode, US dollar movements have not aligned with this narrative. Rather than appreciating, which would cushion the impact of tariffs, the dollar has depreciated markedly. If prices had been sticky in local currencies instead of US dollars, this would have led to a more pronounced increase in US import prices. The fact that we do not observe this further supports the DCP interpretation. Corsetti et al. (2025) find an important role for reciprocal tariff announcements in driving this effect.

Another important factor is substitution effects. Both our analysis and that of Amiti et al. (2019) document substantial changes in import quantities in response to tariffs. If roughly 15% of the shock is avoided via trade diversion, as our shift-share estimates suggest, one could argue that this portion is effectively borne by foreign producers, particularly if it results in heightened competition and price pressure in global markets.

However, the speed and pattern of trade flow adjustments indicate that this is more likely a result of re-routing, i.e., shifting imports from high-tariff countries to lower-tariff alternatives, rather than producers absorbing the cost. In this scenario, no party bears that share of the tariff burden directly, and the effective incidence is reduced through trade diversion.

Finally, the evidence on final consumer prices provides additional robustness. Cavallo et al. (2025) show that consumer prices, so far, have responded relatively quickly to these tariff shocks. However, the magnitude of these responses has remained modest, aligning closely with our aggregate findings. This reinforces the conclusion that, to date, the US tariff shock has not generated significant upward pressure on retail prices.

8. Conclusion

This work yields several important conclusions. First, and perhaps most notably, the foreign absorption of the recent tariff shock appears to be functioning as expected: it is minimal, as is consistent with existing literature for other episodes. In other words, foreign producers are not significantly bearing the cost of these tariffs. Instead, the burden of the tariffs largely falls on domestic producers and consumers. These tariffs are being paid by Americans.

However, a rapid inflationary impulse is not necessarily imminent. Our shift-share analysis suggests that roughly 15% of the tariff shock has already been mitigated by trade diversion, as imports shifted from high-tariff to lower-tariff countries. Furthermore, current estimates indicate that firm profit margins have absorbed a substantial portion of the remaining shock. While this absorption is unlikely to persist in the long run, it has helped cushion the short-term impact and smooth the impact over time.

To better understand these dynamics, we employ an explicit model that incorporates intermediate input structures, enabling us to trace the incidence of the US tariff shock across a range of consumer prices. Relative to the benchmark model, we find that only a limited portion of the shock has been transmitted to consumers.

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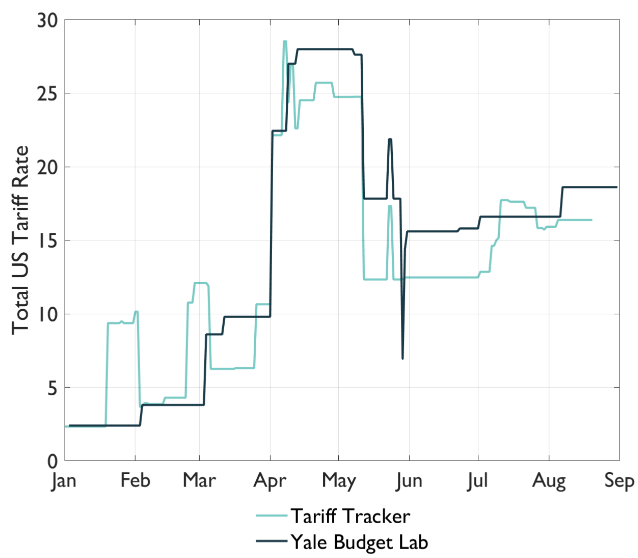
A. Tariff Rate Comparison

Figure 8 compares our high-frequency tariff rate tracker, compiled daily, with the tariff measure produced by the Yale Budget Lab. The two series share many similarities, but the Yale measure is updated less frequently. For example, it does not capture the initial tariff announcements on Canada and Mexico in January and February 2025, though it does reflect the enacted changes in tariff levels on China during this period. Following the 2 April tariffs, the Yale series is slower to remove announced rates and does not account for their subsequent postponements in May and June, showing little adjustment. By contrast, our tracker removes tariffs once they are paused and reinstates them when they become effective again, whether after announced trade deals, letters issued over the summer, or the expiration of earlier suspensions. Both series ultimately converge to similar levels, although the Yale Budget Lab measure indicates a somewhat higher overall tariff burden than our own.

Figure 8: US Tariff Tracker



Sources and Notes: Fulcrum Asset Management LLP and Yale Budget Lab.

B. Efficient Estimate of Producer Price Pass-Through

The regression in equation (11) follow a two-way fixed effects specification. Implementing this requires double-demeaning the regression equation to operationalize the two-way fixed effects:

$$\Delta \ln z_{cjt} = \mu_j + \eta_{ct} + \beta \Delta \ln(1+\tau_{cjt}) + u_{cjt}$$

Define (i) product-level mean within each country-time; (ii) country-time mean for each product and; (iii) grand mean as:

$$\begin{aligned}
\Delta \ln \bar{z}_{ct} &= \frac{1}{N_{ct}} \sum_j \Delta \ln z_{cjt} \quad \text{and} \quad \Delta \ln(1+\bar{\tau}_{ct}) = \frac{1}{N_{ct}} \sum_j \Delta \ln(1+\tau_{cjt}), \\
\Delta \ln \bar{\bar{z}}_j &= \frac{1}{N_j} \sum_{c,t} \Delta \ln z_{cjt} \quad \text{and} \quad \Delta \ln(1+\bar{\bar{\tau}}_j) = \frac{1}{N_j} \sum_{c,t} \Delta \ln(1+\tau_{cjt}), \\
\Delta \ln \bar{\bar{\bar{z}}} &= \frac{1}{N} \sum_{c,j,t} \Delta \ln z_{cjt} \quad \text{and} \quad \Delta \ln(1+\bar{\bar{\bar{\tau}}}) = \frac{1}{N} \sum_{c,j,t} \Delta \ln(1+\tau_{cjt}),
\end{aligned}$$

where N_{ct} is number of products for (c,t), and N_j is number of country-time pairs for product j and N is the total number of observations. Finally, define the double-demeaning as:

$$\begin{aligned}
\Delta \ln z_{cjt}^{DD} &\equiv \Delta \ln z_{cjt} - \Delta \ln \bar{z}_{ct} - \Delta \ln \bar{\bar{z}}_j + \Delta \ln \bar{\bar{\bar{z}}}, \\
&= \mu_j + \eta_{ct} + \beta \Delta \ln(1+\tau_{cjt}) + u_{cjt} \\
&\quad -\bar{\mu} - \eta_{ct} - \beta \Delta \ln(1+\bar{\tau}_{ct}) + \bar{u}_{ct} \\
&\quad -\mu_j - \bar{\eta} - \beta \Delta \ln(1+\bar{\tau}_j) - \bar{u}_j \\
&\quad +\bar{\mu} + \bar{\eta} + \beta \Delta \ln(1+\bar{\tau}) - \bar{u}, \\
&= \beta \Delta \ln(1+\tau_{cjt}^{DD}) + u_{cjt}^{DD}
\end{aligned}$$

where we define:

$$\begin{aligned}
\Delta \ln(1+\tau_{cjt}^{DD}) &\equiv \Delta \ln(1+\tau_{cjt}) - \Delta \ln(1+\bar{\tau}_{ct}) - \Delta \ln(1+\bar{\bar{\tau}}_j) + \Delta \ln(1+\bar{\bar{\bar{\tau}}}), \\
u_{cjt}^{DD} &\equiv u_{cjt} - \bar{u}_{ct} - \bar{\bar{u}}_j + \bar{\bar{\bar{u}}}.
\end{aligned}$$

We have obtained $\hat{\beta}$ via OLS, so then back out the fixed effects using orthogonality restrictions:

$$\begin{aligned}
\Delta \ln \bar{z}_{ct} - \Delta \ln \bar{\bar{\bar{z}}} &= \eta_{ct} + \hat{\beta}\big(\Delta \ln(1+\bar{\tau}_{ct}) - \Delta \ln(1+\bar{\bar{\bar{\tau}}})\big) \underbrace{-\bar{u}_{ct} - \bar{\eta} + \bar{\bar{\bar{u}}}}_{=0}, \\
\Rightarrow \eta_{ct} &= \big(\Delta \ln \bar{z}_{ct} - \Delta \ln \bar{\bar{\bar{z}}}\big) - \hat{\beta}\big(\Delta \ln(1+\bar{\tau}_{ct}) - \Delta \ln(1+\bar{\bar{\bar{\tau}}})\big), \\
\Delta \ln \bar{\bar{z}}_j - \Delta \ln \bar{\bar{\bar{z}}} &= \mu_j + \hat{\beta}\big(\Delta \ln(1+\bar{\tau}_j) - \Delta \ln(1+\bar{\bar{\bar{\tau}}})\big) \underbrace{+\bar{u}_j - \bar{\mu} + \bar{\bar{\bar{u}}}}_{=0}, \\
\Rightarrow \mu_j &= \big(\Delta \ln \bar{\bar{z}}_j - \Delta \ln \bar{\bar{\bar{z}}}\big) - \hat{\beta}\big(\Delta \ln(1+\bar{\tau}_j) - \Delta \ln(1+\bar{\bar{\bar{\tau}}})\big),
\end{aligned}$$

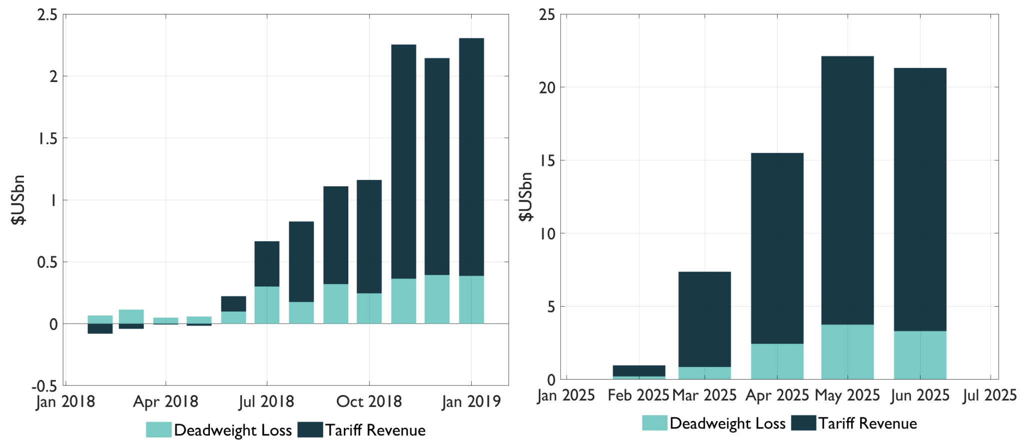
This can be used to compute R^2 for the overall model, while (due to Frisch–Waugh–Lovell theorem) can use residuals from the double demeaned regression for the estimate.

C. Welfare Losses

Following Amiti et al. (2019) we can compute the impact of these tariff policy changes on welfare by computing the deadweight welfare losses associated with the empirical results from section 4. These calculations assume a constant slope in the import demand curve, with an elasticity as estimated from Table 1. The outcomes are plotted in Figure 9. These suggest that the deadweight welfare loss is around \$5bn per month in the current episode, around 10 times the impact of the 2018 tariffs. The total cost to importers equates to over \$20bn per month. This compares to below \$2.5bn in the 2018 episode. Indeed, the monthly cost in the current episode is close to exceeding the cumulative costs of the 2018 episode.

Figure 9: Welfare Impact of Tariff Policy

(a) 2018 Episode (b) 2025 Episode



Sources and Notes: Fulcrum Asset Management LLP. Figure shows impact on US importers of tariff policy, computing deadweight welfare losses according to Amiti et al. (2019).

D. Missing Intercept

When moving from micro-level cross-sectional regressions to a macroeconomic setting, the interpretation of the slope coefficient changes due to what is known as the *missing intercept problem* (Wolf, 2023). To illustrate this in the context of the current setting, it is helpful to work through a simple example using the potential outcomes framework.

Following, Moll (2022), a simple example helps to explain this. Suppose the true underlying relationship for foreign producer price setting is given by:

$$\Delta \ln p_{cjt} = \alpha + \beta\,\Delta \ln(1+\tau_{cjt}) + \gamma\,\Delta \ln(1+T_t) + u_{cjt}, \tag{77}$$

where T_t denotes the overall tariff level. The (even weighted) aggregate relationship between an import price index P_t and the tariff level is then:

$$\Delta \ln P_t = \alpha + (\beta+\gamma)\,\Delta \ln(1+T_t). \tag{78}$$

The challenge this presents is that cross-sectional micro-econometric regressions typically identify β alone, whereas macro-level responses depend on $\beta+\gamma$.

In a potential outcomes framework, consider a treated and an untreated product before and after a change in tariffs, $\Delta \ln(1+\tau_{ijt})$. The four potential outcomes are:

$$\Delta \ln p_{cj1} = \alpha + \beta\Delta \ln(1+\tau_{cj1}) + \gamma\Delta \ln(1+T_1) + u_{cj1}, \qquad \text{(Treated, } t=1) \tag{79}$$

$$\Delta \ln p_{cj0} = \alpha + \beta\Delta \ln(1) + \gamma\Delta \ln(1) + u_{cj0}, \qquad \text{(Treated, } t=0) \tag{80}$$

$$\Delta \ln p_{ij1} = \alpha + \beta\Delta \ln(1) + \gamma\Delta \ln(1+T_1) + u_{cj1}, \qquad \text{(Untreated, } t=1) \tag{81}$$

$$\Delta \ln p_{cj0} = \alpha + \beta\Delta \ln(1) + \gamma\Delta \ln(1) + u_{cj0}, \qquad \text{(Untreated, } t=0) \tag{82}$$

which are associated with the following group-level differences in potential outcomes:

$$E[\Delta \ln p_{cj1}|\text{Treated}] - E[\Delta \ln p_{cj0}|\text{Treated}] = \beta+\gamma, \tag{83}$$

$$E[\Delta \ln p_{cj1}|\text{Untreated}] - E[\Delta \ln p_{ij0}|\text{Untreated}] = \gamma. \tag{84}$$

In this simple example, the true aggregate effect can be recovered in two steps. In the first step standard difference-in-differences are used to compare the treated and untreated groups, and obtain an estimate of β through:

$$\big[E[\Delta \ln p_{cj1}|\text{Treated}] - E[\Delta \ln p_{cj0}|\text{Treated}]\big] - \big[E[\Delta \ln p_{cj1}|\text{Untreated}] - E[\Delta \ln p_{cj0}|\text{Untreated}]\big] = \beta. \tag{85}$$

This difference-in-difference between in potential outcomes is estimated in the main regression specification given in equation (11) of the main text. However, it does not correspond to the overall macroeconomic impact through the omission of γ, which also impacted the price setting behaviour of untreated products.

In this instance, a direct summation of the empirical responses approach, as proposed by Chodorow-Reich (2022), may resolved these differences. The difference in potential outcomes for only untreated items $E[\Delta \ln p_{cj1}|\text{Untreated}] - E[\Delta \ln p_{cj0}|\text{Untreated}] = \gamma$ can be estimated using the threshold effects model, specified in equation (13), and displayed in Table 3. In this case the insignificant of a result for only the negative (untreated) group implies $\gamma \approx 0$, and as such β estimated directly from the micro-econometric panel regression setting does coincide with $\beta + \gamma$ from the macro relationship, resolving the missing intercept issue. In other words, the missing-intercept problem only arises if the omitted intercept differs from zero. Since this is not the case for producer import prices, the issue does not arise in our setting

E. Empirical Robustness Checks

In this subsection we present a series of robustness checks for the main specification of interest. We first investigate the role of differing fixed effects. The results are presented in Table 7. This highlights that the baseline specification (which includes both Product and Country-Time fixed effects is consistent with other alternative specifications of the fixed effect. The results change little across all variants for the change in import quantities. However, the omission of product effects at all (i.e. the models with No Fixed Effect, or just Country or Time etc) results is an upward reassessment of the importer price effect. Directionally, this reinforces the primary conclusion of the paper.

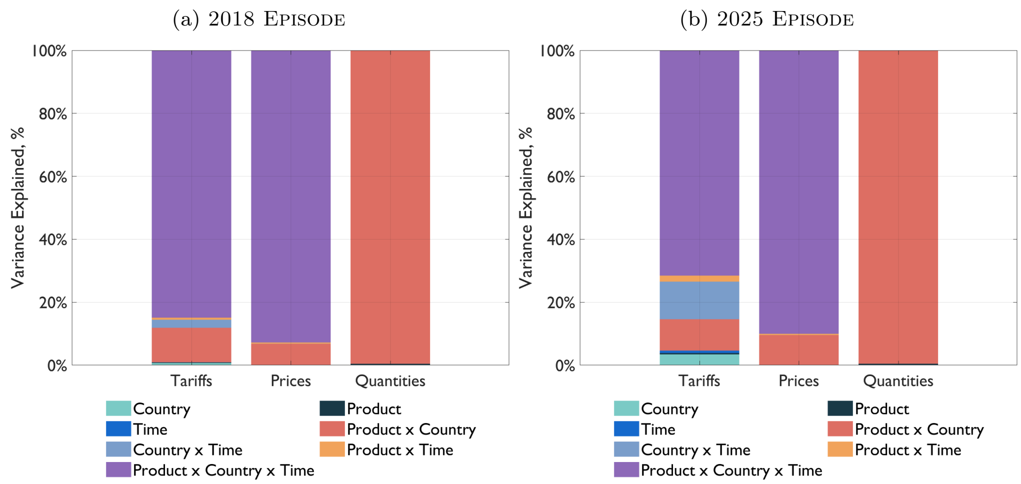
Table 7: Grouped Impact of US Tariffs on Importing

	Independent Variable:			
	log change foreign exporter prices $\Delta \ln(p_{cjt})$ (1)	log change import quantities $\Delta \ln(m_{cjt})$ (2)	log change foreign exporter prices $\Delta \ln(p_{cjt})$ (3)	log change import quantities $\Delta \ln(m_{cjt})$ (4)
	2018 Episode		**2025 Episode**	
No Fixed Effects	0.05	-2.09	-0.04	-1.43
Product	-0.00	-2.21	-0.04	-1.58
Country	0.03	-2.15	-0.03	-1.58
Time	0.03	-2.14	-0.03	-1.85
Product and Country-Time	-0.01	-2.27	-0.01	-1.90
Country and Product-Time	-0.00	-2.27	-0.01	-2.07
Time and Product-Country	-0.01	-2.29	-0.02	-1.86
Product and Time	-0.01	-2.22	-0.02	-1.87
Country and Time	0.03	-2.15	-0.02	-1.88
Country and Product and Time	0.06	-1.82	-0.06	-1.18
Product-Country and Product-Time	-0.01	-2.31	-0.01	-2.00
Country-Product and Country-Time	-0.01	-2.34	-0.02	-1.88
Time-Product and Time-Country	-0.01	-2.31	-0.00	-2.10

Source and Notes: US Census Bureau and Fulcrum Asset Management LLP. Observations are at the HS10-country-month level. The dependent variable in columns 1 and 3 is the log change of prices (before US duties are applied) charged by foreign exporters. In columns 2 and 4 this is the log change in quantities. 2018 episode uses data for the period January 2017 to December 2018. 2025 episode uses data for the period February 2024 to June 2025. Variables are in twelve-month log change. Rows indicate differing levels of fixed effects.

This finding is further supported by a variance decomposition, the results of which are presented in Figure 10. The analysis reveals that, for both tariff and price changes, the majority of the variation arises from a complex, non-linear combination of fixed effects, driven by the interaction of product, country, and time (shown in purple in the figure). In contrast, variation in quantities is predominantly explained by the product–country fixed effects (shown in red in the figure).

Figure 10: Variance Decomposition



Sources and Notes: Fulcrum Asset Management LLP.

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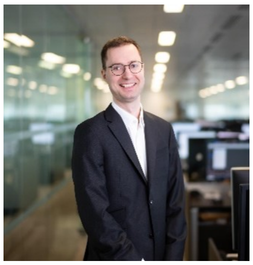

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