The Cost of China's 2025 Tariff Retaliation for U.S. Agriculture*

Xiting Zhuang Shawn Arita Sandro Steinbach

Abstract

This paper estimates the trade destruction effect of China's 2025/26 retaliatory tariffs on U.S. agricultural exports across the Fentanyl, Reciprocal, and Truce phases of the policy timeline. China's retaliation unfolded in three phases: a targeted Fentanyl tariff, a broad Reciprocal tariff, and a November Truce that suspended the larger tariff while leaving part of the retaliation in force. Using a gravity model on monthly bilateral agricultural trade flows from January 2021 through February 2026, we estimate that U.S. agricultural exports to China declined by 61.1 percent during the post-policy window from March 2025 through February 2026, with the contraction reaching 74.4 percent during the reciprocal tariff phase. The implied annualized destruction loss is $14.9 billion on the 2024 export baseline of $24.5 billion, with $10.7 billion concentrated in soybeans, beef, cotton, tree nuts, and corn. A parallel 2018/19 estimate, with the same specification on a 2015–2019 data, yields an aggregate annualized loss of $10.6 billion on the 2017 baseline of $19.6 billion, 41 percent below the 2025/26 figure. The larger effect reflects both broader product coverage and the stacking of new tariffs on the tariff structure left from the earlier round. The November Truce reduced but did not reverse the trade contraction. Exports remained 48.7 percent below baseline during the first three post-Truce months. Event study estimates show that the decline began in January 2025, before the retaliatory tariffs took effect, while export sales and grain inspection data show that the contraction involved contract cancellations and lower physical shipments. The results indicate that the temporary tariff relief could not immediately restore agricultural trade, as buyers redirected purchases and contracting relationships adjusted.

Keywords: China retaliation, U.S. agricultural exports, retaliatory tariffs, gravity model, trade destruction, U.S.–China trade
JEL codes: F13; F14; Q17

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1. Introduction

China is among the largest export markets for U.S. agriculture. In 2024, U.S. agricultural exports to China reached $24.5 billion, more than 15 percent of total U.S. agricultural exports, with soybeans the single largest commodity shipped to China (U.S. Department of Agriculture, Foreign Agricultural Service, 2025). According to USDA Trade Monitor statistics, aggregate U.S. agricultural exports to China fell to approximately $8.4 billion in calendar year 2025, a contraction of roughly two-thirds relative to 2024. In 2025, China imposed a sequence of retaliatory tariffs on U.S. agricultural exports, partially reversed by a November Truce but not fully removed by the end of the data window. The 2025/26 retaliation stacked on the Section 232 and Section 301 base from the 2018/19 round, layering the new burden on top of the pre-existing tariff structure. This paper measures the trade-destruction effect of China's 2025/26 retaliation on U.S. agricultural exports and benchmarks it against the 2018/19 round. The full impact of this second U.S.–China agricultural trade conflict has not yet been quantified despite its scale and policy relevance.

The 2025/26 tariff retaliation round is not the first time China has imposed retaliatory tariffs on U.S. agricultural exports, and a growing literature on the 2018/19 round provides both an empirical framework for measuring its impact and evidence on the duration of the effects. Across the U.S. economy, foreign retaliation in 2018/19 lowered targeted U.S. exports by approximately 11 percent, with welfare costs concentrated in agricultural counties and in Midwestern districts (Fajgelbaum et al., 2020). The agricultural sector was more affected by the 2018/19 retaliation than any other sector of the U.S. economy. Gravity estimates of the U.S. agricultural export contraction in the Chinese market put the annualized loss at $13.5 to $18.7 billion against a 2017 baseline (Grant et al., 2021). The unrecovered share of the shock was absorbed through reductions in domestic prices and increases in carryover stocks (Adjemian et al., 2021). The duration of the market loss has also been documented. Following the Phase One agreement, Brazil's share of Chinese soybean imports remained above its pre-trade-war level, and U.S. exporters did not fully recover the share that had been displaced (Bown, 2021; Dhoubhadel et al., 2023). The existing literature on the 2025/26 round has not yet measured the impact of the new retaliation on a basis comparable to these 2018/19 estimates (Steinbach et al., 2024; Carter et al., 2026).

The 2025/26 round shares the structure of the 2018/19 retaliation, but it differs in three respects that shape what a measurement of its impact has to capture. The 2025/26 tariffs stack on the Section 232 and Section 301 base already imposed in 2018/19, lifting the combined burden on U.S. exporters at the Chinese border above 135 percent for nearly all targeted commodities during the Reciprocal phase. The destruction effect on U.S. exports should therefore be larger than in the prior round. The Reciprocal phase covers virtually all U.S. agricultural exports rather than the selective product list that the 2018/19 retaliation had targeted, so the effect should spread across a broader set of commodities. U.S. exports to China also did not return to their pre-policy seasonal pattern in the three months that followed the November 2025 Truce, which gives an opportunity to observe how exports recover from retaliation once tariffs are reduced.

We measure the trade destruction effect of China's 2025/26 retaliation on U.S. agricultural exports using a gravity model in the tradition of Grant et al. (2021), estimated on monthly export-reported trade data. The analytical exercise builds toward a single result. Trade contracts rapidly when retaliatory tariffs are imposed, and it recovers slowly once they are paused. We decompose the aggregate destruction effect across the Fentanyl, Reciprocal, and Truce phases to map this asymmetry, and we use an event study framework to separate early-2025 anticipation from the post-effective-date trade adjustments. We also disaggregate the loss across commodities and U.S. states, and we cross-check the trade-value series against booking-contract data and grain-shipment inspections that capture new sales and physical shipments outside customs-value totals. Identification rests on the timing of the China retaliatory tariff activation at the BICO-month level on U.S. exports to China. We re-estimate the same specification on the 2018/19 round as a comparable benchmark on a 2017 baseline.

The empirical results document a large and persistent destruction effect. U.S. agricultural exports to China fall by 61.1 percent during the post-treatment window, with a peak decline of 74.4 percent during the Reciprocal phase. Applied to the 2024 baseline of $24.5 billion, the implied annualized loss is $14.9 billion. Product-level estimates account for $13.3 billion of this total, with $10.7 billion concentrated in soybeans, beef, cotton, tree nuts, and corn. The event study shows that the decline begins in January 2025, with an implied 61 percent drop in U.S. exports to China that month before any tariff takes effect. The break precedes both the March 4 announcement of Chinese retaliatory

Fentanyl tariffs and the March 10 effective date, indicating that Chinese buyers adjusted forward in anticipation of the bilateral tariff environment that subsequently emerged. After the November 2025 Truce paused the Reciprocal tariff and reduced the Fentanyl tariff to 10 percent, the decline narrowed but remained at 48.7 percent through the first three post-Truce months. The parallel 2018/19 estimate implies a 54 percent contraction and a $10.6 billion annualized loss on the 2017 baseline. The 2025/26 loss exceeds the prior round by 41 percent, with the gap reflecting both the stacking of new tariffs on the 2018/19 base and the broader product coverage of the Reciprocal phase. The decline is unique to U.S. exports to China during the active retaliation, ruling out coincident demand or supply shocks as the source.

The paper makes three contributions. First, we provide the first ex-post gravity quantification of China's 2025/26 retaliatory tariffs on U.S. agricultural exports. Second, we deliver the first measurement of how exports respond to a partial unwinding of retaliation, using the November 2025 Truce as the unwinding event. Third, we construct a directly comparable 2018/19 benchmark on a parallel exporter-reported data, allowing the magnitudes of the two retaliations to be evaluated against each other rather than against the heterogeneous methods that the prior literature has used. The paper also combines customs trade data with high-frequency USDA Export Sales and Federal Grain Inspection series to validate the monthly bilateral contraction at the sub-monthly horizon.

The remainder of the paper is organized as follows. Section 2 sets out the policy background and refers readers to the companion Agricultural Trade Monitor for the full chronology. Section 3 presents the data and the gravity specification. Section 4 reports the aggregate destruction estimate, the phase decomposition, the event study, and the robustness checks. Section 5 reports the commodity-level destruction effects, the booking and shipment evidence, the state-level exposure map, and the 2018/19 benchmark. Section 6 concludes.

2. Policy Background

U.S. agricultural exports to China face a tariff regime built in layers across two retaliation rounds. The 2018/19 round produced China's Section 232 and Section 301 retaliation against U.S. agricultural goods. The November 2018 Phase One agreement and subsequent waivers did not fully unwind that layer, and at the start of 2025 U.S. exporters still faced the pre-2025 retaliatory rates alongside Chinese most-favored-nation duties. The 2025/26 retaliation analyzed in this paper stacked new tariff components on top of this pre-existing base rather than replacing it. The bilateral-product-calendar-month fixed effect in the empirical model absorbs the constant base, so the destruction coefficient is identified by the 2025/26 incremental rates, but the stacked structure remains relevant for understanding the combined border burden faced by U.S. exporters during the active retaliation.

The 2025/26 retaliation unfolded in three phases that the empirical framework decomposes separately, and **Figure 1** renders the targeted-mean retaliatory rate by month across these phases. China announced the Fentanyl tariff on March 4, 2025 (State Council Tariff Commission Announcement No. 2) in response to U.S. fentanyl-related tariff actions on Chinese imports. The Fentanyl tariff took effect on March 10 at 10 to 15 percent on a targeted set of commodities including soybeans, beef, pork, corn, wheat, sorghum, cotton, and dairy. The broader Reciprocal tariff escalated in two steps, reaching 34 percent on April 9 and 125 percent on April 12, 2025, covering virtually all U.S. agricultural exports to China at the peak. The Geneva agreement on May 12, 2025 reduced the Reciprocal rate from 125 to 10 percent while leaving the Fentanyl tariff stacked on top through October. The November Truce, formalized at the Kuala Lumpur and Busan summits on November 10, 2025, suspended the Reciprocal tariff through December 31, 2026 and held the Fentanyl tariff at 10 percent. **Table 1** reproduces the full sequence of events and maps each month to the regression coding used in the empirical strategy.

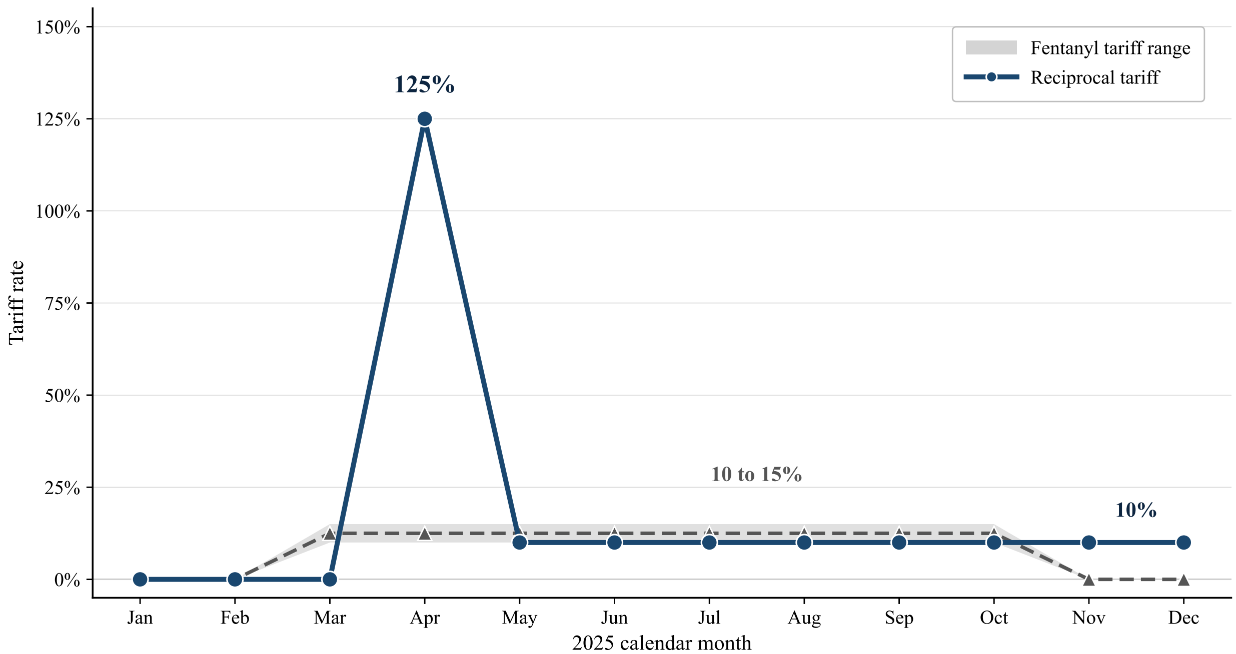

Figure 1. China's Retaliatory Tariff Rates

Note: Targeted-mean China retaliatory tariff rate on U.S. agricultural exports by month, in percent. The mean is taken across BICO commodity groups with a positive 2025/26 retaliatory tariff. The series traces the Fentanyl phase (March 2025), the Reciprocal phase (April–November 2025), and the post-Truce period (December 2025 onward).

Table 1. Policy Timeline.

Month	Event and tariff status
Feb 2025	U.S. fentanyl-related tariffs on imports from China take effect on February 4. China has not yet announced its retaliatory response.
Mar 2025	China announces the retaliatory Fentanyl tariff on March 4 (SCTC Announcement No. 2), effective March 10, adding 10% to 15% on targeted BICO commodities.
Apr 2025	The Reciprocal tariff escalates in steps. 34% effective April 9, then 125% effective April 12, applying to virtually all U.S. agricultural exports.
May 2025	The Geneva agreement on May 12 reduces the Reciprocal rate from 125% to 10%.
Jun–Oct 2025	The 10% Reciprocal tariff remains stacked on the Fentanyl tariff.
Nov 2025	The Truce announced on November 10 suspends the Reciprocal tariff and holds the Fentanyl tariff at 10%.
Dec 2025–Feb 2026	The 10% Fentanyl tariff remains in force. The Reciprocal tariff stays suspended.

Note: The overall destruction dummy in column (1) of **Table 3** activates whenever any tariff is positive on the U.S.–China bilateral flow. February 2025 is untreated in the baseline destruction model and appears only in the event-study specification as a pre-announcement anticipation lead.

The November Truce did not return the bilateral relationship to its pre-policy trajectory, and aggregate U.S. agricultural exports to China remained far below pre-retaliation levels. According to USDA Trade Monitor data, exports fell from approximately $24.5 billion in 2024 to $8.4 billion in calendar year 2025. **Figure 2** shows the resulting monthly contraction in U.S. agricultural exports to China relative to the 2021–2024 seasonal benchmark. The Fentanyl tariff at 10 percent remained in force, placing the effective Chinese duty on U.S. soybeans at approximately 13 percent plus value-added tax. At competitive Brazilian and Argentine pricing this rate constrained market-based Chinese purchases of U.S. supplies through the first three post-Truce months in the data. The November framework also re-established U.S. soybean purchase commitments of approximately 25 million metric tons per year for 2026 through 2028 and resumed Chinese purchases of sorghum, softwood logs, and hardwood logs. The May 14–15, 2026 Beijing summit reaffirmed the framework without adding new tariff cuts or upgraded purchase targets, though it signaled that bilateral negotiations remain ongoing. A complete chronology of the 2025/26 retaliation, including announcement and effective dates, product coverage, and developments since the end of the data window, is provided in the companion NDSU Agricultural Trade Monitor (May 2026) released alongside this paper.

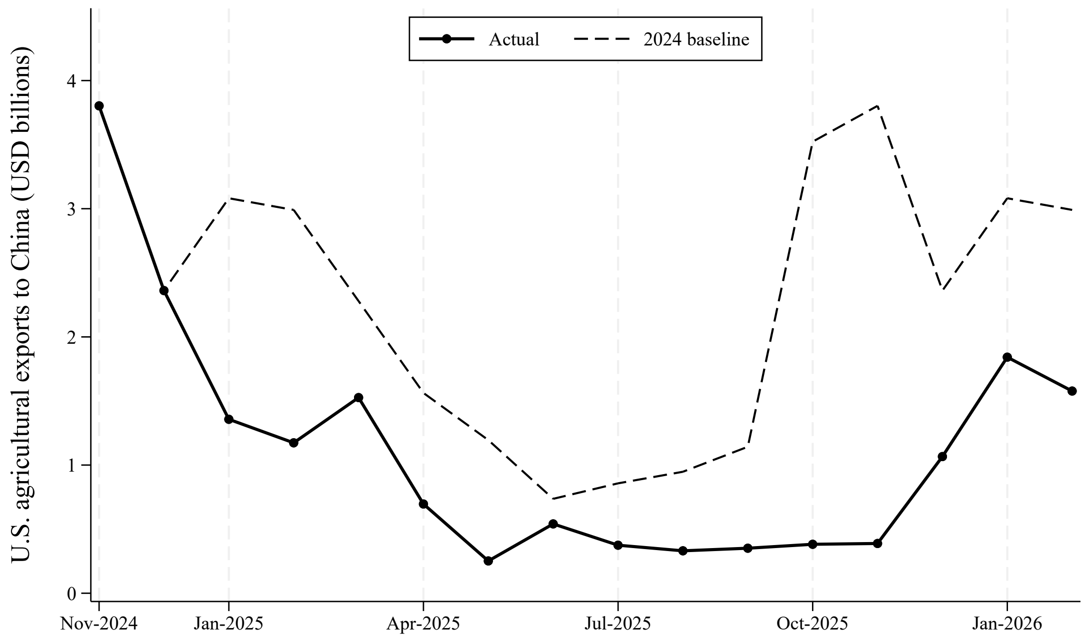

Figure 2. Monthly U.S. Agricultural Exports to China

Note: Aggregate U.S. agricultural exports to China in USD billions, plotted by calendar month. The navy line is 2025 actual monthly trade. The grey dashed line is the 2021–2024 same-calendar-month mean. The seasonal comparison isolates the 2025 deviation from the historical seasonal pattern.

3. Data and Empirical Strategy

3.1 Trade Data

We use exporter-reported bilateral trade data from the Global Trade Atlas at the HS-6 commodity code level. Each bilateral flow is recorded by the country of origin at the point of shipment, so U.S. flows reflect outbound shipments declared at U.S. customs, and the foreign flows reflect what the partner country recorded as its own exports. We aggregate HS-6 export values to the BICO (Bulk, Intermediate, Consumer-Oriented, and Related) commodity group level using the USDA BICO-to-HS6 concordance. The data cover monthly trade flows from January 2021 through February 2026. The data window encompasses the pre-escalation period, the full 2025/26 retaliation, and the first three months of the November 2025 Truce. For the 2018/19 comparison, we extend the same data source back to January 2015 through December 2019.

For each exporting country in the data, we retain the top thirty importing partners ranked by total bilateral trade value across the entire data period. The United States, Brazil, and Argentina are always retained as exporters regardless of their trade rank, which ensures complete coverage of the treatment group and the most likely substitute origins. We balance the panel by filling in zero-trade months for each observed bilateral-BICO pair, which is necessary because PPML uses zero flows to inform the conditional mean (Santos Silva and Tenreyro, 2006).

3.2 Tariff Data

We source China tariff data from the official monthly tariff schedule for the 2025/26 retaliation and from the corresponding 2018/19 schedule for the historical comparison. Both schedules are aggregated to the BICO commodity group level using HS6-level weights based on three-year average import values.

For the 2025/26 round, we construct the new retaliatory tariff rate τ_{kt}^{CN} for each BICO commodity k in month t as the sum of the Fentanyl Retaliation and Reciprocal Retaliation components. These are the tariff actions newly imposed in 2025. Pre-existing tariff components such as MFN rates, Section 232 retaliation from 2018, and Section 301 retaliation from 2018 and 2019 were already in effect before the start of the 2025 escalation and remained constant throughout the data period. The exporter, importer, product, and calendar-month fixed effect μ_{ijkm} in the gravity model fully absorbs them. They therefore do not confound the treatment estimate. For the 2018/19 round, the new retaliatory tariff is the sum of Section 301 and Section 232 Retaliation components, which were the tariff actions newly imposed during that earlier conflict.

Table 2 reports descriptive statistics for the data. Panel A summarizes the China retaliatory tariff across BICO-month observations with a positive new tariff, separately for the combined new rate and for the Fentanyl and Reciprocal components. Panel B reports annualized U.S. agricultural exports to China and total U.S. agricultural exports for the 2024 base year, the 2021–2024 pre-policy average, and the March 2025 onward post-policy window, together with the implied percent change relative to the pre-policy average.

Table 2. Descriptive Statistics

Panel A. China retaliatory tariff, when $\tau > 0$ (percentage points)				
	Mean	SD	Min	Max
Combined	21.8	33.5	0.0	140.0
Fentanyl	7.4	–	–	15.0
Reciprocal	20.7	–	–	125.0
Panel B. Annualized U.S. agricultural trade ($B)				
	2024	2021–24 avg.	Post-policy	Δ (%)
U.S. exports to China	24.5	31.1	9.3	−70.1
Total U.S. agricultural exports	161.7	165.5	155.7	−5.9
U.S.–China share of total (%)	15.2	18.8	6.0	

Notes. Monthly export-reported bilateral flows from the Global Trade Atlas, aggregated from HS6 to BICO commodity groups using the USDA concordance, January 2021 – February 2026; 30 exporters × 42 importers × 60 BICO commodity groups, 2,462,764 balanced-panel observations. The 2025 China retaliation is positive for 57 of 60 BICOs (221,906 observations with $\tau > 0$). Tariff = Fentanyl Retaliation + Reciprocal Retaliation. Pre-existing MFN, Section 232, and Section 301 tariffs are absorbed by the bilateral-product-calendar-month fixed effect in the regression and are excluded from the table. Panel A is conditional on a positive new tariff. Panel B reports annualized trade baselines: the 2024 calendar-year total (base year for trade-loss calculations), the 2021–2024 four-year annualized average, and monthly totals from March 2025 forward annualized across the 12 months available in the sample. The Δ column reports the percent change of the post-policy annualized value against the 2021–2024 average. The U.S.–China share row reports U.S. exports to China as a share of total U.S. agricultural exports in each column.

3.3 Specification

We identify the destruction effect by comparing U.S.–China bilateral flows in commodities subject to the 2025/26 retaliation against bilateral-product flows that the retaliation does not target. We estimate the following gravity equation by Poisson pseudo-maximum likelihood (Santos Silva and Tenreyro, 2006), which handles the heteroskedasticity and zero-trade observations typical of bilateral trade data.

$$\begin{aligned} Y_{ijkt} &= \exp(\eta_{ijkt})\,\varepsilon_{ijkt}, \\ \eta_{ijkt} &= \mu_{ijkm} + \pi_{it} + \phi_{jt} + \kappa_{kt} + \xi_{mt} + \beta_{\text{dest}} D^{\text{dest}}_{ijkt}. \end{aligned} \tag{1}$$

Y_{ijkt} is the export value from exporter i to importer j in BICO commodity k in month t. The bilateral-product-calendar-month effect μ_{ijkm} absorbs every time-invariant component of the bilateral trade cost in commodity k, including distance, FTA coverage, the pre-existing Section 232 and Section 301 base tariffs, and the BICO-specific seasonal pattern of bilateral flows. The exporter-year effect π_{it} absorbs U.S. crop-year weather, the strong-dollar cycle, conservation-reserve acreage shifts, and competing-country supply shocks such as the Brazilian real-rate cycle and Argentine planting conditions. The importer-year effect ϕ_{jt} absorbs Chinese GDP growth, RMB movements, the African-swine-fever feed-grain cycle, and aggregate Chinese demand shifts. The product-year effect κ_{kt} absorbs global commodity-price cycles and world-supply shocks specific to each BICO. The year-month effect ξ_{mt} absorbs global agricultural-trade cycles common across all bilateral pairs. This FE structure follows Grant et al. (2021) and disciplines the multilateral resistance terms of the underlying CES system.

The destruction treatment $D^{\text{dest}}_{ijkt} = \mathbf{1}_{i=\text{US}} \cdot \mathbf{1}_{j=\text{CN}} \cdot \mathbf{1}(\tau^{\text{CN}}_{kt} > 0)$ equals one when the United States exports to China in a BICO commodity with an active 2025/26 retaliatory tariff. Under the maintained FE structure, $\exp(\beta_{\text{dest}})$ is the ratio of the treated conditional mean to the counterfactual conditional mean, so $1 - \exp(\beta_{\text{dest}})$ is the partial-equilibrium proportional contraction in U.S. exports to China during the active retaliation. Identification comes from the differential timing of tariff activation across BICO-month cells, with the treatment dummy switching on for U.S.–China cells once τ^{CN}_{kt} becomes positive at the BICO-month level. The identifying assumption is that, absent China's 2025/26 retaliation, U.S.–China treated flows would have followed the same conditional path as comparable agricultural trade flows. Standard errors are clustered at the importer-product-calendar-month level to absorb serial correlation in within-cell shocks across years (Cameron and Miller, 2015).

Three threats to this identifying assumption are addressed by the research design. First, Chinese buyers may have anticipated the retaliation in the months between the November 2024 election and the March 2025 effective date, which would pull part of the contraction into the pre-treatment window and bias the aggregate destruction coefficient toward zero. Section 4.2 reports an event-study specification that splits the post-treatment dummy into month-of-event leads and lags, separating pre-effective-date adjustment from the post-effective-date contraction. Second, a coincident Chinese demand shock or U.S. supply-side contraction unrelated to the tariff could produce a similar bilateral pattern. Section 4.3 reports placebo specifications that reassign the treatment to competitor-China bilateral flows and to the U.S.-to-non-China flow, holding the calendar-month tariff activation pattern fixed. Third, other 2025 policy changes such as sanitary measures or currency movements could load onto the treatment dummy. The exporter-year and importer-year fixed effects absorb any policy or macroeconomic shock that operates at the country-year level rather than at the bilateral cell.

To recover commodity-specific destruction effects, we interact the destruction dummy with a full set of BICO product indicators, $\sum_k \beta_{\text{dest},k} D^{\text{dest}}_{ijkt} \cdot \mathbf{1}_{\text{BICO}=k}$, which delivers one coefficient per BICO commodity estimated simultaneously. The interaction approach provides better identification than per-commodity subsample estimation because the fixed effects are estimated using all trade flows (Grant et al., 2021). Counterfactual annualized trade losses are computed as $\text{Loss}_k = \text{Base}_k \times (1 - e^{\hat{\beta}_{\text{dest},k}})$, where Base_k is the 2024 calendar-year U.S. export value to China for BICO commodity k. This quantity is the partial-equilibrium gravity counterfactual on the maintained FE path and is not a general-equilibrium welfare measure. The welfare interpretation is taken up in Section 6. The 2024 base year is the most recent pre-treatment calendar year and reflects the bilateral trade level immediately before the activation of the 2025/26 retaliation. The 2018/19 comparison uses 2017 as the analogous base year.

4. Results

4.1 Aggregate Destruction and Phase Decomposition

Table 3. Destruction Effect and Phase Decomposition

	(1)	(2)	(3)	(4)
	Overall	Fentanyl	Reciprocal	Truce
Destruction (β)	-0.943***	-0.488**	-1.361***	-0.668***
	(0.179)	(0.205)	(0.247)	(0.152)
Bilateral × product × cal. month	Yes	Yes	Yes	Yes
Exporter × year FE	Yes	Yes	Yes	Yes
Importer × year FE	Yes	Yes	Yes	Yes
Product × year FE	Yes	Yes	Yes	Yes
Year × cal. month FE	Yes	Yes	Yes	Yes
Observations	1,130,925		1,130,925	
Pseudo R^2	0.961		0.961	
Implied %Δ trade	-61.1	-38.6	-74.4	-48.7
Phase base ($M)	24,483	2,280	13,769	8,434
Avg. monthly loss ($M)	1,246	880	1,280	1,370
Phase total loss ($M)	14,949	880	10,237	4,111
Phase length (months)	12	1	8	3

Notes: Structural gravity PPML estimates of the effect of China's 2025 retaliatory tariffs on U.S. agricultural exports to China. Column (1) reports the aggregate destruction coefficient from dummy that activates whenever the retaliatory tariff is positive on the U.S.–China bilateral flow. Columns (2)–(4) replace the single dummy with three mutually exclusive month-range dummies. The Fentanyl phase covers March 2025. The Reciprocal phase covers April through November 2025, and the Truce phase covers December 2025 through February 2026. The phase base is the 2024 same-calendar-month U.S. exports to China summed across the months of each phase. The Overall column uses the full 2024 calendar year. Fentanyl uses March 2024. Reciprocal uses April through November 2024. Truce uses December 2024 together with January and February 2024. Phase total loss equals the phase base multiplied by $(1 - \exp(\hat{\beta}))$, and average monthly loss equals the phase total loss divided by the phase length. Standard errors are clustered at the importer × product × calendar month level and reported in parentheses. Asterisks denote statistical significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 3 reports the aggregate destruction estimate and the three-phase decomposition. We find that China's 2025/26 retaliation reduced U.S. agricultural exports to China by 61.1 percent during the 12-month post-treatment window from March 2025 through February 2026, with implied annualized losses of $14.9 billion on the 2024 calendar-year baseline of $24.5 billion (column 1). The estimate sits within the $13.5–$18.7 billion range that Grant et al. (2021) report for the 2018/19 round on the same fixed-effects gravity specification.

We document a monotone phase pattern in columns (2)–(4). The Fentanyl tariff alone reduced exports by 38.6 percent in March 2025. With the Reciprocal escalation stacking the combined retaliatory rate to roughly 135 percent across April through November, the contraction deepened to 74.4 percent. The post-Truce window, in which the Reciprocal tariff was suspended and only the 10 percent Fentanyl tariff remained, retains a 48.7 percent contraction across the first three Truce months. By contrast with the 93 percent reduction in the combined retaliatory rate, the bilateral trade contraction narrowed by only 26 percentage points. We find that the size of the tariff reversal exceeded the size of the trade recovery by roughly a factor of three.

The Truce-phase persistence is consistent with two features of the bilateral contracting environment. The 2025–2026 marketing-year contracting cycle was largely complete by the November agreement, so Chinese buyers had already locked forward soybean and corn purchases with Brazil and Argentina for the months that follow the Truce (Dhoubhadel et al., 2023; Bown, 2021). The 90-day pause with a one-year sunset is closer to a reversible suspension than to a permanent removal, and the re-entry cost framework of Chaney (2008) implies that buyers and sellers will not bear the cost of re-establishing relationships when the tariff schedule remains reversible. Section 5.2 documents how the contraction interacts with the marketing-year calendar through the weekly booking and shipment evidence.

4.2 Event Study

Figure 3 reports an event-study version of the destruction estimate, replacing the aggregate destruction dummy with four pre-treatment leads from November 2024 through February 2025 and twelve post-treatment lags from March 2025 through February 2026. Event time $t = 0$ is the March 2025 Fentanyl effective date. The omitted reference baseline pools all U.S.–China observations at or before October 2024 ($t \leq -5$), the months preceding the November 2024 U.S. presidential election, so each lead and lag coefficient measures the contraction relative to this pre-election conditional mean. The lead-and-lag specification recovers two patterns that the aggregate specification cannot separate, namely an anticipation contraction that opens months before any retaliatory tariff is in force and a gradual post-Truce narrowing of the contraction in the final two data months.

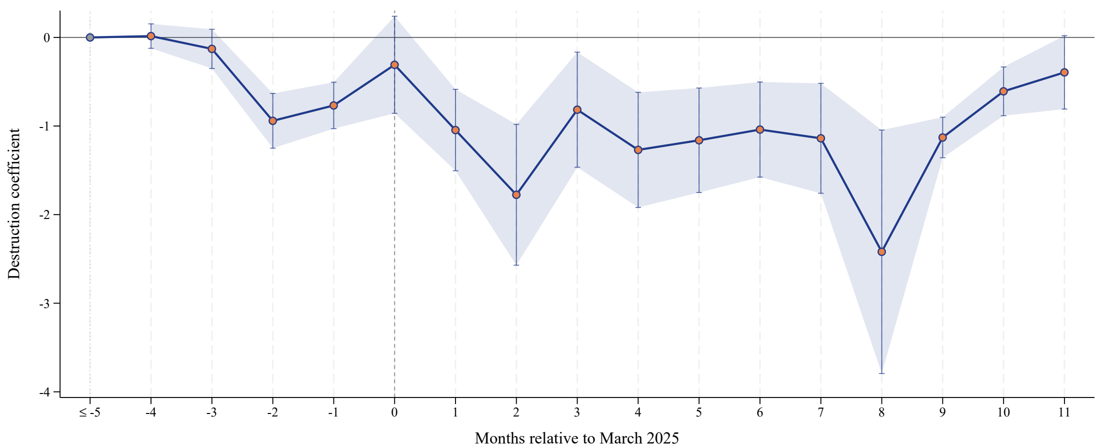

Figure 3. Event Study of the Destruction Effect

Note: Each point is the PPML coefficient on a month-of-event treatment dummy for the U.S.–China bilateral flow. Event time $t = 0$ is March 2025, the Fentanyl tariff effective date. The estimated window covers four pre-treatment leads ($t = -4$ through $t = -1$, November 2024 through February 2025) and twelve post-treatment lags ($t = 0$ through $t = +11$, March 2025 through February 2026). All U.S.–China months at or before October 2024 ($t \leq -5$) are pooled as the omitted reference baseline. Vertical markers indicate the March 2025 Fentanyl effective date and the April 2025 Reciprocal effective date. Fixed effects, treatment construction, and clustering match the baseline specification in **Table 3**. Shaded band is the 95 percent confidence interval.

Section 3.3 flagged buyer anticipation between the November 2024 election and the March 2025 effective date as the first identification threat to the aggregate destruction estimate. **Figure 3** quantifies that anticipation lead by lead. We document a sharp anticipation contraction that opens at the January 2025 inauguration. The November 2024 election lead at $t = -4$ is statistically indistinguishable from zero. By contrast, the January 2025 inauguration lead at $t = -2$ records a 61 percent contraction in U.S. exports to China statistically significant at the one-percent level, fully two months before the March 4 Fentanyl announcement and three months before the March 10 effective date. The February lead at $t = -1$ records a contraction of comparable magnitude at 54 percent. The pre-treatment break therefore tracks the change in U.S. administration rather than the activation of the retaliatory tariff, consistent with Chinese buyers adjusting forward to the bilateral tariff environment that subsequently emerged.

The post-treatment path traces the deepening contraction and the partial post-Truce recovery. March 2025, the first month of the Fentanyl phase, shows a 23 percent contraction that is not statistically distinguishable from zero, in part because the January and February anticipation had already pulled trade below the pre-policy benchmark. The Reciprocal escalation in April drops the path sharply to an 84 percent trough in May 2025, and coefficients hold in the same depressed range through November. By contrast, the post-Truce months in January and February 2026 narrow to 46 and 33 percent contractions, consistent with the Truce-phase aggregate in **Table 3** and indicating that the post-Truce rate reduction had begun to undo a portion of the contraction by the end of the data window.

The aggregate destruction estimate in **Table 3** and the event-study path use different reference periods. The aggregate coefficient compares treated months to the rest of the data, while the event study compares each month to the pre-election baseline of October 2024 and earlier. The post-treatment contraction in column (1) of **Table 3** measures the bilateral collapse from March 2025 onward. **Figure 3** traces the same collapse back to its anticipation onset at the November 2024 U.S. election. The March 2025 Fentanyl effective date itself is not statistically distinguishable from zero in the event study, indicating that the bilateral collapse arrived primarily through anticipation rather than through the formal tariff activation. The pattern is consistent with the policy-uncertainty channel in Handley and Limão (2017), in which bilateral trade adjusts to expectations of future trade-cost changes rather than to the formal activation of those changes. Despite the anticipation contamination of the pre-treatment window, the aggregate destruction effect is robust. Excluding November 2024 through February 2025 from the data (row (8) of **Table 4**) yields a 64.5 percent contraction, only 3.4 percentage points larger than the 61.1 percent aggregate reported in column (1) of **Table 3**.

4.3 Robustness

We assess the robustness of the aggregate destruction estimate across nine specifications reported in **Table 4**. The specifications address five distinct threats to identification, namely sensitivity to a single dominant commodity (rows 2–3), confounding from coincident non-tariff shocks on the U.S.–China bilateral flow (rows 4–6), contamination from a pre-policy trend (row 7), contamination of the pre-treatment baseline by anticipation in late 2024 and early 2025 (row 8), and mirror-data discrepancies between exporter-reported and importer-reported flows (row 9). We find that the aggregate destruction effect is robust across all five checks. The destruction coefficient remains negative and statistically significant at the one-percent level in the alternative specifications (rows 2, 3, and 8) and in the mirror-data specification (row 9), the three placebo bilateral flows (rows 4–6) yield the expected positive signs ruling out non-tariff explanations, and the pseudo-treatment placebo (row 7) shows no detectable effect.

Table 4. Robustness Checks

	Specification	$\hat{\beta}_{\text{dest}}$	SE	N
(1)	Body (full sample, U.S. exports to China)	-0.943***	0.179	1,130,925
(2)	Drop soybeans	-1.039***	0.093	1,125,481
(3)	Drop top-5 commodities	-0.422***	0.061	1,065,993
(4)	Placebo: Brazil's exports to China	0.224***	0.058	1,130,925
(5)	Placebo: Argentina's exports to China	0.481***	0.135	1,130,925
(6)	Placebo: U.S. exports to non-China destinations	0.369***	0.059	1,130,925
(7)	Pseudo-treatment: dummy activated January 2024	-0.110*	0.060	855,037
(8)	Anticipation window excluded (Nov 2024–Feb 2025)	-1.035***	0.170	1,051,332
(9)	Mirror data: import-reported bilateral flows	-0.802***	0.147	1,418,387

Note: Each row reports the destruction coefficient from a re-estimation of the body specification under the indicated sample or treatment-flow change. Row (1) reproduces the Table 3 column (1) coefficient. Rows (4)–(6) reassign the destruction dummy to a counterfactual bilateral flow, holding the calendar-month tariff activation pattern fixed. Row (7) restricts the sample to months at or before December 2024 (no actual policy) and activates the dummy on the U.S.–China bilateral flow from January 2024 onward. Row (8) drops the four-month anticipation window (November 2024 through February 2025) from the sample so that the destruction dummy's pre-treatment reference excludes the months in which Chinese buyers were adjusting forward to the incoming retaliation. Row (9) re-estimates the same specification on import-reported bilateral trade data, in which the U.S.–China flow is measured as China's reported imports from the United States rather than U.S. reported exports to China. Fixed effects, clustering, and panel construction match the body specification. Asterisks denote $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We document that the destruction effect is not driven by a single dominant commodity or by the top tier alone. Row (1) reproduces the aggregate specification as a benchmark. Dropping soybeans, the single largest commodity by 2024 export value to China, leaves the destruction coefficient slightly larger in magnitude than the aggregate estimate (row 2). Dropping the top five commodities together, namely soybeans, beef, cotton, tree nuts, and corn, still yields a 34 percent contraction in the long tail of smaller-loss commodities (row 3), statistically significant at the one-percent level. The proportional destruction effect therefore extends across the commodity basket and is not confined to the five commodities that account for most of the dollar losses.

We find no evidence for the two leading non-tariff alternative interpretations of the aggregate destruction estimate. Rows (4) through (6) reassign the destruction dummy to counterfactual bilateral flows while holding the calendar-month tariff activation pattern fixed. A coincident Chinese demand shock or trade-financing disruption would depress competitor flows into China, leaving a negative coefficient on Brazil's exports to China (row 4) and Argentina's exports to China (row 5). A broad U.S. supply-side contraction would depress U.S. shipments to other destinations, leaving a negative coefficient on the U.S.-to-non-China flow (row 6). By contrast, all three placebo coefficients are positive and statistically significant at the one-percent level, so the two leading non-tariff explanations for the aggregate destruction effect are inconsistent with the bilateral pattern in the data.

The positive placebo signs are themselves informative about where the destroyed U.S.–China trade is redirected. The positive Brazil–China and Argentina–China coefficients are consistent with competitor exporters expanding their shipments to China during the months when the U.S.–China flow contracted, and the positive U.S.-to-non-China coefficient is consistent with U.S. exporters redirecting some shipments toward third-country destinations. These two channels, competitor diversion into the Chinese market and U.S. redirection to non-Chinese buyers, are documented for the 2018/19 round (Bown, 2021; Dhoubhadel et al., 2023). The bilateral destruction loss measures the gross U.S.–China contraction, while the net producer welfare loss to the U.S. agricultural sector is smaller, since part of the lost China trade is recovered through sales to other countries.[1]

We find no evidence of a pre-policy trend on the U.S.–China bilateral flow that could be mistaken for the destruction effect. Row (7) is a pseudo-treatment placebo that activates the destruction dummy on the U.S.–China flow in January 2024, one full year before the actual policy, with the data restricted to months at or before December 2024. The estimated 10 percent contraction is small and only marginally statistically significant. The destruction effect is therefore not detectable one year before the actual policy, which supports the March 2025 treatment timing.

We find that the aggregate destruction effect is robust to anticipation contamination of the pre-treatment baseline. Row (8) drops the four-month anticipation window of November 2024 through February 2025 from the data, so the destruction dummy's pre-treatment reference excludes the months in which Chinese buyers were adjusting forward to the incoming retaliation. The resulting 64.5 percent contraction is only 3.4 percentage points larger than the 61.1 percent aggregate reported in column (1) of **Table 3**, indicating that the aggregate estimate is not materially biased by the anticipation it absorbs into its pre-treatment reference.

We find that the aggregate destruction effect is robust to the choice of reporting side. Row (9) re-estimates the aggregate specification on import-reported bilateral trade data, in which the U.S.–China flow is measured at Chinese customs as imports from the United States rather than at U.S. customs as exports to China. The resulting 55.2 percent contraction is 6 percentage points smaller than the 61.1 percent body estimate. The appendix reports the full side-by-side comparison in **Table A.1** and discusses the sources of mirror-data discrepancies in detail.

[1] The placebo coefficients in rows (4)–(6) provide indirect evidence on the diversion and deflection channels by reassigning the destruction dummy to counterfactual bilateral flows one at a time. A more general specification that estimates destruction, diversion, and deflection jointly in a single equation, would yield a more direct decomposition of the gross bilateral contraction into the share absorbed by competitor exporters into the Chinese market, the share redirected by U.S. exporters to non-Chinese destinations, and the residual net loss to U.S. producers. We leave this extension to future work.

5. Heterogeneity

We disaggregate the aggregate destruction effect of **Table 3** along three dimensions. Section 5.1 reports product-level coefficients and dollar losses by commodity. Section 5.2 cross-checks the customs-value-based estimates against high-frequency USDA Export Sales Reporting and grain-inspection series. Section 5.3 maps the dollar losses onto state-level production exposure. Section 5.4 benchmarks the 2025/26 results against a parallel 2018/19 estimate.

5.1 Commodity-Level Destruction

Table 5 reports product-level counterfactual destruction effects from the interaction specification, restricted to the 21 commodities with a statistically significant negative destruction coefficient and a 2024 U.S. export baseline to China above $50 million. We find that the aggregated destruction loss reaches $13.3 billion against a $22.4 billion subset baseline, an implied 59.4 percent destruction rate across the filtered set.

We document that the destruction loss concentrates in a handful of commodities. Soybeans alone account for $6.8 billion, half the filtered-set total, reflecting their dominant share of the 2024 U.S.–China export baseline. Beef and cotton each contribute about $1.3 billion, tree nuts $964 million, and corn $333 million. Together these five commodities account for $10.7 billion, or 80 percent of the annualized destruction loss in the filtered set, and each carries a destruction coefficient statistically significant at the one-percent level.

By contrast with the dollar-loss concentration, the proportional contraction extends across the commodity basket. **Figure 4** pairs each commodity's mean 2025/26 retaliatory tariff rate against its estimated percent change in U.S. exports to China, with bubble area proportional to the annualized destruction loss. The bubbles cluster in the lower right, indicating that the highest-tariff commodities experience the largest proportional contractions, and the dashed loss-weighted linear fit summarizes this negative tariff–trade relationship across the commodity basket. Beef, cotton, tree nuts, and corn sit at percent changes near -80 to -100 and tariff rates in the 100 to 150 percent range, mirroring the 74.4 percent Reciprocal-phase aggregate in column (3) of **Table 3**. Soybeans is the upper-left outlier at a -54 percent contraction, the smaller proportional decline

Table 5. Destruction Effect by Commodity

Product	β	SE	%Δ	2024 Base	Annualized Loss
Non-specialty/Row Crops				**16,572.1**	**9,605.2**
Soybeans	-0.773*	(0.409)	-53.8	12,636.6	6,801.1
Cotton	-2.000***	(0.201)	-86.5	1,477.8	1,277.8
Coarse Grains (ex. corn)	-1.221***	(0.383)	-70.5	1,231.9	868.7
Corn	-5.711***	(0.789)	-99.7	334.1	333.0
Hay	-0.497***	(0.077)	-39.2	365.4	143.1
Distillers Grains	-3.200***	(0.174)	-95.9	80.1	76.9
Other Feeds & Fodders	-0.189**	(0.090)	-17.2	371.7	64.0
Peanuts	-0.791*	(0.428)	-54.7	74.4	40.7
Livestock				**4,103.2**	**2,405.5**
Beef & Beef Products	-1.985***	(0.528)	-86.3	1,550.5	1,337.4
Pork & Pork Products	-0.529***	(0.103)	-41.1	993.9	408.5
Poultry Meat & Prods. (ex. eggs)	-1.036***	(0.120)	-64.5	481.4	310.5
Hides & Skins	-0.473***	(0.066)	-37.7	434.6	163.7
Dairy Products	-0.290***	(0.084)	-25.2	584.2	147.1
Live Animals	-1.058***	(0.339)	-65.3	58.6	38.2
Specialty & Processed				**1,772.8**	**1,307.5**
Tree Nuts	-2.355***	(0.178)	-90.5	1,065.5	964.4
Other Intermediate Products	-0.767***	(0.098)	-53.6	135.1	72.4
Planting Seeds	-0.574***	(0.130)	-43.7	157.3	68.7
Essential Oils	-0.456***	(0.116)	-36.6	161.7	59.2
Wine & Related Products	-0.727***	(0.261)	-51.7	96.1	49.6
Fresh Fruit	-0.892***	(0.114)	-59.0	79.3	46.8
Processed Fruit	-0.909***	(0.126)	-59.7	77.8	46.5
Total				**22,448.0**	**13,318.2**

Note: Product-level structural gravity PPML estimates of China's 2025 retaliatory tariff effect on U.S. exports to China, by BICO commodity group. The annualized loss is computed as the 2024 calendar-year U.S. exports to China for the commodity multiplied by $(1-\exp(\beta))$ and is expressed in U.S. dollars (millions). The post-treatment window covers March 2025 through February 2026. Fixed effects: bilateral pair × product × calendar month, exporter × year, importer × year, product × year, year × calendar month. Standard errors clustered at the importer × product × calendar month level reported in parentheses. Asterisks denote statistical significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

reflecting its much larger 2024 baseline rather than a weaker tariff response. The phase coverage encoded in the bubble color provides direct visual evidence of the stacking effect, with navy bubbles for commodities subject to both the Fentanyl and Reciprocal retaliation systematically further left than grey bubbles for commodities subject only to the Reciprocal retaliation.

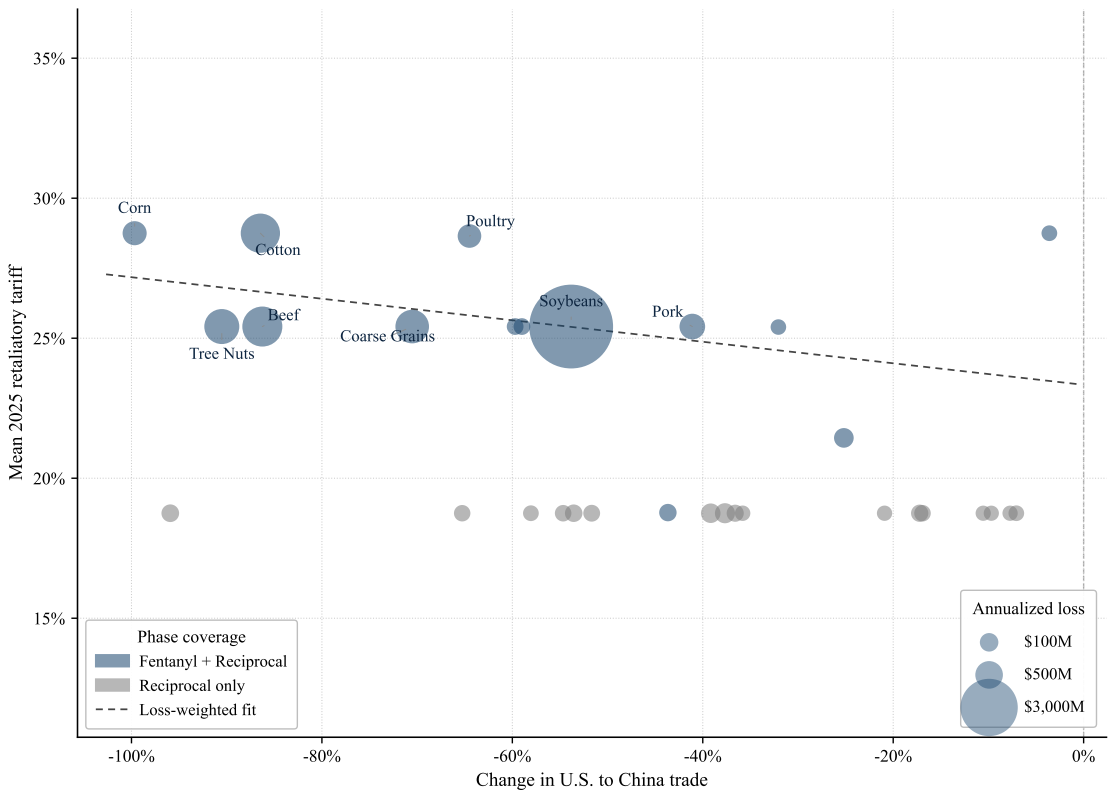

Figure 4. Tariff Rate and Trade Impact by Commodity

Note: Each bubble is a commodity group. The vertical axis is the mean 2025/26 China retaliatory tariff (Fentanyl plus Reciprocal) on U.S. exports, averaged over March 2025 through February 2026. The horizontal axis is the implied change in U.S. exports to China from the product-level PPML destruction specification. Bubble area is proportional to the annualized destruction loss on the 2024 U.S. export baseline. Color encodes phase coverage. Navy denotes commodities subject to both the Fentanyl and the Reciprocal retaliation. Grey denotes commodities subject to the Reciprocal retaliation alone. The dashed line is the loss-weighted linear fit. Labels identify the eight commodities with the largest dollar losses.

5.2 Booking and Shipment Evidence

The product-level PPML estimates rest on monthly trade-value data, which measure the bilateral contraction at the customs-recording stage. They do not show whether the contraction first appears in new sales, in physical shipments, or in both. We therefore turn to two complementary USDA series that record booking contracts and physical grain shipments. The USDA Foreign Agricultural Service Export Sales Reporting (ESR) program records weekly U.S. net export sales, including cancellations, and covers selected affected commodities such as soybeans, cotton, beef, and sorghum. The USDA Federal Grain Inspection Service (FGIS) records weekly inspected grain shipments at U.S. port facilities. Together the two series distinguish a collapse in new contract bookings, which appears first in the ESR sales data, from a delay or pause in physical shipments, which appears first in the FGIS inspection data.

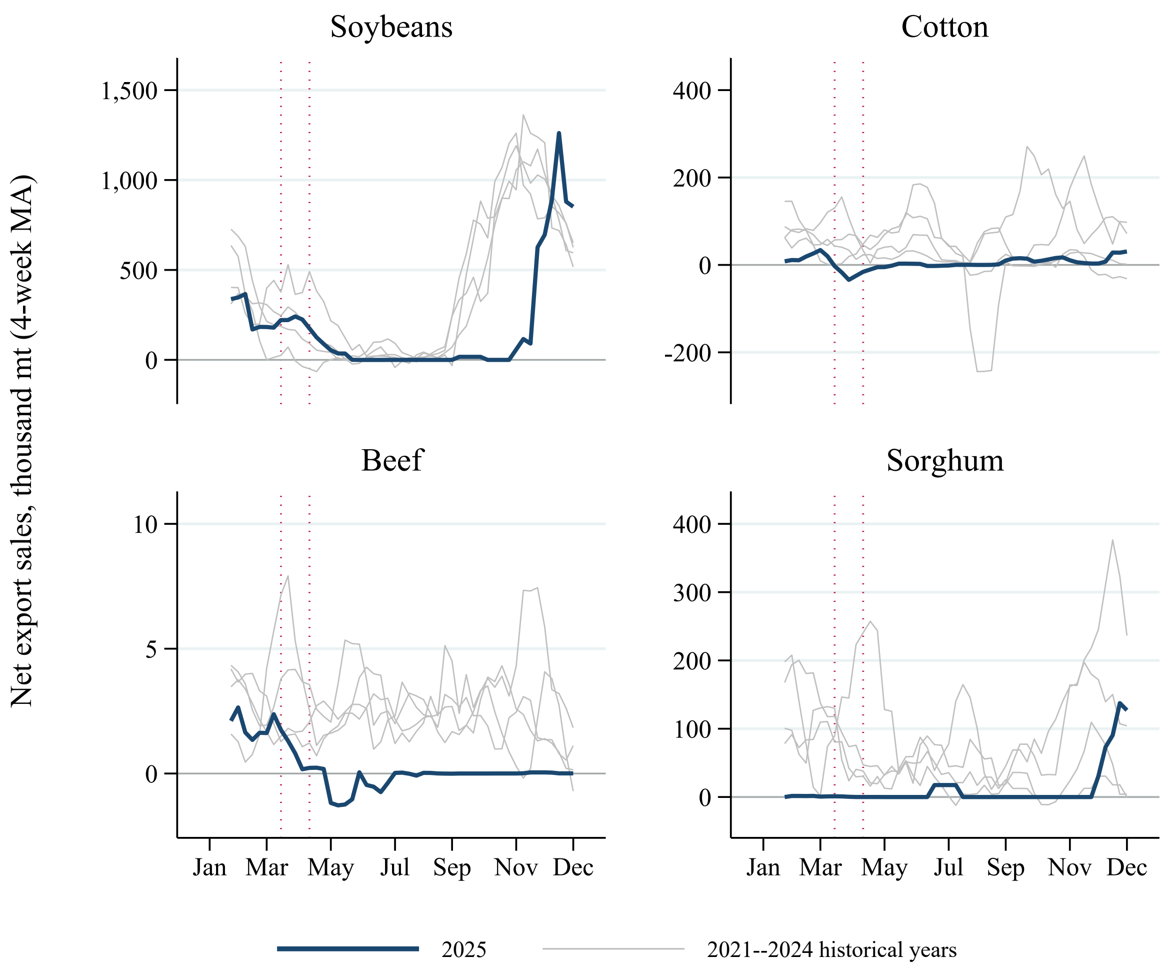

Figure 5. Weekly U.S. Export Sales to China, Selected Affected Commodities

Note: Navy line shows 2025 weekly U.S. net export sales to China from the USDA Foreign Agricultural Service Export Sales Reporting program, smoothed with a four-week trailing moving average. Grey line shows the 2021–2024 historical weekly mean over the same period. Net sales equal new sales minus cancellations and can be negative when cancellations exceed new bookings. Vertical dashed lines mark March 10 and April 10, 2025.

We find two distinct responses in the ESR series shown in **Figure 5**. For cotton and beef, net export sales turn negative from late March 2025 onward, indicating that Chinese buyers actively cancelled previously booked contracts rather than only slowing new orders. By contrast, sorghum and soybean sales fall below the 2021–2024 historical range from April without turning negative, indicating slower new bookings without large cancellations. The contemporaneous reduction is restricted to U.S. exports to China, consistent with the U.S.-to-non-China placebo in row (6) of

Table 4.

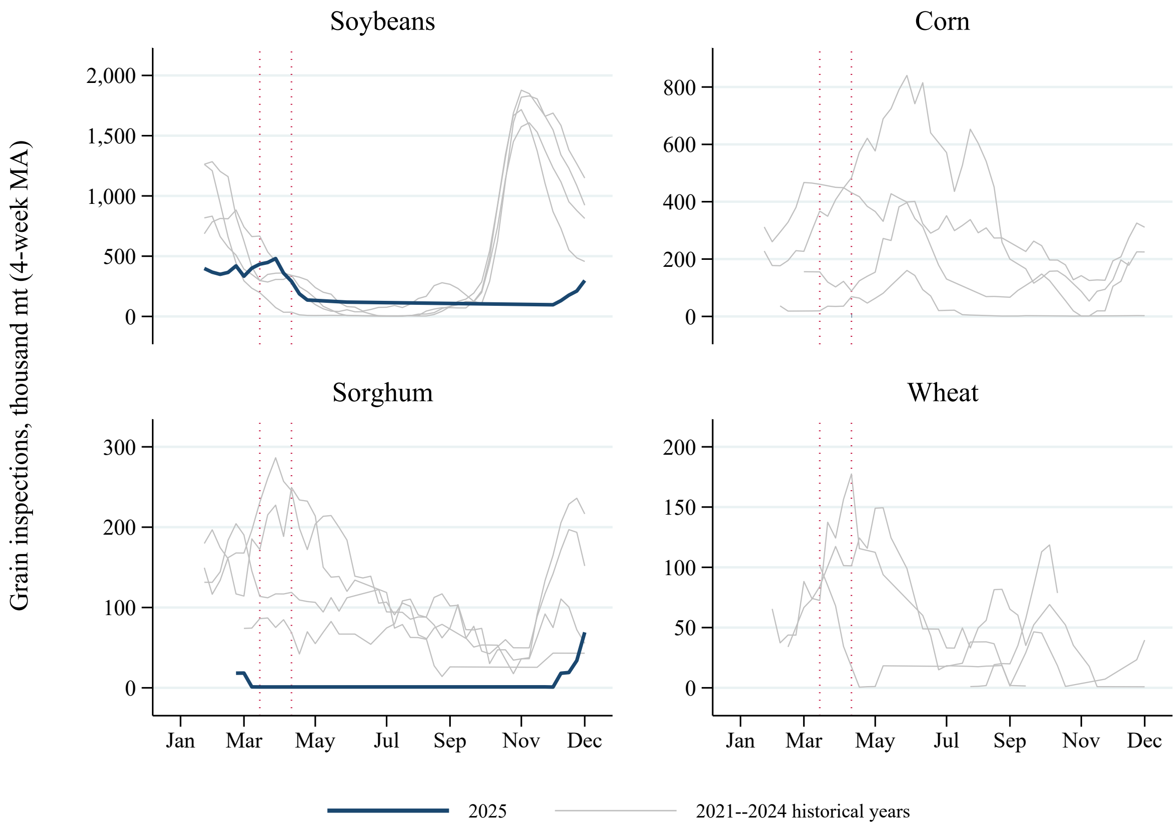

Figure 6. Weekly Grain Export Inspections to China

Note: Navy line shows 2025 weekly U.S. grain export inspections to China by the USDA Federal Grain Inspection Service for soybeans, corn, sorghum, and wheat, smoothed with a four-week trailing moving average. Grey line shows the 2021–2024 historical weekly mean. Vertical dashed lines mark March 10 and April 10, 2025.

We document that the ESR sales contraction translates into lower physical shipments for grains. **Figure 6** shows FGIS inspections falling in tandem with ESR for soybeans, corn, sorghum, and wheat, with the FGIS decline appearing within four to eight weeks of the ESR contraction. The short lag matches the typical contract-to-vessel scheduling window. It also rules out the alternative interpretation that previously booked cargoes continued to clear at port while only new bookings paused. The monthly destruction estimate for grains therefore reflects a real shipment contraction.

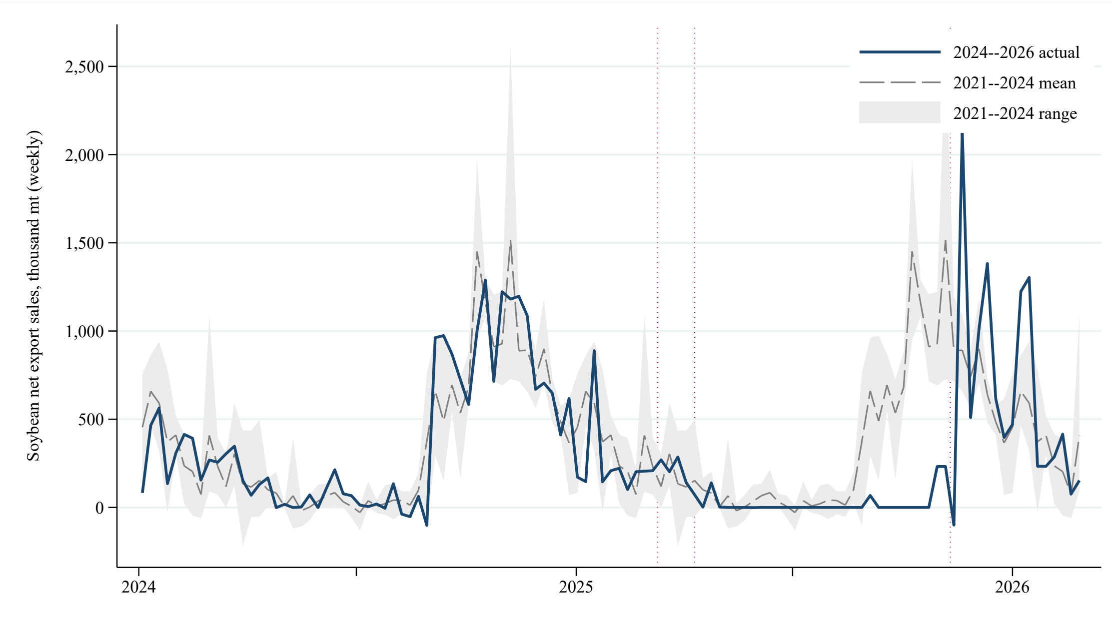

Figure 7. Soybean Export Sales and Marketing-Year Timing

Note: Navy line shows 2025 weekly U.S. soybean net export sales to China from USDA FAS Export Sales Reporting, smoothed with a four-week trailing moving average. Red dashed line shows early-2026 weekly sales. The grey band is the 2021–2024 weekly minimum-maximum range and the grey line is the 2021–2024 mean. Soybean sales are highly seasonal and concentrated around the U.S. marketing-year transition each September.

Soybeans require separate interpretation because weekly sales are highly seasonal and concentrated around the marketing-year transition each September. Old-crop contracts continue to clear in the first quarter of 2025, but new sales fall below the 2021–2024 minimum band starting in April and remain there through the new-crop contracting window in August and September. Soybean ESR sales cumulated from March 2025 onward run well below the 2021–2024 same-week cumulated mean, and the cumulative gap is not closed by the late-year rebound in weekly sales. The monthly trade-value series and the FGIS shipment series remain depressed over the same period, so the recovery in weekly ESR bookings does not translate into a recovery in either monthly export values or inspected shipments through the end of the data. The pattern is consistent with Chinese buyers shifting new-crop purchases to Brazil and Argentina, in line with the durable origin reallocation documented for the 2018/19 round (Dhoubhadel et al., 2023; Bown, 2021) and with the positive Brazil–China placebo coefficient in row (4) of **Table 4**. Together the three figures show that the bilateral destruction reflects a real-time collapse in new contracts and inspected shipments rather than a delay in customs reporting.

5.3 State-Level Exposure

Figure 8 maps each state's allocated exposure to the national U.S.–China destruction loss. We allocate each commodity's destruction loss to states in proportion to their share of U.S. production using 2024 USDA NASS production shares, and the state-allocated value is the sum across commodities of the state's production share multiplied by the commodity destruction loss. These allocations measure exposure to the national bilateral destruction loss through the state's production mix, not realized state income losses, since the latter additionally depend on within-state buyer mix, basis movements, and any state-level absorption channels we do not model. Production shares are plausibly exogenous to the 2025/26 retaliation because the state production mix was determined by the prior cropping cycle.

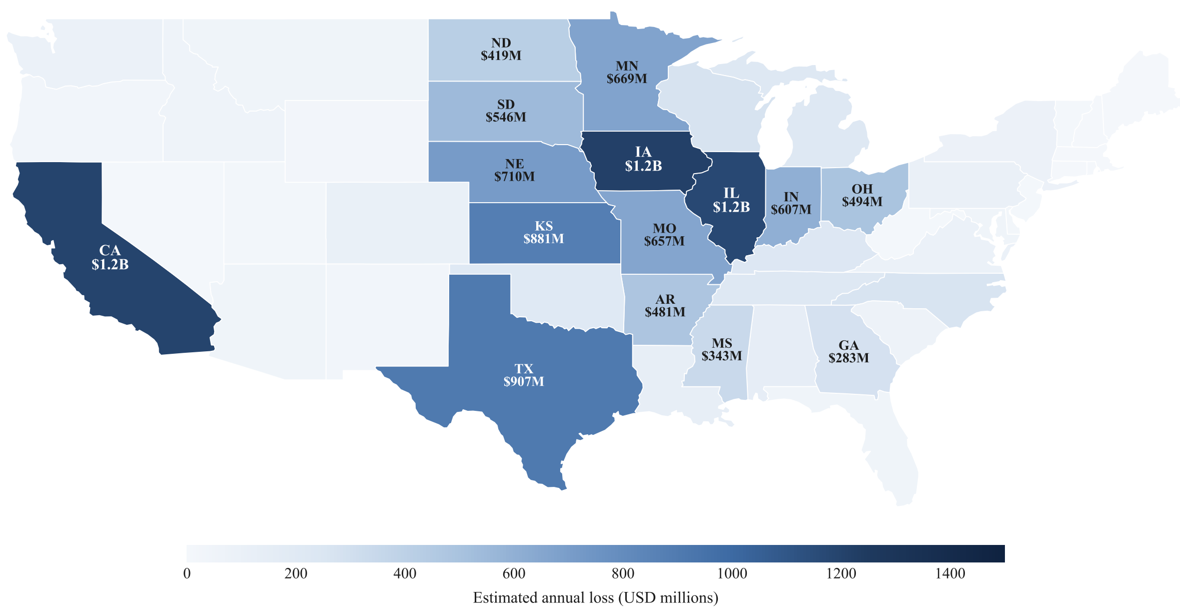

Figure 8. State-Level Exposure to Trade Destruction

Note: The map shows each state's allocated exposure to the national U.S. destruction loss to China, in USD millions. Each commodity's national loss is allocated to states in proportion to their share of U.S. production from USDA NASS (2024), then summed across commodities within state. The projection is Albers Equal-Area on the lower-48 contiguous states. Dollar labels are shown for the fifteen states with the largest allocated exposure.

We document that the allocated exposure concentrates in the Corn Belt, Great Plains, Texas, and California, mirroring the commodity concentration documented in Section 5.1. Iowa carries the largest allocated exposure at $1.2 billion, driven primarily by its soybean and corn production. California ($1.2 billion) and Illinois ($1.2 billion) follow, with California's exposure dominated by tree nuts and Illinois's by soybeans. Texas ($907 million) enters the top tier through cotton, wheat, and beef. Kansas, Nebraska, Minnesota, Missouri, Indiana, and South Dakota each carry between $0.5 and $0.9 billion in allocated exposure, primarily through corn, soybean, and beef production.

5.4 Benchmark Against the 2018/19 Retaliation

To benchmark the magnitude of the 2025/26 destruction effect, we re-estimate the identical PPML specification on a parallel exporter-reported data drawn from the 2015–2019 Global Trade Atlas data. Treatment timing is data-driven at the BICO-month level. The destruction dummy activates when each BICO is first hit by China's 2018 retaliatory tariffs and remains on through December 2019. The base year for the trade-loss calculation is 2017, the most recent pre-treatment calendar year before the 2018 escalation, which mirrors the 2024-base choice used for the 2025/26 round. The 2018/19 retaliation operated through Section 301 and Section 232 components, both of which were the tariff actions newly imposed during that earlier conflict.

Table 6. Aggregate Destruction Estimate, 2018/19 Benchmark

	(1)
	2018/19 Aggregate
Destruction (β)	-0.774 ***
	(0.210)
Bilateral × product × cal. month	Yes
Exporter × year FE	Yes
Importer × year FE	Yes
Product × year FE	Yes
Year × cal. month FE	Yes
Observations	1,181,122
Pseudo R^2	0.962
Implied %Δ trade	-53.9
2017 base ($M)	19,630
Annualized loss ($M)	10,579

Note: Structural gravity PPML estimate of the effect of China's 2018/19 retaliatory tariffs on U.S. agricultural exports to China, estimated on monthly exporter-reported trade flows from January 2015 through December 2019. The destruction dummy activates at the BICO-month level whenever the relevant retaliatory tariff was positive on the U.S.–China cell, with treatment timing data-driven by China's first and second retaliatory tariff lists. Standard errors are clustered at the importer × product × calendar month level and reported in parentheses. The 2017 base is total U.S. agricultural exports to China in calendar year 2017. Annualized loss equals the 2017 base multiplied by $(1-\exp(\hat{\beta}))$. Asterisks denote statistical significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We find that the 2025/26 aggregate destruction loss exceeds the 2018/19 loss by 41 percent. **Table 6** reports the aggregate PPML estimate for the 2018/19 round. The destruction coefficient is -0.774 (s.e. 0.210), which implies a 53.9 percent contraction in U.S. agricultural exports to China during the 2018/19 treatment window. Applied to the 2017 calendar-year baseline of $19.6 billion, the implied annualized loss is \$10.6 billion. The corresponding 2025/26 aggregate figure on the 2024 baseline of \$24.5 billion is \$14.9 billion, a difference of \$4.3 billion.

To test whether the anticipation effect is specific to the 2025/26 round or a generic feature of bilateral trade-war shocks, we benchmark the 2025/26 event-study path against a parallel event-study estimate for the 2018/19 round. **Figure 9** reports both sets of coefficients on a common scale, anchored at the first retaliatory tariff effective date in each round (July 2018 for Panel A, March 2025 for Panel B). The 2018/19 leads show a gradual decline from −19 percent at $t = -4$ (March 2018) to −43 percent at $t = -1$ (June 2018), consistent with the negotiation-period trade slowdown during the spring 2018 dispute. By contrast, the 2025/26 round displays a discrete anticipation jump at the January 2025 U.S. inauguration, from a statistically insignificant lead at $t = -4$ (November 2024 election) to a −61 percent contraction at $t = -2$ (January 2025). The anticipation effect is therefore specific to the 2025/26 round and reflects forward-looking adjustment by Chinese buyers to the incoming tariff environment.

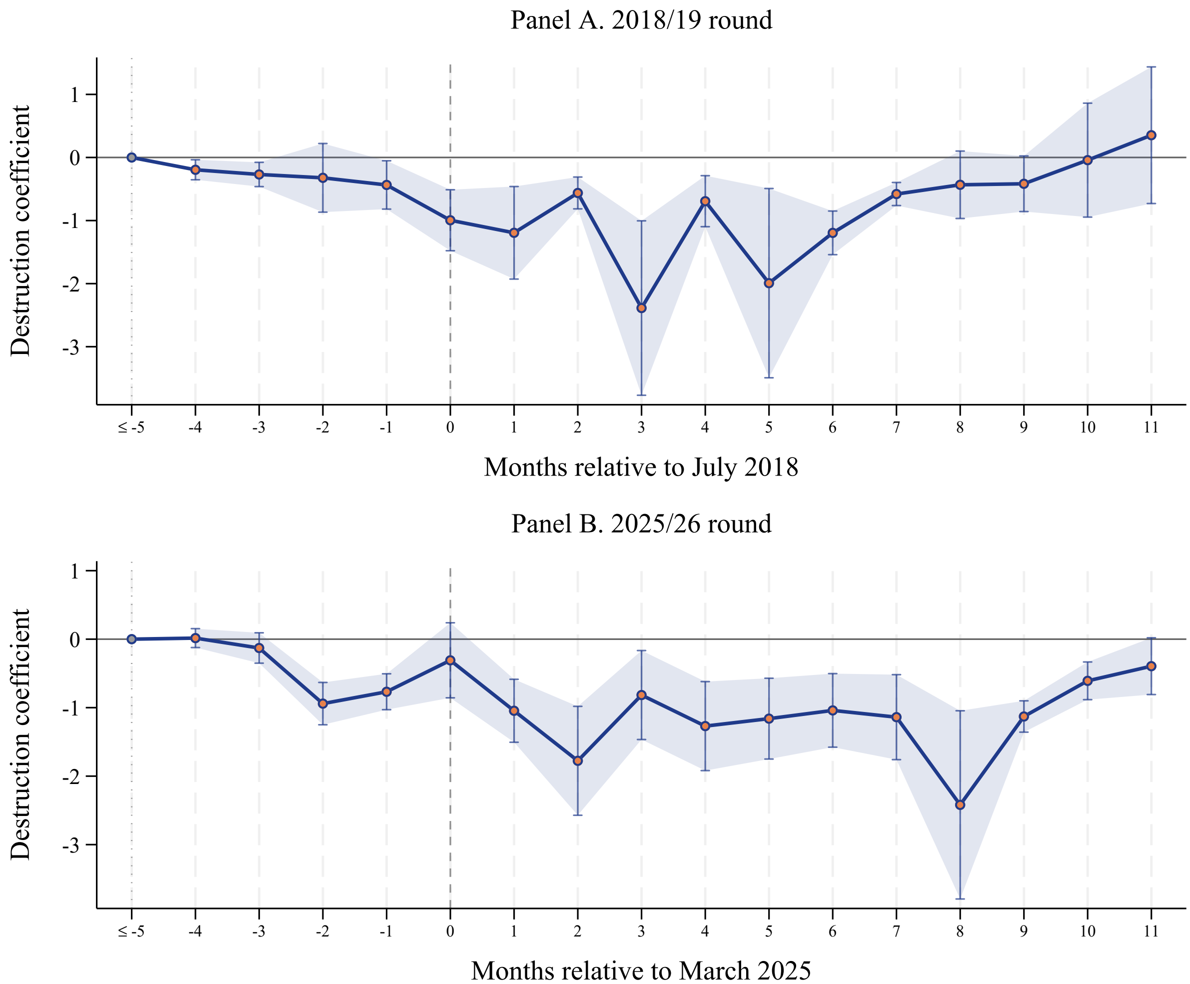

Figure 9. Event-Study Comparison: 2018/19 versus 2025/26

Note: Panel A reports event-study coefficients for the 2018/19 China retaliation with anchor $t = 0$ at July 2018 (first Chinese retaliatory tariff list effective). Panel B reports event-study coefficients for the 2025/26 round with anchor $t = 0$ at March 2025 (Fentanyl tariff effective). Both panels use the same destruction-dummy specification with bilateral-product-calendar-month, exporter-year, importer-year, product-year, and year-month fixed effects, estimated on parallel exporter-reported data (2015–2019 for Panel A, 2021–2026 for Panel B). Pre-period reference is $t \leq -5$ in both cases. For direct comparison, both panels display the same event-time window $t = -5$ through $t = +11$, although the full 2018/19 estimation extends to December 2019 ($t = +17$). Shaded band is the 95 percent confidence interval. Y-axes are on a common scale.

We attribute the larger 2025/26 loss to two features of the policy environment. The 2025/26 retaliation begins from a pre-existing tariff base that already includes the Section 301 and Section 232 actions from 2018/19, so the new Fentanyl and Reciprocal layers stack on top of that base.

The product coverage is also broader, since the 2018/19 list was selective and excluded several commodity categories that the 2025/26 Reciprocal phase now covers at the flat 125 percent rate.

The 2018/19 round was followed by the January 2020 Phase One agreement, under which Chinese commitments to purchase U.S. agricultural products were associated with a partial recovery of bilateral trade through 2020 and 2021 (Bown, 2021). The post-2018/19 recovery trajectory provides a relevant historical reference for assessing post-Truce dynamics in the 2025/26 round.

Our \$10.6 billion 2018/19 estimate sits just below the \$13.5 to \$18.7 billion range reported by Grant et al. (2021) using the same 2017 baseline. The difference reflects both country coverage and time-period coverage. Our specification retains the top thirty exporters per importer, whereas Grant et al. retain 81 reporting countries. In addition, our estimate covers the 2018/19 retaliation period, while their estimates span a somewhat broader retaliation window. Despite these differences, the proximity of our estimate to the published benchmark provides a useful credibility anchor for the 2025/26 estimate produced using the same specification.

6. Conclusion

We estimate the destruction effect of China's 2025/26 retaliatory tariffs on U.S. agricultural exports using a gravity PPML model with bilateral-product-calendar-month, exporter-year, importer-year, product-year, and year-month fixed effects. The aggregate destruction coefficient implies a 61.1 percent contraction in U.S. agricultural exports to China during the post-treatment window from March 2025 through February 2026, with implied annualized destruction losses of \$14.9 billion on the 2024 baseline of \$24.5 billion. The phase decomposition recovers a 38.6 percent contraction under the Fentanyl-only tariff, a 74.4 percent trough during the Reciprocal escalation, and a 48.7 percent contraction that persists into the first three post-Truce months. The parallel 2018/19 estimate yields an aggregate annualized loss of \$10.6 billion on the 2017 baseline, so the 2025/26 aggregate figure of \$14.9 billion exceeds it by 41 percent. The paper delivers the first ex-post gravity quantification of the 2025/26 round, the first measurement of how trade recovers after a partial tariff unwinding (the November 2025 Truce), and a directly comparable benchmark against the 2018/19 round on a parallel data.

The estimated magnitudes, the geographic incidence, and the asymmetry between the speed of contraction and the speed of recovery point to three implications for the bilateral trade-policy literature.

First, the bilateral export contraction is an upper bound on producer welfare losses to the U.S. agricultural sector. The $14.9 billion bilateral loss overstates net producer harm because the positive U.S.-to-non-China placebo coefficient in row (6) of **Table 4** shows that U.S. exporters recover part of the lost China trade through sales to other countries. The commodity and state-level concentration documented in Section 5 also indicates that the gross shortfall is unevenly distributed across producing regions, with five commodities accounting for 80 percent of the dollar loss and the Corn Belt, Great Plains, Texas, Kansas, and California carrying most of the production-share exposure.

Second, recovery from retaliation is gradual relative to the speed of contraction. The 48.7 percent Truce-phase destruction effect documents that a 93 percent reduction in the combined retaliatory rate undoes only one-third of the bilateral contraction in the first three post-Truce months. The asymmetry is consistent with the durable competitor share gains in Bown (2021) and Dhoubhadel et al. (2023) for the 2018/19 round, with the re-entry frictions implied by the fixed-cost framework of Chaney (2008), and with the marketing-year contracting cycle that was largely complete by the November 2025 Truce. Trade contracts in a single month, and recovery accumulates over a longer horizon.

Third, weekly booking and shipment data provide an early view of bilateral trade adjustment. The USDA Export Sales Reporting and Federal Grain Inspection Service series identified the bilateral contraction in real time, with the ESR cancellations in late March 2025 and the matched FGIS shipment decline preceding the corresponding monthly customs figures by several weeks. High-frequency indicators of this kind can extend the gravity framework to a sub-monthly horizon for future trade-policy episodes.

The May 14–15, 2026 U.S.–China summit in Beijing reaffirmed the November framework without adding new tariff cuts or upgraded purchase targets. The trajectory of recovery will depend on how the bilateral relationship evolves through the December 31, 2026 expiration of the Reciprocal-tariff suspension and beyond, and the historical precedent of the post-Phase One 2018/19 trajectory suggests that competitor share gains may persist even after a tariff agreement.

Three caveats temper the interpretation. The data captures only the first 12 months of the 2025/26 retaliation and the first three months of the post-November Truce, so long-run adjustment may differ substantially from these short-run estimates. The tariff environment remained fluid during the data period, and subsequent policy reversals could alter the estimated effects. The partial-equilibrium gravity framework does not capture general-equilibrium effects such as world commodity price changes, exchange-rate movements, or third-country tariff responses by Brazil, Argentina, or other competing exporters.

Two extensions of the current framework would sharpen the welfare interpretation. A Fajgelbaum-style specification with trade-diversion and deflection dummies would identify how much of the bilateral contraction is absorbed by competitor exporters into the Chinese market and by U.S. redirection to non-Chinese buyers, separating the gross bilateral loss from the net global producer loss. Extending the data past February 2026 would measure the speed of recovery once the marketing-year contracting cycle resets and the Reciprocal-tariff suspension reaches its expiration, allowing a direct test of whether the post-Truce contraction narrows on the timetable implied by the 2018/19 Phase One trajectory.

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Appendix

Import-Reported Mirror Data

We replicate the aggregate destruction estimate on a parallel import-reported dataset in which each bilateral flow is measured by the importing country's own customs reporting. The Global Trade Atlas import-reported data covers monthly bilateral imports across 29 reporting countries for January 2021 through February 2026, with each country reporting its imports from all partner exporters by BICO commodity. For the U.S.–China bilateral flow specifically, this provides Chinese customs measurement of imports from the United States, which we substitute for the U.S. Bureau of the Census export measurement used in the body specification.

Mirror discrepancies between the two reporting sides arise from CIF-versus-FOB valuation gaps, transit lags between shipment and customs clearance, and tariff-evasion misreporting that may systematically bias the importing-side measurement during periods of high border duties. We re-estimate the aggregate destruction specification using the same fixed-effects structure (bilateral-product-calendar-month, exporter-year, importer-year, product-year, and year-month) and the same importer-product-calendar-month clustering as the body specification. The estimation panel contains 1,418,387 bilateral-product-month observations, larger than the export-reported panel of 1,130,925 because importer-side coverage extends to more partner exporters per importing country.

Table A.1 reports the side-by-side comparison. We find that the import-reported destruction coefficient is -0.802, implying a 55.2 percent contraction in U.S. exports to China as measured at Chinese customs. By contrast, the export-reported body estimate of -0.943 implies a 61.1 percent contraction at U.S. customs. The two estimates differ by approximately 6 percentage points, statistically indistinguishable at conventional significance levels. The aggregate destruction effect is therefore not an artifact of how the bilateral flow is recorded at one side of the border.

Appendix Table A.1: Mirror-Data Robustness: Export-Reported versus Import-Reported

	Export-reported (body)	Import-reported (mirror)
Destruction β	-0.943***	-0.802***
	(0.179)	(0.147)
Implied %Δ trade	-61.1	-55.2
Observations	1,130,925	1,418,387
Reporting side	U.S. customs	Chinese customs
Bilateral flow	U.S. $\rightarrow$ China	China $\leftarrow$ U.S.

Note: Both columns estimate the aggregate destruction coefficient from the same PPML gravity specification with bilateral-product-calendar-month, exporter-year, importer-year, product-year, and year-month fixed effects. Standard errors are clustered at the importer-product-calendar-month level and reported in parentheses. The export-reported column reproduces column (1) of **Table 3** from U.S. Bureau of the Census export data aggregated via the USDA BICO concordance. The import-reported column re-estimates the same specification on China's reported imports from the United States, with country-of-origin and product reporting determined at Chinese customs. A standard t-test on the difference between the two coefficients yields $t = 0.61$, statistically indistinguishable at conventional levels. Asterisks denote $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Continuous Destruction Treatment

Table A.2 replaces the single binary destruction dummy with a continuous treatment that interacts the U.S.–China bilateral flow with $\ln(1+\tau_{kt}^{\mathrm{CN}})$. The continuous coefficient is statistically significant and negative. The implied trade contractions evaluated at the three observed tariff levels (10, 12.8, and 125 percent) span the range that the phase decomposition in **Table 3** columns (2)–(4) recovers under binary treatment, which indicates that the destruction effect is not an artifact of the constant-treatment-intensity assumption that the binary specification imposes.

Appendix Table A.2: Continuous Destruction Treatment

	U.S. to China
β_{cont}	-3.552***
	(1.309)
Implied %Δ trade at representative tariff rates	
at 10% (Fentanyl / Truce rate)	-28.7
at 12.8% (Reciprocal-phase average)	-34.8
at 125% (Reciprocal-phase peak)	-94.4
Bilateral × product × cal. month	Yes
Exporter × year FE	Yes
Importer × year FE	Yes
Product × year FE	Yes
Year × cal. month FE	Yes
Observations	1,130,925
Pseudo R^2	0.960

Note: Structural gravity PPML estimate with continuous destruction treatment $\beta_{\text{cont}} \cdot \mathbf{1}\{\text{US}\} \cdot \mathbf{1}\{\text{CN}\} \cdot \ln(1 + \tau_{kt}^{\text{CN}})$ in place of the single binary dummy used in Table 3. The implied %Δ trade row is computed as $(\exp(\beta_{\text{cont}} \cdot \ln(1 + \tau)) - 1) \times 100$ evaluated at the three tariff rates observed during the sample window. Standard errors clustered at the importer × product × calendar month level reported in parentheses. Asterisks denote statistical significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Alternative Standard-Error Clustering

Table A.3 reports the aggregate destruction coefficient under three alternative cluster definitions. Column (1) reproduces the baseline importer-product-calendar-month clustering used throughout the body of the paper. Column (2) two-way clusters at the importer-year and product-year levels, which addresses the concern that identification on the single U.S.–China bilateral flow may concentrate within-cluster correlation. Column (3) clusters at the bilateral pair level. The destruction coefficient remains statistically significant at the one-percent level under all three cluster definitions.

Appendix Table A.3: Robustness: Alternative Standard-Error Clustering

	Cluster level	$\hat{\beta}_{\text{dest}}$	Std. error
(1) Baseline	Importer × product × cal. month	-0.943***	(0.179)
(2) Two-way	Importer × year + Product × year	-0.943***	(0.159)
(3) Pair	Exporter × importer	-0.943***	(0.044)
(4) Pair-product	Exporter × importer × product	-0.943***	(0.161)
(5) Importer-only	Importer	-0.943***	(0.037)
Observations		1,130,925	
Pseudo R^2		0.961	

Note: Structural gravity PPML estimate of the aggregate U.S. to China destruction coefficient under five alternative standard-error clusters. Row (1) replicates Table 3 column (1). Row (2) two-way clusters on importer-year and product-year. Row (3) clusters on the exporter-importer pair. Row (4) clusters on the exporter-importer-product panel unit, the most restrictive single-way cluster aligned with the gravity panel structure. Row (5) clusters on the importer alone, a conservative stress test given the single treated importer. The point estimate is identical across rows. Only the standard error varies. Fixed effects are the same as in Table 3. Asterisks denote statistical significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.