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Soybean Futures Shocks and Vertical Price Transmission: Evidence from the 2018–2019 U.S.–China Trade War

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Abstract

The 2018–2019 U.S.–China trade war disrupted soybean export markets, but whether those disruptions propagated to downstream poultry prices remains unclear. This study traces price transmission along the soybean-to-chicken supply chain using weekly futures-price innovations and regime-specific local projections. Upstream price transmission lost persistence during the retaliatory-tariff period, with sustained propagation over subsequent weeks collapsing especially for soybean meal prices, and recovered during the Phase One period. Wholesale and retail poultry prices show little evidence of systematic pass-through. The results suggest that trade-policy disruptions to price transmission were concentrated upstream, with U.S. chicken consumers largely insulated from the shock.

Keywords: price transmission, local projections, futures markets, trade war, soybeans, broiler markets

JEL Codes: Q11, Q13, Q17, F13, C32

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Introduction

When a trade policy shock hits an upstream commodity market, a fundamental question for consumers and policymakers is whether the disruption remains contained at the farm level or propagates through the entire supply chain to retail food prices. The answer determines who bears the welfare cost of the policy and shapes the distributional implications of agricultural trade disputes.

Agricultural commodity markets are acutely exposed to trade policy shocks, and price signals must travel through multiple intermediaries before reaching consumers. The degree and speed of this vertical price transmission depend on market structure, the nature of contracting arrangements, and the role of futures markets as price-discovery mechanisms (Meyer and von Cramon-Taubadel, 2004; Garbade and Silber, 1983; Wohlgenant, 2001). When the transmission channel is active, disruptions to upstream commodity prices can propagate through the supply chain and affect consumer welfare. When institutional factors insulate downstream stages, price adjustments may remain concentrated among upstream producers and processors rather than reaching food consumers. Establishing where in the supply chain price signals weaken or break is therefore central to evaluating the incidence of trade policy.

The 2018–2019 US–China trade war provides a rare opportunity to trace this propagation along a well-defined supply chain. On July 6, 2018, China imposed a 25% retaliatory tariff on US soybeans, effectively closing the world's largest bilateral soybean trade route. The United States had exported roughly 30 million metric tons of soybeans to China annually in the years preceding the dispute, representing approximately 60% of total US soybean exports (Carter and Steinbach, 2020). The abrupt removal of this demand reduced CBOT soybean futures prices sharply and widened the interior cash basis. Because soybeans are the primary protein feed ingredient for US broilers, the shock had the potential to propagate through soybean meal processing, wholesale broiler markets, and ultimately to the retail chicken prices paid by consumers. Chicken is the most consumed protein in the United States, with per-capita consumption exceeding 100 pounds per year, and feed costs constitute roughly two-thirds of broiler production costs (MacDonald, 2008), so the stake for downstream transmission was substantial.

A growing body of literature examines tariff incidence using scanner data and price indices. Amiti et al. (2019), Fajgelbaum et al. (2020), and Cavallo et al. (2021) find that the 2018 US tariffs on Chinese imports were largely passed through to US consumer prices for directly targeted goods. Agriculture-specific studies have quantified income and trade-flow losses attributable to the soybean tariffs (Carter and Steinbach, 2020; Adjemian et al., 2021), but these papers focus on aggregate market outcomes rather than the stage-by-stage propagation of price shocks through a domestic processing and distribution chain that is only indirectly affected by the tariff. A separate strand of research on price transmission in agricultural supply chains establishes that vertical transmission is often incomplete and asymmetric, particularly at downstream retail stages where retail chains exercise market power and promotional strategies shape observed prices (Meyer and von Cramon-Taubadel, 2004; Goodwin and Holt, 1999; Azzam, 1999; Boyd and Brorsen, 1988; Wohlgenant, 2001; Sexton, 2013). Despite these literature, evidence on how a sudden bilateral trade policy shock alters the degree and speed of vertical price transmission along a specific supply chain remains limited.

This paper fills that gap by tracing the soybean-to-chicken price transmission chain stage by stage across three policy regimes: the Baseline period of normal US–China trade relations, the China Tariff period following tariff imposition in July 2018, and the Phase One period following the December 2019 trade agreement. The analysis constructs a weekly soybean futures innovation by residualizing end-of-week CBOT futures returns on contemporaneous corn and soybean oil futures changes, the US dollar index, VIX, WASDE release indicators, and an autoregressive lag. Raw futures returns contain predictable components driven by broad commodity co-movement, financial conditions, and scheduled information releases that independently affect prices throughout the supply chain; removing these leaves a residual that reflects unexpected soybean-specific price news rather than common market movements. This innovation series then enters regime-interacted local projections (Jordà, 2005; Ramey and Zubairy, 2018; Plagborg-Møller and Wolf, 2021) that estimate cumulative impulse responses at each supply chain stage and horizon, with inference that accounts for the moving-average overlap inherent in multi-horizon regression (Newey and West, 1987; Montiel Olea and Plagborg-Møller, 2021).

The analysis yields three main findings. First, the China Tariff period substantially attenuated futures-to-soybean-meal price transmission at medium horizons; soybean cash transmission also weakened, though with less statistical precision. For soybean meal, the contemporaneous response within the same week remained positive, indicating that market participants continued to observe CBOT signals, but this initial co-movement did not persist: by four weeks ahead, cumulative SBM transmission weakened sharply relative to the larger and more persistent Baseline responses. Wald tests confirm that the regime difference is statistically significant at horizons $h = 4$, 13, and 26. Second, transmission recovered during the Phase One period, consistent with renewed export-market integration. Soybean cash and soybean meal transmission coefficients returned to Baseline-like patterns, providing evidence that transmission attenuation associated with export-channel closure can reverse within months once bilateral purchasing resumes. Third, downstream wholesale and retail chicken prices show no stable or economically coherent pass-through pattern across all three regimes, consistent with the shock-absorbing role of vertical integration in US broiler production and with the institutional structure of retail poultry pricing.

These findings contribute to three strands of literature. The price transmission literature (Meyer and von Cramon-Taubadel, 2004; Goodwin and Holt, 1999; Sexton, 2013) has studied asymmetric and incomplete vertical transmission, focusing on market structure, market power, and the speed of price adjustment as determinants of pass-through. This paper shows that a bilateral trade policy shock can disrupt the persistence of upstream price transmission: the contemporaneous co-movement between futures and cash prices remains intact, but the sustained propagation that normally anchors cash prices to futures-implied levels over subsequent weeks is severed. This disruption reverses once the policy shock is resolved, a pattern that market structure and adjustment costs alone do not predict. The trade policy incidence literature (Amiti et al., 2019; Fajgelbaum et al., 2020; Cavallo et al., 2021) has established pass-through results for directly targeted goods; this paper extends this work to an indirectly affected supply chain, showing that the welfare incidence of the tariff was concentrated upstream rather than shared with chicken consumers. The agriculture and trade policy literature (Carter and Steinbach, 2020; Adjemian et al., 2021; Janzen, 2023) has estimated aggregate income and production effects; this paper complements that work by establishing the price-transmission dimension of the disruption and showing that no stable downstream transmission to US chicken consumers is detectable, consistent with price incidence concentrated upstream.

The remainder of this paper is organized as follows. The Institutional Background section describes US soybean and broiler markets. The Data section covers sample construction and variable definitions. The Empirical Framework section presents the shock-construction and local-projection methodology. The Results section reports transmission estimates and robustness checks. The Discussion section interprets the economic mechanism, and the Conclusion follows.

Institutional Background

US Soybean Markets and the CBOT Futures Complex

CBOT soybean futures serve as the global benchmark price for soybeans, and Central Illinois country-elevator cash bids are the standard interior reference used in this paper. Under normal export-market conditions, the local cash price and the nearby futures price move closely together: physical deliverability against the futures contract and competitive export bidding create an arbitrage link that anchors cash prices to the futures-implied level. The local cash price minus the nearby futures price, known as the basis, reflects transportation costs, local supply-demand conditions, and carrying costs, but remains mean-reverting as long as the export channel is active.

When Chinese retaliatory tariffs removed the primary US export destination in July 2018, this arbitrage link weakened sharply. Deprived of export demand, interior elevators had fewer competitive bidders, and the basis collapsed. The basis collapse of 2018–2019 is the primary price-level channel through which the trade war affected US soybean producers (Carter and Steinbach, 2020; Adjemian et al., 2013).

Soybean-to-Chicken Supply Chain

This paper studies how price signals originating in soybean futures markets propagate through five stages of the supply chain: soybean futures, soybean cash, soybean meal cash, wholesale broiler, and retail chicken.

Soybeans are a fungible commodity crush input: approximately 47.5 pounds of soybean meal and 11 pounds of soybean oil are extracted from each 60-pound bushel. Soybean meal (SBM), the high-protein residue after oil extraction, is the primary variable cost in US broiler feed, typically comprising 25–30% of the diet by weight and representing 35–40% of total feed cost. The crush margin, defined as the difference between the value of SBM and soybean oil produced and the cost of the soybean input, is the primary determinant of crush plant utilization.

US broiler production is highly vertically integrated: approximately 95% of commercial broilers are produced under contract arrangements between independent growers and large integrators (MacDonald, 2008). Integrators own the breeder flocks, hatcheries, feed mills, and processing plants, while contract growers supply land, labor, and housing capital. Integrators supply the feed and therefore bear direct exposure to changes in SBM and corn prices. Feed cost decisions are typically made weeks in advance of the production cycle, as integrators lock in input purchases before chicks are placed in growout houses.

Retail chicken prices are set through markups over wholesale input costs by retail chains. Unlike fresh produce, chicken retailing involves significant private-label presence, advertising, and promotional pricing strategies that introduce idiosyncratic variation into the relationship between wholesale and retail prices (Wohlgenant, 2001). Retail chains frequently use chicken as a promotional item across product cuts and store regions, which generates high-frequency price variation that is largely unrelated to upstream input costs. The retail price series used in this paper, from the USDA AMS Weekly Retail Chicken reports, captures prices from stores actively running a promotion on the product in a given week, which means week-to-week changes exhibit strong negative first-order autocorrelation consistent with promotional cycling.[1]

[1]The LP specifications control for four lags of price changes to partially absorb this promotional cycle pattern.

Timeline of the 2018–2019 Trade War

The 2018–2019 US–China trade dispute escalated through a sequence of policy actions over roughly two years. Tensions began in March 2018 when President Trump signed the Section 301 Presidential Memorandum directing the US Trade Representative (USTR) to impose tariffs on $50 billion of Chinese goods, prompting China to announce a proposed 25% tariff on 106 US products including soybeans in April. The retaliatory tariff took effect on July 6, 2018, marking the start of the China Tariff regime in this paper. A temporary truce at the G20 summit in December 2018 paused additional escalation but provided no soybean exemption. Resolution came at the end of 2019, when the US and China announced a Phase One agreement in principle on December 13, 2019, with the agreement signed on January 15, 2020. China opened a firm-specific tariff exclusion process for US soybeans beginning March 2, 2020, which marks the start of the Phase One regime. A complete event chronology with precise dates is provided in Table 1.

Data

Weekly Price Panel

The main analysis uses a weekly price panel spanning January 2015 through January 2025, covering 499 in-sample observations across three estimation regimes (Baseline 167 weeks, China Tariff 75 weeks, Phase One 257 weeks). All price series are aligned to a consistent end-of-week closing convention, with a Wednesday closing price used as a fallback for holiday weeks. All series are analyzed in log levels and log-differences. Appendix A provides complete data construction details.

Weekly cash prices for US No. 1 Yellow soybeans and 48% protein soybean meal (SBM) at the Central Illinois hub are obtained from the USDA Agricultural Marketing Service (AMS) Grain and Feed Weekly Summary. The Central Illinois hub aggregates deliveries from the major US soybean-producing states and is directly linked to CBOT futures contract delivery. Both series are available for more than 97% of sample weeks.

CBOT continuous front-month futures prices for soybeans, soybean meal, soybean oil, and corn are from Yahoo Finance (Yahoo Finance, 2024). Futures prices are measured in standard CBOT contract units and serve both as the primary shock variable (soybean futures) and as contemporaneous controls in the shock regression and local projections.

National composite broiler wholesale prices in cents per pound, production-weighted, are from the USDA AMS National Composite Broiler Price Report, which aggregates prices across major producing regions. Retail chicken prices are from the USDA AMS Weekly Retail Chicken reports for two products: whole bagged fryers in dollars per pound and boneless-skinless chicken breast in regular packs. National weekly retail prices are computed as store-count-weighted averages to control for geographic variation in store coverage. Wholesale and retail coverage exceeds 96% of sample weeks.

Weekly Futures Innovation Series

The shock construction requires isolating unexpected news to global soybean supply and demand from the weekly futures return. I assemble a weekly panel spanning January 2015 through January 2026 covering CBOT soybeans, corn, soybean meal, and soybean oil; the ICE US Dollar Index; and the CBOE VIX, all from Yahoo Finance (Yahoo Finance, 2024).

The shock regression controls are chosen to remove predictable co-movement from the weekly futures return. Corn and soybean oil futures enter because soybeans, corn, and soybean oil form a triangular production system in which shared agricultural supply conditions drive correlated price movements; corn also competes with soybeans for planted acreage, so crop-specific supply news is partially reflected in both markets. The US dollar index is included because dollar appreciation systematically depresses dollar-denominated commodity prices (Akram, 2009). VIX enters to capture the financialization channel through which changes in global risk appetite affect commodity futures markets (Tang and Xiong, 2012). A binary indicator for WASDE release weeks absorbs the price impact of the most market-moving scheduled supply-and-demand announcement in grain markets (Adjemian, 2012; U.S. Department of Agriculture, World Agricultural Outlook

Board, 2024), and a contract-roll indicator removes mechanical effects from the continuous futures series construction (Working, 1949; CME Group, 2024). Model lag order is selected by AIC over $p \in \{1, \ldots, 5\}$. Estimated coefficients are reported in Table A3 and Table A2 reports all series with coverage statistics. Full construction details are in Appendix A.

Sample Periods and Regime Classification

The main sample is partitioned into three estimation regimes separated by two excluded transition windows. The Baseline covers 167 weeks from January 8, 2015 to March 15, 2018, representing normal US–China trade relations with no soybean-specific tariffs. The first transition window, excluded from estimation, runs from March 22, 2018 to July 11, 2018, after the Section 301 signing but before the retaliatory tariff took effect. The China Tariff regime covers 75 weeks from July 12, 2018 to December 12, 2019, with China's 25% retaliatory tariff on US soybeans in force. The second transition window, also excluded, runs from December 19, 2019 to February 27, 2020. The Phase One regime covers 257 weeks from March 5, 2020 to January 30, 2025, with the Phase One agreement in force and China's US soybean purchases recovering substantially. Observations from February 2025 onward are excluded from all main regressions. The main estimation sample totals $N = 499$ weeks. Table 1 provides the complete event chronology.

Descriptive Statistics

Figure 1 plots all five price series over the full sample with regime windows shaded, and Table A4 reports means and standard deviations by regime. CBOT soybean futures declined from a Baseline mean of \$9.72 per bushel to \$8.80 per bushel during the China Tariffs period, a drop of approximately \$0.92 per bushel reflecting the loss of China as the dominant US export destination. Soybean cash prices followed a similar trajectory, confirming that the tariff shock propagated from the export market into interior cash markets (Carter and Steinbach, 2020). SBM cash prices also declined during the tariff period, consistent with lower soybean input costs reducing the crush margin.

Wholesale whole-bird and retail chicken prices were both lower on average during the China

Tariffs period than in the Baseline. Retail boneless-skinless breast prices averaged \$2.42 per pound during the tariff period compared with \$2.84 per pound in the Baseline. Upstream futures and cash series exhibit higher annualized volatility during the China Tariff period relative to the Baseline, while broiler and retail prices show markedly lower and more stable volatility across regimes (Wohlgenant, 2001; Sexton, 2013).

Appendix Figure A1 plots the weekly futures innovation series over the full sample period. Pairwise correlations among weekly log-returns (Appendix Figure A2) show the futures-to-cash correlation is high at 0.71, while the cash-to-SBM correlation is lower at 0.38, and the SBM-to-wholesale correlation is near zero at 0.06.

Empirical Framework

Shock Construction

I construct the weekly futures innovation e_w^F as the residual of a first-stage regression that removes predictable commodity co-movement, financial conditions, and scheduled information releases from the weekly futures return:

$$\Delta f_w = \alpha + \sum_{i=1}^{p} \varphi_i \Delta f_{w-i} + \gamma' \mathbf{Z}_w + e_w^F, \tag{1}$$

where $f_w = \ln(\text{SoyFut}_w)$ is the log CBOT soybean continuous front-month futures closing price, Δf_w is its weekly first difference, and $\mathbf{Z}_w$ is the vector of contemporaneous control variables:

$$\mathbf{Z}_w = \big(\Delta \ln \text{Corn\_Fut}_w,\ \Delta \ln \text{SoyOil\_Fut}_w,\ \Delta \ln \text{USD\_DXY}_w,\ \Delta \text{VIX}_w,\ \text{WASDE\_week}_w,\ \text{roll\_week}_w\big), \tag{2}$$

where WASDE_week_w is a binary indicator equal to one if any Monday through Thursday of week w contains a WASDE release, and roll_week_w flags contract-roll weeks. The lag order p is selected by AIC over $p \in \{1,\ldots,5\}$; the information criterion selects $p = 1$.[2]

Regime-Interacted Local Projection

For each downstream price $Y \in \{\text{SoyCash}, \text{SBM}, \text{Wholesale}, \text{RetailBreast}, \text{RetailFryer}\}$ and each horizon $h \in \{0,1,\ldots,26\}$ weeks, I estimate:

$$\begin{aligned} Y_w^{(h)} &\equiv \ln y_{w+h} - \ln y_{w-1} \\ &= \sum_{r \in \mathscr{R}} \beta_r^h (D_{r,w} \cdot \text{shock}_{F,w}) \\ &\quad + \sum_{r \in \mathscr{R}} \alpha_r D_{r,w} + \delta' \mathbf{X}_w + u_{w+h}^{(h)}, \end{aligned} \tag{3}$$

where $\mathscr{R} = \{\text{Pre}, \text{War}, \text{Post}\}$, $D_{r,w}$ is an indicator for regime r in week w, $u_{w+h}^{(h)}$ is the forecast error realized at $w+h$, and $\mathbf{X}_w$ collects the control lags. No global constant is included; the three regime dummies serve as regime-specific intercepts. The horizon starts at $h = 0$, capturing the within-week contemporaneous response; $h = 1,\ldots,26$ capture cumulative multi-week transmission.

The control vector $\mathbf{X}_w$ collects four lags each of $\text{shock}_{F,w}$, $\Delta \ln y_w$, $\Delta \ln \text{CornFut}_w$, and $\Delta \ln \text{SoyOilFut}_w$. The lag order of four, approximately one calendar month, reflects the natural memory length of agricultural pricing decisions, as grain storage choices, processing schedules, and wholesale contracts typically operate on monthly cycles. Following Jordà (2005) and Jordà and Taylor (2016), the lag order for LP control variables is chosen to be at least as large as the AIC-selected lag order of the shock regression. Robustness to lag orders $L \in \{2,4,6\}$ is reported in Section 5.2.

Standard errors are Newey-West HAC (Newey and West, 1987) with bandwidth $\ell = \max(h,4) + 1$, which accounts for the $(h+1)$-period moving-average overlap induced by the cumulative left-hand-side construction and residual autocorrelation in the error $u_{w+h}^{(h)}$.

[2]The estimated model achieves $R^2 = 0.485$ on 585 weekly observations. Estimated coefficients for all regressors are reported in Table A3.

Interpretation of Transmission Coefficients

The regime-interacted LP estimates regime-specific transmission of futures price signals. The regime dummies $D_{r,w}$ partition the sample into distinct market environments; they do not enter as a treatment variable. The source of identifying variation is the within-regime time-series variation in $\text{shock}_{F,w}$, and the coefficients $\hat{\beta}_r^h$ measure how futures price innovations propagate to downstream prices conditional on being in each regime.

The comparison across $\hat{\beta}_r^h$ speaks to how the market environment altered the transmission mechanism: whether a given futures price innovation propagated differently to downstream prices depending on which policy regime was in place. The residual $\text{shock}_{F,w}$ is mean-zero by construction and distributed around zero throughout the sample, including at regime boundaries (Appendix Figure A1), confirming that the shock series does not carry systematic directional information about the policy change itself. As a robustness check, I re-estimate the LP after standardizing $\text{shock}_{F,w}$ by its within-regime sample standard deviation, to address the possibility that higher tariff-period return volatility confounds the transmission estimates.

The key inferential object is the estimated IRF profile $\{\hat{\beta}_r^h\}_{h=0}^{26}$ for each regime r. The analysis focuses on the sign, magnitude, persistence, and cross-regime differences of the estimated IRFs. A t-test against $H_0 : \beta_r^h = 0$ identifies whether any futures shock propagation is statistically detectable within regime r at horizon h, using Newey-West HAC standard errors at the 90% level. Cross-regime differences are assessed by Wald tests for $H_0 : \beta_r^h = \beta_s^h$.

Results

Futures Shock Transmission by Regime

Table 2 reports LP transmission coefficients $\hat{\beta}_r^h$ at four horizons ($h \in \{4, 8, 13, 26\}$ weeks) for five supply-chain stages. Figure 2 displays the full IRF curves with 90% Newey-West HAC confidence bands for all outcomes and regimes.

During the Baseline period (2015–2018), futures innovations transmit significantly to soybean cash prices at horizons of zero through twelve weeks. The IRF is positive and persistent under normal conditions, indicating that futures news is rapidly incorporated into local cash markets. Beyond horizon twelve, the Baseline coefficient declines as new information accumulates and dilutes the contribution of the original shock, which is expected in weekly LP and reflects the arrival of subsequent crop reports, export demand signals, and storage-related information that progressively dominate the price level.

During the China Tariff period (2018–2019), the transmission pattern for soybean cash prices shows some weakening, though the evidence is imprecise given the 75-week sample. Tariff-period coefficients fall below their Baseline counterparts at shorter horizons but the differences are not statistically significant at conventional levels (Panel A). Wald tests for $H_0 : \beta^h_{\text{pre}} = \beta^h_{\text{war}}$ yield $p > 0.25$ at all four horizons, reflecting the limited statistical power available in the 75-week tariff window. The point-estimate pattern, with a strong contemporaneous response declining more steeply than in the Baseline, is consistent with the attenuation mechanism but should be interpreted with caution. During the Phase One period (2020–2025), transmission recovers strongly: the coefficient is positive and statistically significant at all horizons, providing evidence of market re-integration.

The SBM cash price response provides stronger evidence of trade-war transmission disruption. During the Baseline period, futures shocks transmit strongly and persistently to SBM prices at all horizons from zero through twenty-six weeks. The SBM market shows little long-run attenuation under normal conditions, reflecting persistent crush-margin arbitrage. During the China Tariff period, medium-run SBM transmission collapses almost entirely: the contemporaneous response is preserved at the first two to three horizons, but from horizon four onward the coefficient is statistically indistinguishable from zero through week twenty-six (Table 2, Panel B). Wald tests for $H_0 : \beta^h_{\text{pre}} = \beta^h_{\text{war}}$ are rejected at the 5% level at $h = 4$ ($p = 0.012$), $h = 13$ ($p = 0.024$), and $h = 26$ ($p = 0.006$), confirming that the regime difference is statistically significant. This pattern indicates that futures innovations no longer generate durable movements in SBM prices: the contemporaneous signal is received but is not propagated through the crush-arbitrage chain. During the Phase One period, transmission recovers strongly: the coefficient is positive and statistically significant at all horizons.

LP coefficients for wholesale broiler, retail breast, and retail whole fryer show no stable or economically coherent pattern across horizons and regimes, with wide confidence bands spanning values far above and below zero. The China Tariff period shows some positive wholesale coefficients at medium horizons, but these are imprecisely estimated, economically implausibly large, and inconsistent across adjacent horizons. No robust downstream pass-through pattern is detected in any regime.

Robustness Checks

In direct response to tariff-induced income losses, the USDA implemented the Market Facilitation Program (MFP), authorized under the Commodity Credit Corporation, with payments distributed primarily between September and December 2018. Janzen (2023) provides evidence that these payments increased farmers' propensity to store grain rather than sell into depressed cash markets, which could attenuate the cash-price response to futures shocks during the payment window independently of any tariff effect. To assess this, the baseline LP is re-estimated adding a binary indicator for weeks falling in the concentrated payment window. Results are in Appendix Figures A5 and A6. The MFP indicator is positive and marginally significant for soybean cash prices at medium horizons, consistent with the storage incentive partially supporting realized cash prices during that window; for SBM cash prices, the indicator is small and statistically indistinguishable from zero at all horizons. Crucially, the regime-specific transmission coefficients are robust to this control: Baseline and Phase One coefficients shift by less than 0.002 across all prices and horizons, and the qualitative finding of tariff-period attenuation is unchanged.

The Phase One Deal window (2020–2025) overlaps substantially with COVID-19 supply chain disruptions. To assess sensitivity, I truncate the Phase One period at June 30, 2020, reducing the Phase One sample to approximately 17 weeks. Baseline and China Tariff coefficients are stable across this restriction, and the key finding that China Tariffs disrupted the persistence of upstream transmission relative to the Baseline is unchanged (Appendix Figures A7 and A8).

The baseline LP includes four lags of the shock, own price growth, corn, and soybean oil as control variables. Re-estimating with two and six control lags confirms that the results do not depend on this choice (Appendix Figures A9 and A10).

To address the concern that wide confidence bands in the 75-week China Tariff window may mask genuine attenuation, I implement a block permutation test. Within the combined Baseline and Phase One sample, I randomly draw 2,000 contiguous blocks of 75 weeks, label each a pseudo-Trade-War period, re-estimate the LP with pseudo-labels, and record the Wald statistic for H_0 : $\beta^h_{\text{true}} = \beta^h_{\text{pseudo}}$ at $h = 4$. For SBM cash prices, the true Wald chi-squared statistic is 7.19, and none of the 2,000 permutation draws exceeded this value, yielding a permutation p-value below 0.001. For soybean cash prices, the permutation p-value is 0.17, reflecting the more limited statistical precision of the soybean cash regime comparison relative to the soybean meal results.

Berger and Vavra (2019) distinguish changes in shock volatility from changes in market responsiveness. The China Tariff period exhibits lower futures shock volatility than the Baseline, which would predict higher pass-through under the volatility channel, the opposite of what is observed. Re-estimating the LP after normalizing $\text{shock}_{F,w}$ by its regime-specific sample standard deviation confirms that the transmission collapse reflects genuine attenuation of market responsiveness rather than lower shock volatility. Results are in Appendix Figures A11 and A12.

Comparing narrower and wider Newey-West bandwidths produces confidence bands of similar width, and the main conclusions regarding statistical significance of regime differences are robust to bandwidth variation. As a complementary check, regime-specific cointegration and error-correction models estimated directly between adjacent supply-chain stages are consistent with weakened upstream transmission during the China Tariff period and no stable downstream pass-through.

For wholesale and retail prices, re-estimating the LP with the contemporaneous log-change in corn futures and eleven month indicator variables does not produce any statistically significant regime coefficient at conventional levels for wholesale broiler, and sporadic horizon-specific significant coefficients for retail prices persist in similar fashion under the augmented specification, confirming they reflect noise in the promotional retail price series rather than omitted confounders (Appendix Figures A15 and A16).

To assess whether the Phase One period results reflect the structural expansion in US soybean oil demand driven by the renewable diesel boom rather than trade policy restoration, I split the Phase One period at January 1, 2022, yielding an early sub-period of 96 weeks (March 2020 through December 2021) and a late sub-period of 161 weeks. For soybean cash prices, early Phase One transmission is positive and statistically significant at both four-week and thirteen-week horizons, establishing that transmission had recovered well before the renewable diesel demand expansion could have altered the structural market environment. SBM cash prices show similarly strong early Phase One transmission. The biofuel channel is therefore unlikely to be the sole explanation for the Phase One recovery (Appendix Figures A13 and A14).

Discussion

The empirical findings paint a coherent picture of how the 2018–2019 trade war disrupted price transmission along the soybean-to-chicken supply chain. Upstream, the tariff severed the persistence of transmission; downstream, no stable transmission pattern is detected in any regime.

The LP results reveal a distinctive pattern during the China Tariff period: domestic cash and SBM prices still react immediately to futures innovations at horizons zero through three, but this initial response does not persist. By horizon four, cumulative transmission coefficients revert toward zero and are statistically indistinguishable from zero, in sharp contrast to the Baseline. This fast-but-non-persistent pattern is economically distinct from a complete absence of transmission. Domestic market participants still observe and react to CBOT price signals, but the mechanism that sustains the cash price response over time was severed. Under normal conditions, a positive futures shock triggers competitive bidding by Gulf export buyers, whose higher purchase offers chain upstream to interior elevators and keep cash prices elevated over subsequent weeks. With the export channel closed, no such bidding cascade materialized: elevators observed the CBOT signal but faced no competitive export demand to validate and sustain higher bids, so the initial cash price response faded. The gap between where futures indicated prices should be and where cash prices could be supported widened into the basis, which is precisely the collapse documented in the descriptive statistics. The Phase One period largely restored futures-to-cash transmission, consistent with China's renewed large-scale US soybean purchases re-integrating domestic and export markets.

The economic model predicts precisely this outcome through the spatial equilibrium and export arbitrage channel (Fackler and Goodwin, 2001). Under competitive spatial equilibrium, interior cash prices satisfy

$$P_{\text{interior},i} = P_{\text{futures}} - \tau_{i \to \text{Gulf}} - \phi_t, \tag{4}$$

where $\tau_{i \to \text{Gulf}}$ is the transportation cost from location i to the Gulf export terminal and ϕ_t is a time-varying wedge reflecting export-market conditions. Under active Chinese export demand, $\phi_t \approx 0$; when a positive CBOT futures shock arrives, Gulf export buyers immediately revise their forward bids upward, and competitive pressure chains upstream through the freight network to interior posted bids within days, producing a strong and persistent IRF. China's retaliatory tariff severed this chain at the Gulf: US soybean shipments to China collapsed to near zero within weeks of tariff imposition (Carter and Steinbach, 2020; Adjemian et al., 2021). With the US–China export channel closed and global importers shifting toward Brazilian supply, alternative export outlets for US soybeans contracted simultaneously, leaving domestic crush demand as the primary price-setting margin for interior elevators. Crush plant bids are derived from domestic SBM and soybean-oil demand, markets that are inelastic at the weekly frequency and do not respond sharply to global CBOT innovations. Without the competitive export-bidding cascade, a positive futures shock pushed up P_{futures} in equation (4) but generated no purchasing pressure to lift P_{interior} in tandem. The gap between the two widened into a larger negative basis, ϕ_t, rather than translating into a sustained cash price increase, which is why the medium-horizon IRF is flat during the China Tariff period.

This basis absorption is directly quantifiable. The mean weekly soybean level basis averaged +\$0.009 per bushel in the Baseline; during the China Tariff period the mean basis collapsed to

−\$0.196 per bushel, a persistent shift of −\$0.205 per bushel. Phase One restored the mean basis to +\$0.128 per bushel as Chinese purchasing resumed and Gulf bidding reactivated. Appendix Figure A3 visualizes the correlation collapse: in the Baseline the scatter of weekly futures innovations against five-week cumulative soy-cash returns shows a strong positive slope, while during the China Tariff period the same scatter is nearly flat.

The export-channel mechanism generates an additional testable prediction. Chinese soybean purchasing from the United States follows a seasonal pattern: demand concentrates in the US marketing season from September through March, when newly harvested US soybeans are logistically available at Gulf terminals, and shifts to Brazilian supplies from April through August (Williams and Betancourt, 2009). Appendix Figure A4 splits the Phase One period by season. US-season weeks (September–March, when newly harvested US soybeans are logistically available at Gulf terminals) show large and statistically significant responses at both four-week and thirteen-week horizons, while Brazil-season weeks show substantially weaker transmission: the four-week coefficient remains statistically significant but is much smaller, and the thirteen-week coefficient is statistically indistinguishable from zero. The Wald test for equal seasonal coefficients within Phase One is rejected at the 5% level at horizon thirteen. No seasonal gap appears in the Baseline, consistent with Chinese buyers being active year-round under normal trade conditions. This within-Phase-One seasonal difference is consistent with the export channel mechanism, with the caveat that COVID-19 disruptions overlap the Brazil-season sub-window in 2020.

The absence of significant futures-to-wholesale transmission in any regime corroborates the insulation hypothesis of MacDonald (2008): vertically integrated broiler companies set feed purchase decisions weeks in advance of the production cycle, absorbing feed-cost innovations in profit margins. No stable or economically coherent pattern of downstream price transmission is detected across all three regimes. The institutional structure of US broiler retailing insulates consumer prices from upstream cost shocks: retail chains set prices through multi-week promotional calendars and private-label strategies that evolve largely independently of weekly commodity movements (Wohlgenant, 2001; Sexton, 2013). An important caveat applies to the retail evidence:

the USDA AMS weekly retail series captures prices from stores actively running a promotion, which is not a volume-weighted average transaction price and may amplify high-frequency idiosyncratic variation. These estimates should therefore be interpreted as consistent with limited downstream transmission of futures price signals. The fact that retail breast prices fell on average during the China Tariff period despite a reduction in upstream feed costs suggests that demand-side factors dominated retail pricing during this period. Together, these results are consistent with price-incidence evidence pointing to concentration upstream, particularly in soybean cash and meal markets, with US chicken consumers largely insulated from the shock.

The robustness check adding an indicator for the 2018 MFP payment window finds a small positive effect on soybean cash prices at medium horizons, consistent with Janzen (2023)'s finding that MFP payments reduced farmer selling. The regime-specific transmission coefficients are virtually unchanged, confirming that the attenuated tariff-period transmission reflects a genuine structural break in the futures-cash price relationship rather than a storage-induced supply response confined to the payment window.

Conclusion

This paper examines how the 2018–2019 US–China trade war disrupted soybean futures-to-downstream price transmission using a regime-interacted local projection framework with a weekly shock constructed from end-of-week futures prices and a rich set of contemporaneous controls.

Three findings emerge from the analysis. During the China Tariff period, futures-to-soybean-meal price transmission lost persistence, with sustained propagation collapsing by horizon four and remaining near zero through week twenty-six. Wald tests confirm statistically significant regime differences at $h = 4$, 13, and 26. Soybean cash transmission also weakened, but with insufficient precision to reject the null of equal regime coefficients. This tariff-period attenuation is robust to controlling for the Market Facilitation Program payment window, alternative lag orders, and Newey-West bandwidth choices. The Phase One period largely restored Baseline transmission, with SBM cash coefficients returning to Baseline-like patterns at medium-to-long horizons, consistent with market re-integration following renewed Chinese purchasing. No stable or economically coherent downstream pass-through pattern is detected across wholesale or retail chicken prices in any regime, consistent with the shock-absorbing role of vertical integration in US broiler production.

Several policy implications follow. The rapid restoration of transmission during the Phase One period suggests that trade policy changes can reverse price-discovery disruptions at the horizon of months, not years, provided that bilateral trading relationships are restored. The absence of stable downstream transmission implies that price-incidence evidence from this episode points to concentration upstream, especially in soybean cash markets and soybean-meal price formation, with US chicken consumers largely insulated from the shock. Future work should examine whether the 2025 Trade War II episode produces a similar or amplified pattern of transmission disruption, and whether MFP-style support programs offset or distort the market adjustment process.

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Table 1: **Regime Classification and Event Chronology**

Period	Window	Weeks	Key event
Baseline	2015-01-08 to 2018-03-15	167	Normal US–China soybean trade relations
Trans. 1	2018-03-22 to 2018-07-11	excl.	(excl.) Section 301 signed Mar 22; China retaliates Apr 4; tariffs not yet in force
China Tariff	2018-07-12 to 2019-12-12	75	China 25% retaliatory tariff on US soybeans in force (effective Jul 6)
Trans. 2	2019-12-19 to 2020-02-27	excl.	(excl.) Phase One signed Jan 15, 2020; firm-level soybean exclusion opens Mar 2, 2020
Phase One	2020-03-05 to 2025-01-30	257	Phase One in force; US soybean purchases recover
Trade War II	2025-02-01 to present	excl.	(excl. from all regressions) US broad tariff reimposition; ongoing
Main sample		**499**	Baseline + China Tariff + Phase One

Note: Transition windows excluded from all regressions. The Phase One window includes the COVID-19 period (approx. 2020-03 to 2021-06); robustness checks truncate at 2020-06-30.

Table 2: **Regime-Interacted LP: Transmission Coefficients at Selected Horizons**

	$h = 4$	$h = 8$	$h = 13$	$h = 26$
Panel A: Soybean Cash Price				
Baseline (2015–2018)	0.772*	0.586*	0.401*	0.520*
	(0.227)	(0.276)	(0.226)	(0.219)
China Tariff (2018–2019)	0.153	0.402	0.449	−0.144
	(0.262)	(0.344)	(0.301)	(0.296)
Phase One (2020–2025)	1.017*	1.031*	0.873*	1.069*
	(0.164)	(0.255)	(0.374)	(0.444)
Panel B: Soybean Meal Cash Price				
Baseline (2015–2018)	0.904*	0.778*	0.846*	1.028*
	(0.324)	(0.467)	(0.375)	(0.467)
China Tariff (2018–2019)	−0.239	0.150	0.154	−0.009
	(0.344)	(0.361)	(0.223)	(0.320)
Phase One (2020–2025)	0.997*	1.012*	0.700*	0.790*
	(0.157)	(0.255)	(0.327)	(0.389)
Panel C: Wholesale Broiler				
Baseline (2015–2018)	0.192	0.044	−0.412	−0.208
	(0.272)	(0.350)	(0.368)	(0.544)
China Tariff (2018–2019)	−0.186	0.739	1.294*	1.201*
	(0.416)	(0.656)	(0.560)	(0.726)
Phase One (2020–2025)	−0.166	0.127	0.216	0.360
	(0.272)	(0.268)	(0.375)	(0.397)
Panel D: Retail Breast (B/S)				
Baseline (2015–2018)	−0.495*	−0.544	−0.235	−0.356
	(0.278)	(0.375)	(0.270)	(0.358)
China Tariff (2018–2019)	−0.788	0.239	−1.266*	0.008
	(0.841)	(0.784)	(0.731)	(0.714)
Phase One (2020–2025)	0.364	−0.257	0.745	0.614*
	(0.370)	(0.439)	(0.512)	(0.303)
Panel E: Retail Whole Fryer				
Baseline (2015–2018)	0.573*	−0.058	−0.121	0.452
	(0.303)	(0.259)	(0.319)	(0.346)
China Tariff (2018–2019)	0.752	−1.437*	0.326	−1.171*
	(0.539)	(0.533)	(0.466)	(0.431)
Phase One (2020–2025)	0.002	−0.045	−0.787*	0.554*
	(0.324)	(0.278)	(0.329)	(0.324)

Note: LP coefficient $\hat{\beta}_r^h$ from equation (3); Newey-West HAC standard errors in parentheses. * denotes significance at the 90% level. Wald tests for $H_0 : \beta^h_{\text{pre}} = \beta^h_{\text{war}}$ yield $p < 0.05$ at $h = 4, 13, 26$ for Panel B (SBM Cash) and $p > 0.25$ for all horizons in Panel A (Soy Cash).

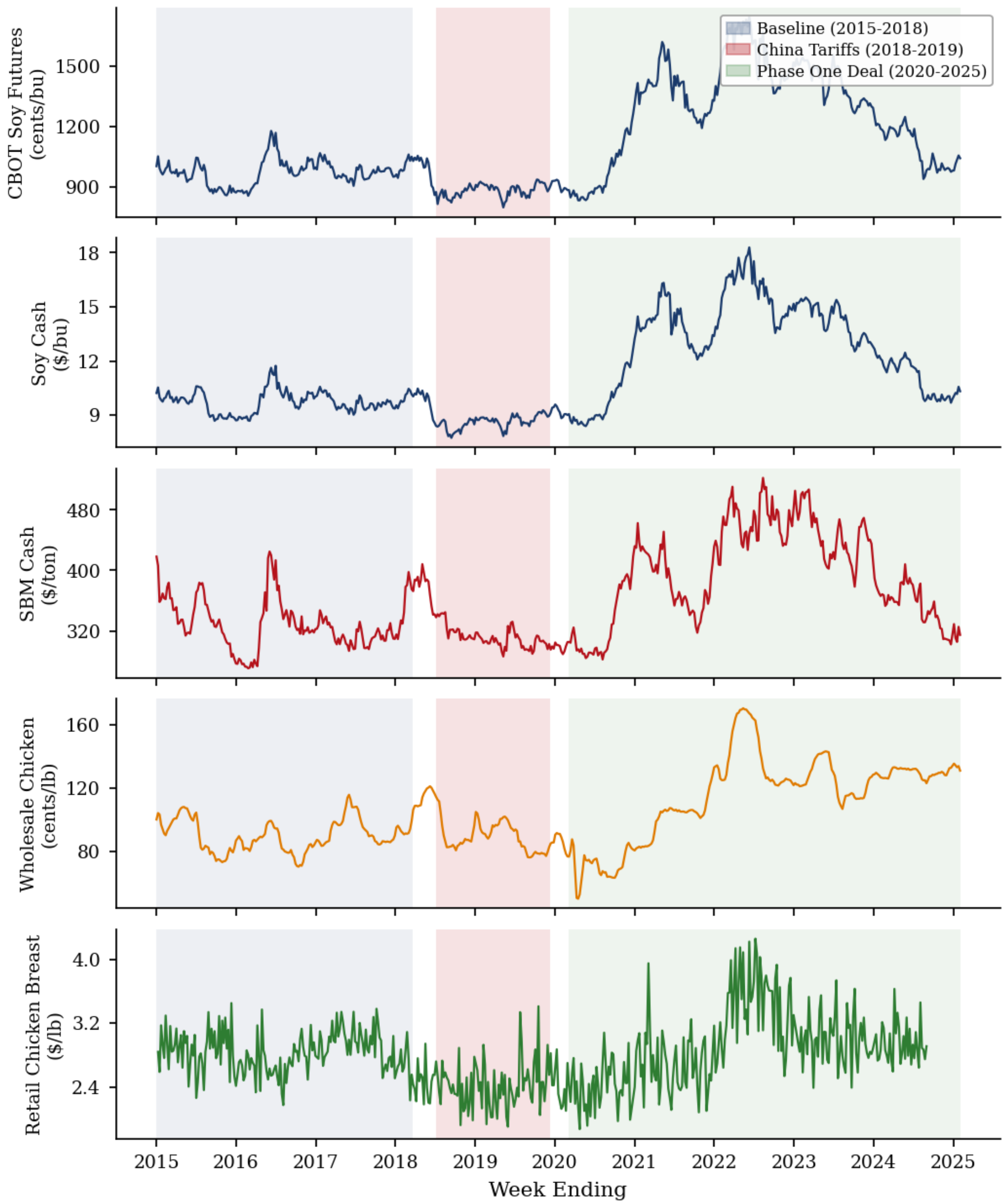

Figure 1: **Weekly Price Series Along the Soybean-to-Chicken Supply Chain, 2015–2025**
Note: Blue shading = Baseline (2015–2018); red shading = China Tariff (2018–2019); green shading = Phase One (2020–2025). All series are national or Central Illinois benchmarks.

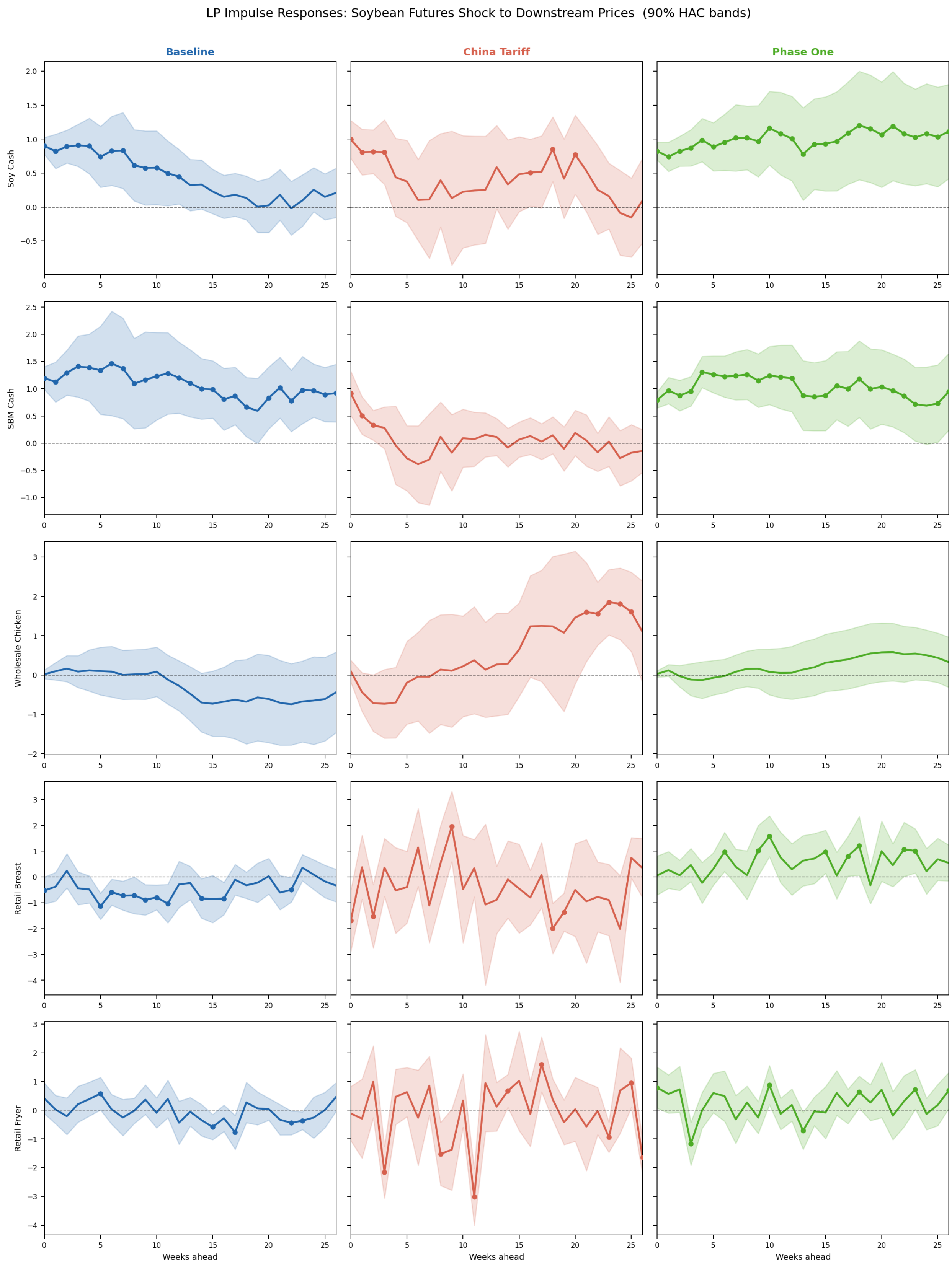

Figure 2: **Regime-Interacted LP Transmission Coefficients: All Supply-Chain Stages**

Note: Each panel shows the regime-interacted LP coefficient $\hat{\beta}_r^h$ from equation (3) at horizons $h = 0$–26 weeks, with 90% Newey-West HAC confidence bands. Regimes: Baseline (solid, navy), China Tariff (dashed, crimson), Phase One (dash-dot, green).

Appendix

Supplementary Tables and Figures

Table A1: **Weekly Price Panel: Variable Definitions, Sources, and Summary Statistics** (N = 588 weeks, 2015-01-02 to 2026-04-03)

Variable	**Description**	**Unit**	**Src**	**Obs**	**Mean**	**SD**
Upstream: Soybean						
`soy_cash`	US No. 1 Yellow soybeans, Central IL	$/bu	[a]	527	11.15	2.54
`soy_fut`	CBOT soybean continuous front-month	$/bu	[b]	527	11.12	2.44
Midstream: Soybean Meal						
`sbm_cash`	48% SBM FOB Rail, Central IL	$/sh. ton	[a]	527	360.0	60.3
`soyoil_fut`	CBOT soybean oil continuous	¢/lb	[b]	527	41.8	14.9
`corn_fut`	CBOT corn continuous front-month	$/bu	[b]	527	4.47	1.22
Downstream: Broiler Wholesale						
`wholesale`	National composite whole-bird, wtd. avg	¢/lb	[c]	527	102.7	23.5
Downstream: Retail Poultry						
`retail_fryer`	Whole bagged fryer, store-count wtd. avg	$/lb	[d]	512	1.21	0.21
`retail_breast`	Breast B/S regular pack, store-count wtd	$/lb	[d]	491	2.78	0.43
Shock Series						
`shock_F`	Weekly AR(1)+controls residual, soybean futures	—	der.	585	—	—

[a] USDA AMS Grain and Feed Weekly Summary. End-of-week quotes; Wednesday fallback for holiday weeks.

[b] CBOT continuous front-month futures from Yahoo Finance. Soy and corn originally in cents/bu, divided by 100.

[c] USDA AMS National Composite Broiler Price Report. National composite whole-bird price, cents/lb.

[d] USDA AMS Weekly Retail Chicken reports. Store-count-weighted national weekly average. This series captures prices from stores actively running a promotion on the product.

[Note] "der." = derived. Statistics over 499 in-sample observations (Baseline + Trade War + Phase One). `shock_F` obs = 585 (full sample).

Table A2: **Weekly Control Variables for Futures Shock Construction**

Variable	Yahoo Ticker	Exchange	Unit	% non-null
Soy_Fut	ZS=F	CBOT	$/bu	99.8
Corn_Fut	ZC=F	CBOT	$/bu	99.7
SoyOil_Fut	ZL=F	CBOT	cents/lb	99.8
USD_DXY	DX-Y.NYB	ICE	index	99.9
VIX	^VIX	CBOE	index	99.8
WASDE_week	—	—	binary (0/1)	—
roll_week	—	—	binary (0/1)	—

Note: $N = 585$ weekly observations, 2015–2026 (Wednesday fallback for holiday weeks). Coverage reflects weeks with non-missing close price. WASDE_week = 1 if any Monday–Thursday of that week contains a WASDE release. roll_week flags contract-roll weeks.

Table A3: **Weekly Soybean Futures Shock Regression**

Regressor	Coefficient	Significance
$\Delta \ln \text{Corn\_Fut}_w$	+0.331	$p < 0.001^{***}$
$\Delta \ln \text{SoyOil\_Fut}_w$	+0.304	$p < 0.001^{***}$
$\Delta \ln \text{USD\_DXY}_w$	−0.188	$p < 0.10^{*}$
ΔVIX_w	−0.001	$p < 0.05^{**}$
WASDE_week_w	+0.005	$p < 0.05^{**}$
AR(1) lag, roll-week indicator	included; not separately reported	
Constant	included	
N (weekly obs.)	585	
R^2	0.485	
Lag order (p, AIC)	1	

Note: OLS estimates. Dependent variable: $\Delta \ln(\text{SoyFut}_w)$. Sample: 2015–2026, $N = 585$. Lag order selected by AIC over $p \in \{1, \ldots, 5\}$. Residuals constitute the weekly soybean futures innovation series used in all LPs. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Table A4: **Descriptive Statistics by Regime** (Main Estimation Sample, $N = 499$ weeks)

	Baseline (167 wk)		**China Tariff** (75 wk)		**Phase One** (257 wk)	
Variable	Mean	SD	Mean	SD	Mean	SD
Soy Futures ($/bu)	9.72	0.63	8.80	0.31	12.87	2.39
Soybean Cash ($/bu)	9.73	0.61	8.59	0.36	13.00	2.46
SBM Cash ($/short ton)	329.4	33.3	311.8	13.5	396.0	62.3
Wholesale Bird (¢/lb)	89.8	10.1	89.3	9.3	115.1	26.6
Retail Whole Fryer ($/lb)	1.117	0.117	1.050	0.087	1.327	0.216
Retail Breast B/S ($/lb)	2.836	0.259	2.417	0.300	2.897	0.488

Note: Transition windows and Trade War II (2025–) excluded. B/S = boneless–skinless. Retail Breast captures store-count-weighted regular-pack prices only.

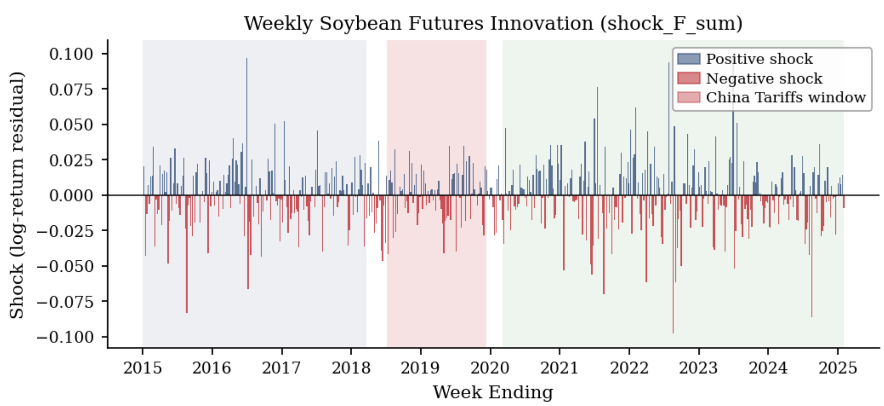

Figure A1: **Weekly Soybean Futures Innovation Series, 2015–2025**
Note: Weekly AR(1)+controls residuals from the first-stage futures shock regression (Table A3). Blue bars = positive shocks; red bars = negative shocks. Regime shading: white = Baseline; light gray = China Tariff; dark gray = Phase One.

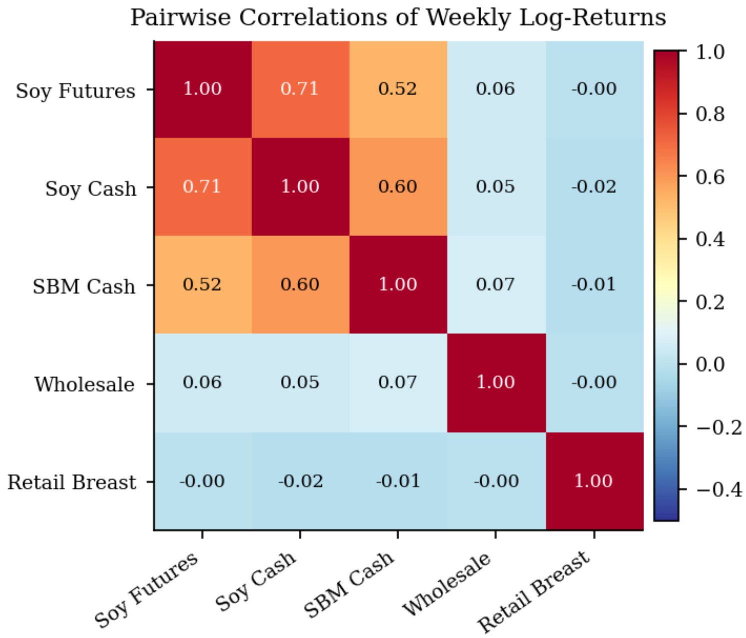

Figure A2: **Pairwise Correlations of Weekly Log-Price Changes Along the Supply Chain**

Note: Correlations computed over the full 499-observation in-sample panel.

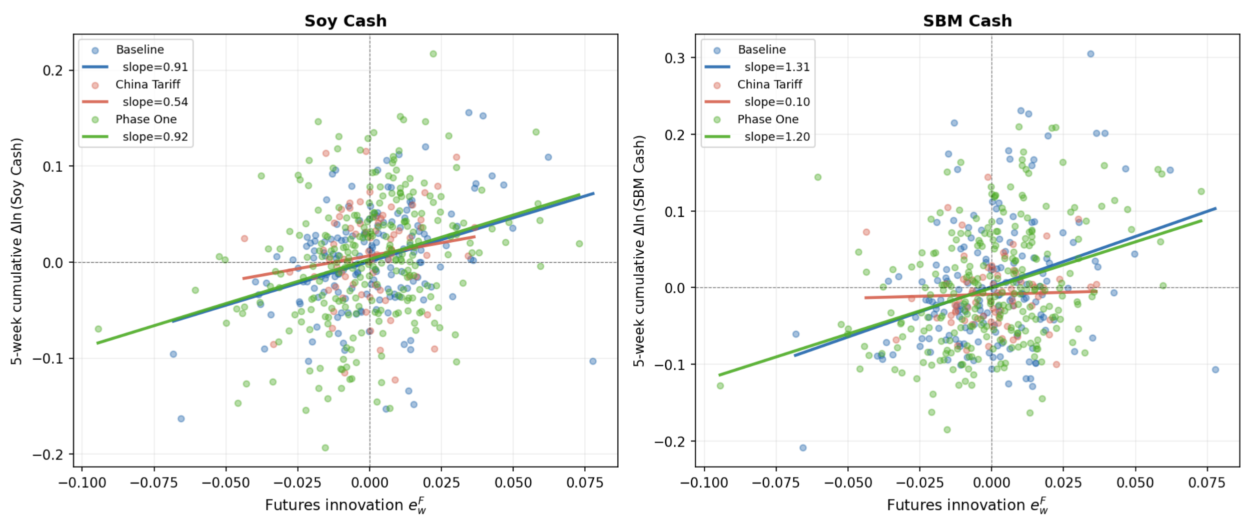

Figure A3: **Basis Absorption Mechanism: Futures Innovation vs. Five-Week Cumulative Cash Return**

Note: Each panel plots the weekly futures innovation e_w^F against the five-week cumulative log-price change for soybean cash (left) and SBM cash (right), colour-coded by regime, with OLS trend lines. Baseline (blue) slopes show strong upstream transmission; China Tariff (red) slopes collapse toward zero; Phase One (green) slopes return toward the Baseline. In-sample, $N = 499$.

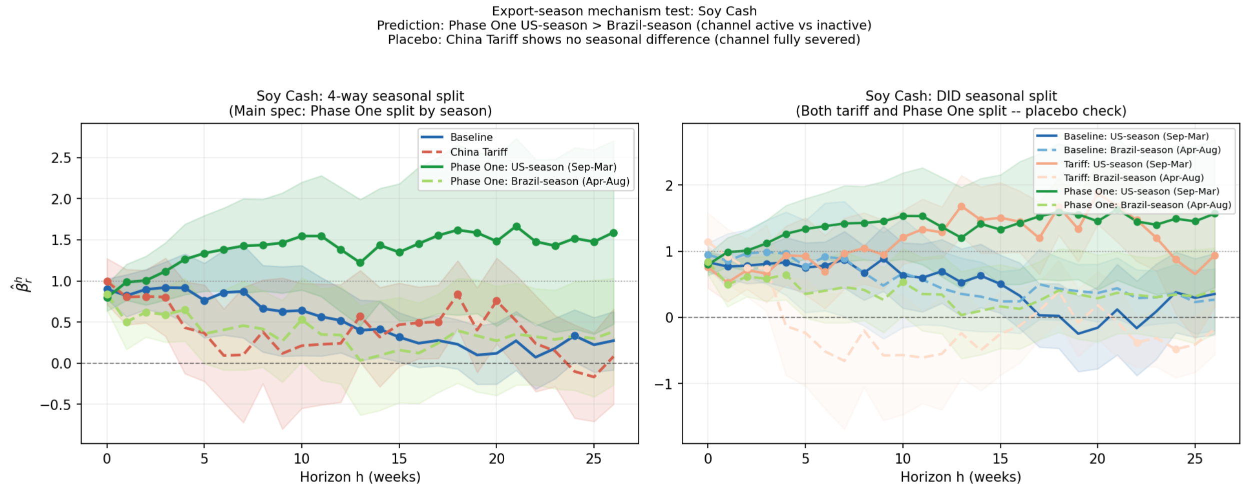

Figure A4: **Export-Season Mechanism Test: Soybean Cash LP by US vs. Brazil Marketing Season**

Note: Left panel: four-way seasonal split of the Phase One period. Right panel: six-way split of all three regimes by season. US-season (solid lines) = September–March; Brazil-season (dashed lines) = April–August. During Phase One, Wald test for equal seasonal coefficients: $p = 0.038$ at $h = 13$. 90% Newey-West HAC confidence bands.

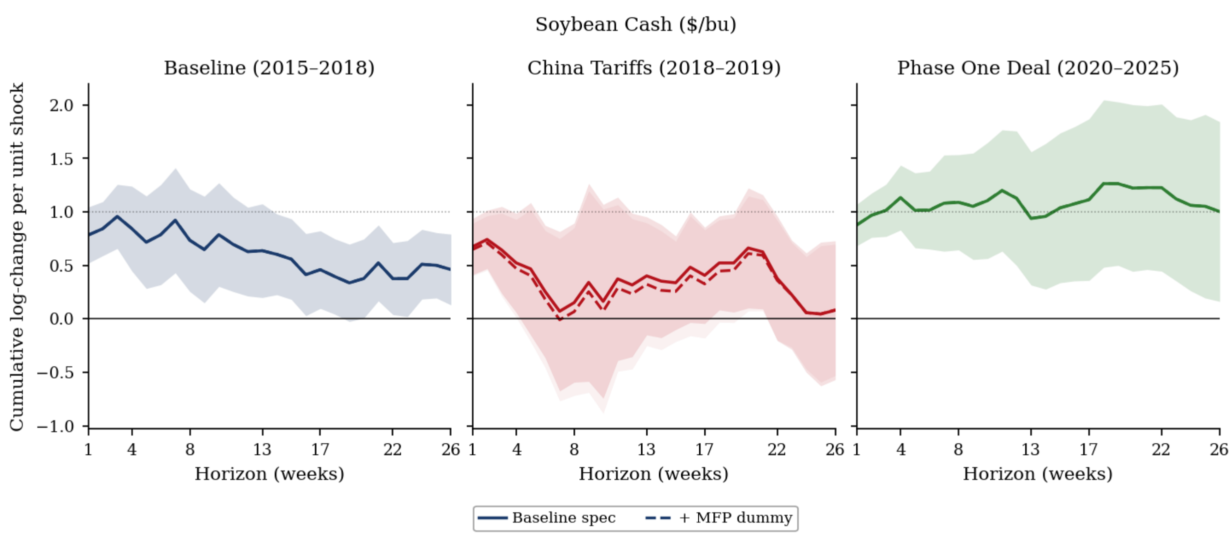

Figure A5: **Robustness: Soybean Cash, Baseline vs. MFP-Augmented Specification**

Note: Solid = baseline specification; dashed = augmented specification adding a dummy for the September 27–December 17, 2018 MFP payment window. Shaded bands = 90% Newey-West HAC confidence intervals.

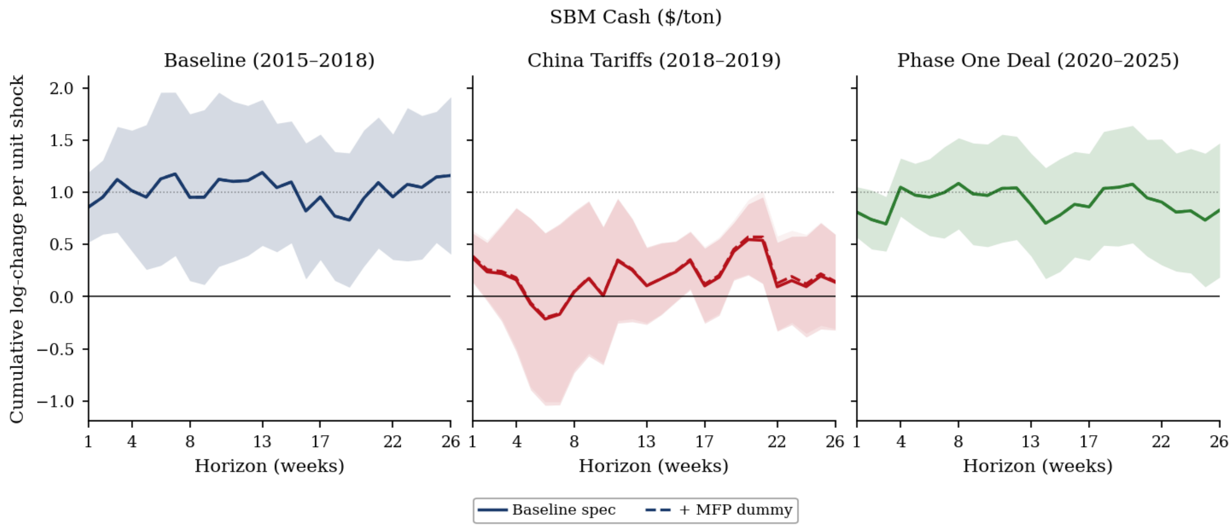

Figure A6: **Robustness: SBM Cash, Baseline vs. MFP-Augmented Specification**

Note: See Figure A5. The MFP indicator is statistically indistinguishable from zero for SBM cash at all horizons.

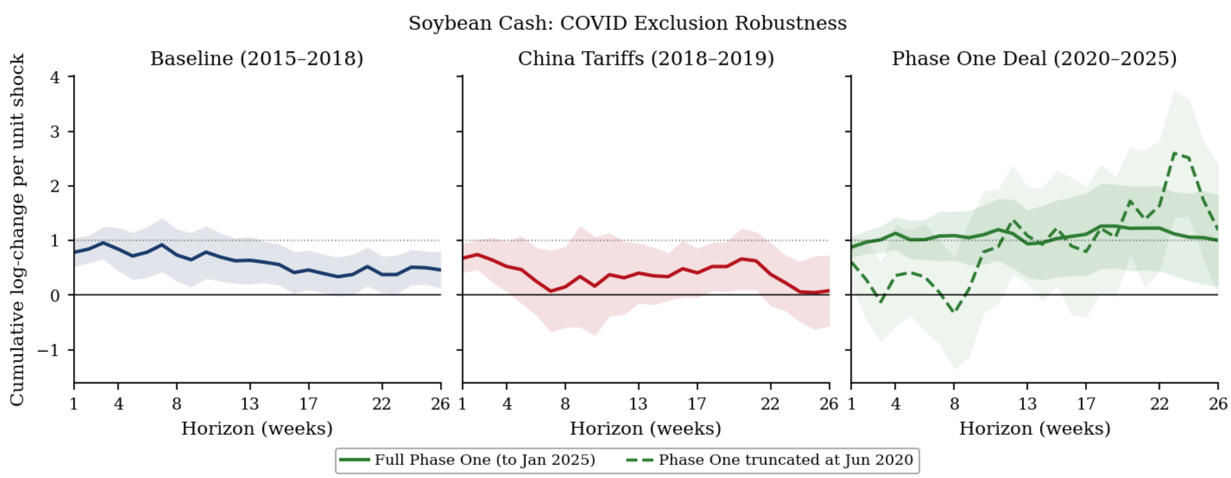

Figure A7: **Robustness: COVID Exclusion, Soybean Cash (Phase One truncated at June 2020)**

Note: Solid lines use the full Phase One sample (2020–2025); dashed lines truncate at June 30, 2020.

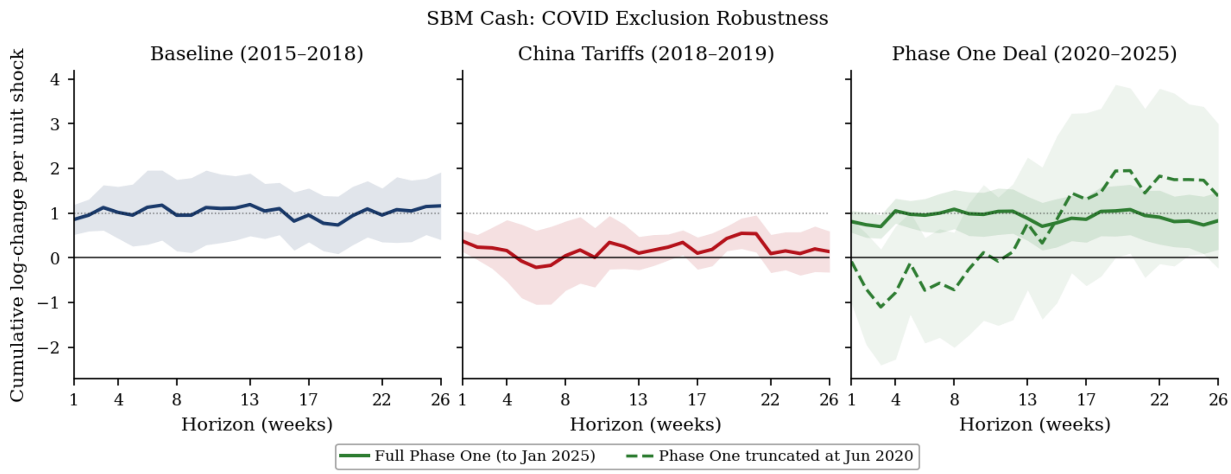

Figure A8: **Robustness: COVID Exclusion, SBM Cash (Phase One truncated at June 2020)**

Note: See Figure A7.

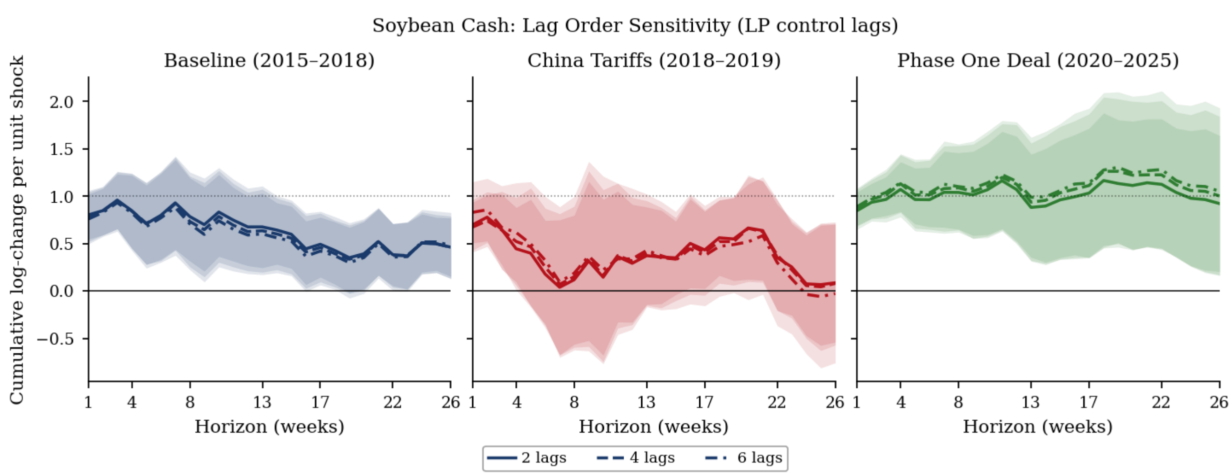

Figure A9: **Robustness: Lag Order Sensitivity, Soybean Cash (2, 4, or 6 Control Lags)**

Note: LP re-estimated with 2 (solid), 4 (dashed, baseline), and 6 (dash-dot) control lags.

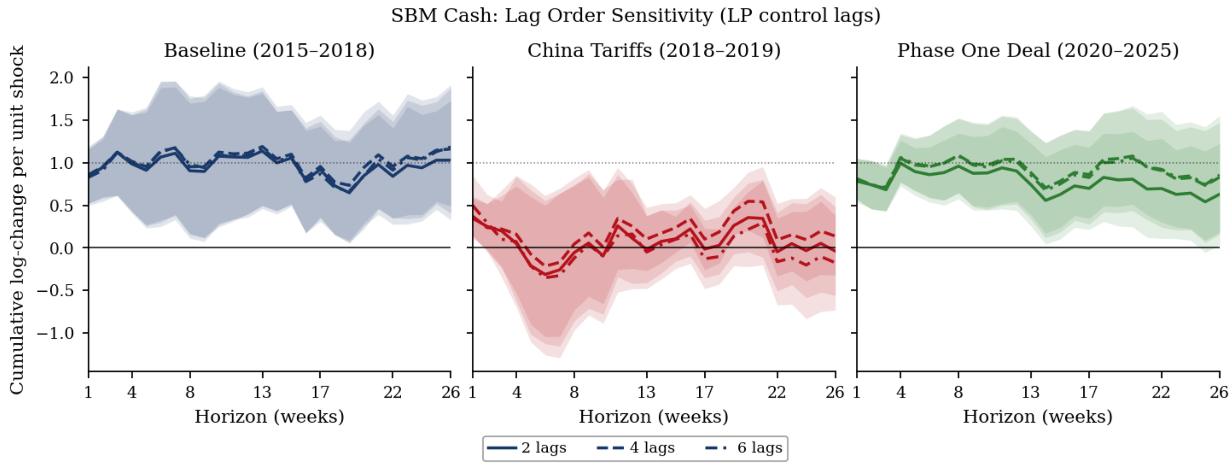

Figure A10: **Robustness: Lag Order Sensitivity, SBM Cash (2, 4, or 6 Control Lags)**

Note: See Figure A9.

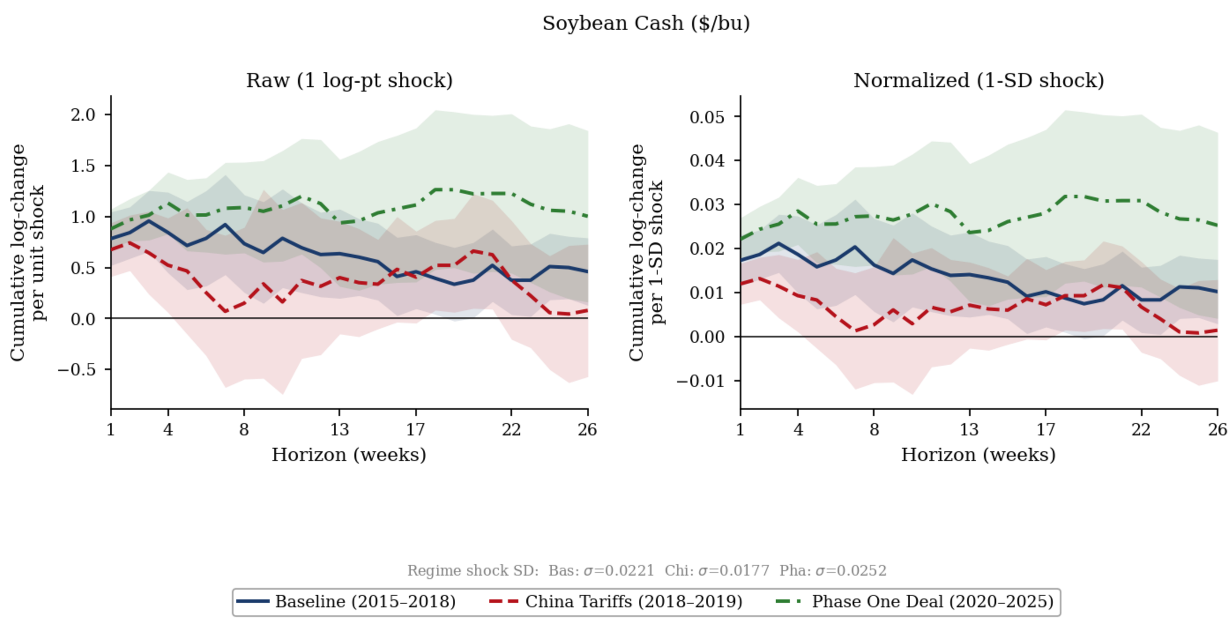

Figure A11: **Robustness: Shock Standardization, Soybean Cash**

Note: Left panel = baseline (response to one log-point shock); right panel = normalized by within-regime standard deviation. 90% Newey-West HAC confidence bands.

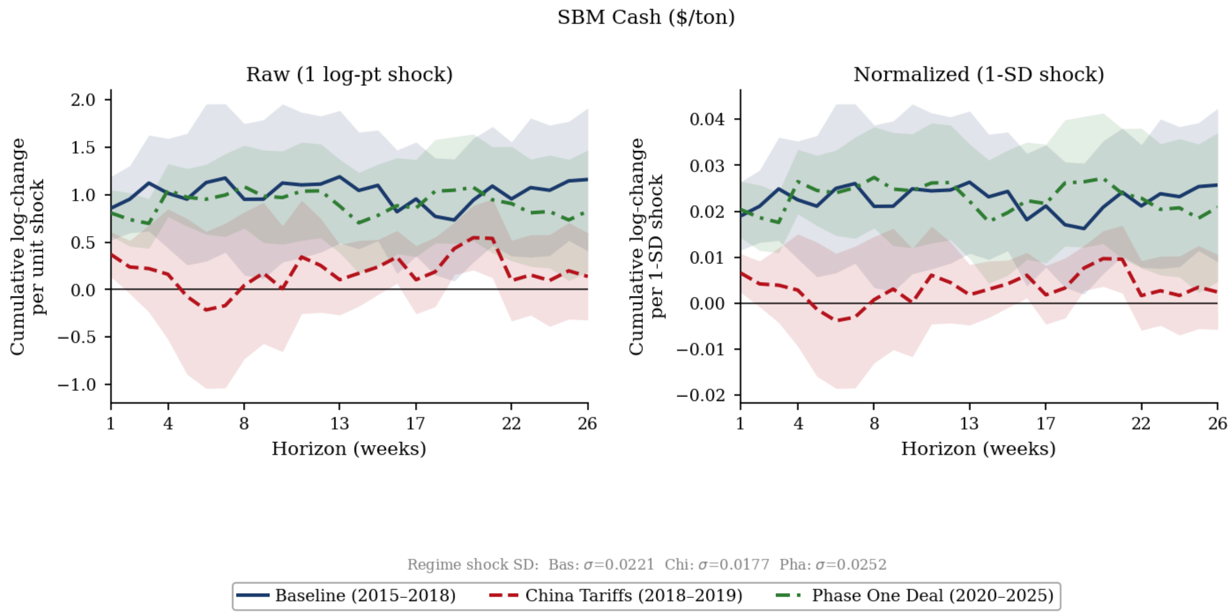

Figure A12: **Robustness: Shock Standardization, SBM Cash**

Note: See Figure A11.

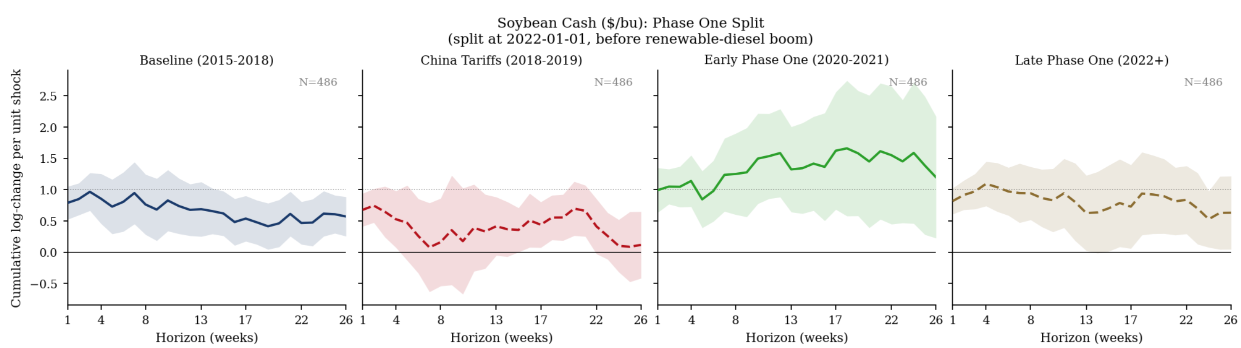

Figure A13: **Robustness: Soybean Cash, Phase One Sub-Period Split at January 2022**

Note: Early Phase One (March 2020–December 2021, 96 weeks); Late Phase One (January 2022–January 2025, 161 weeks). 90% Newey-West HAC confidence bands.

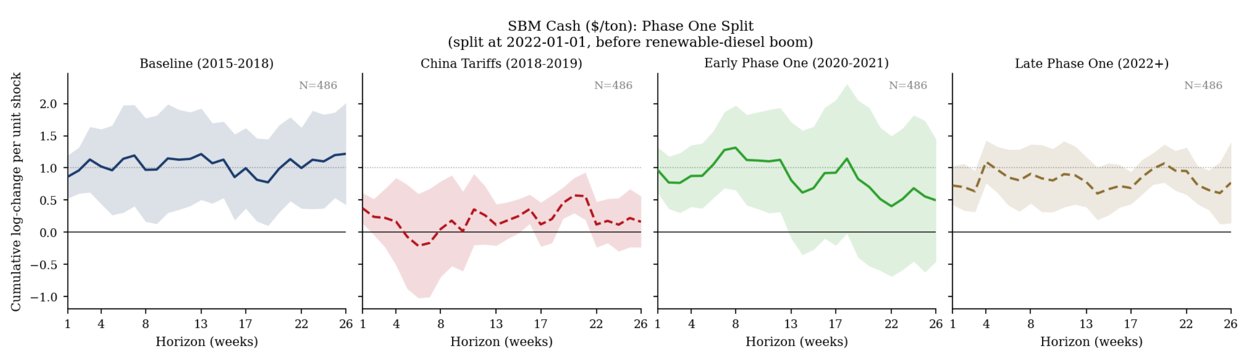

Figure A14: **Robustness: SBM Cash, Phase One Sub-Period Split at January 2022**

Note: See Figure A13.

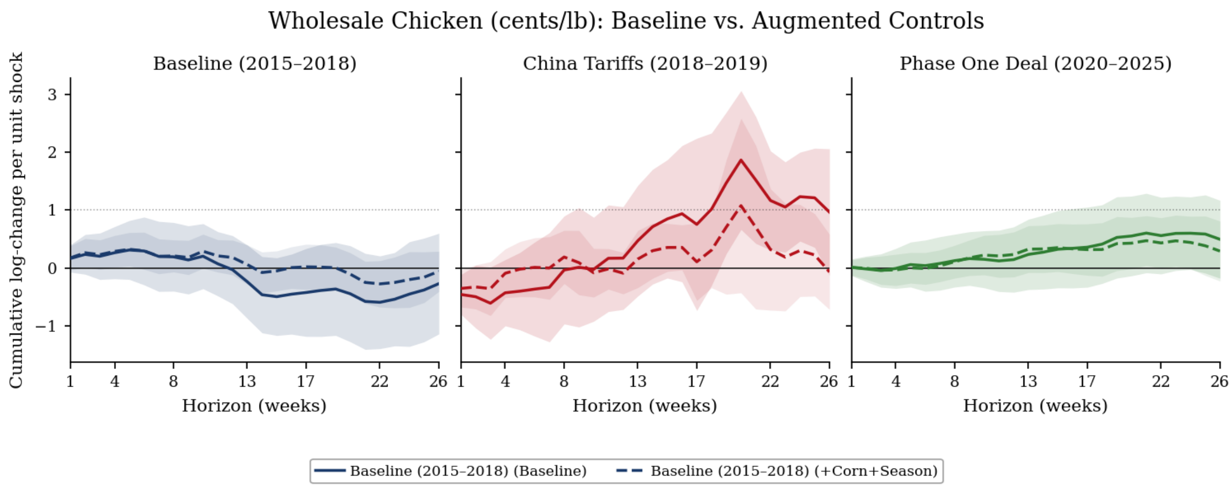

Figure A15: **Robustness: Wholesale Broiler, Augmented Controls (Corn + Seasonal)**

Note: Solid = baseline; dashed = augmented with contemporaneous corn log-change and eleven month indicators.

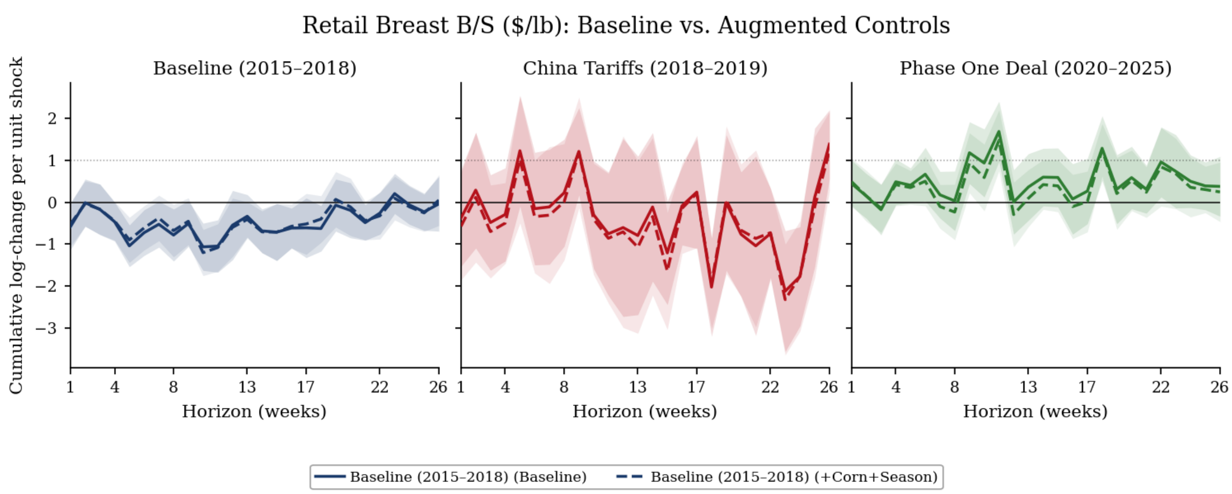

Figure A16: **Robustness: Retail Breast, Augmented Controls (Corn + Seasonal)**

Note: See Figure A15.