Final Report
Agreement No. 24-TMTED-MO-0006

Title:
Corn and Soybean Basis Spread Implied by the USDA Projections

Abstract

This study examines how projected market drivers for the 2025/2026 marketing year—crop production, export volumes, shipping costs, and total export merchandise—are expected to affect U.S. corn and soybean basis spreads and, by extension, the domestic crop transportation network. Basis spreads represent the price difference between local collection points and export facilities. They are shaped not only by supply and demand fundamentals but also by transportation efficiency and infrastructure capacity. This study provides the first empirical assessment of how anticipated shifts in these market drivers affect basis spreads across approximately 4,000 collection points in the Corn Belt. Results indicate that average basis spreads will decline modestly—by −$0.026/bushel for corn and −$0.021/bushel for soybeans—relative to 2024/2025 levels. The largest reductions are concentrated in northern and northwestern counties, with heterogeneous effects across ports: corn basis spreads decline most sharply through Laredo and Vancouver, while soybean spreads decrease most consistently through Vancouver. Among individual drivers, production and shipping cost fluctuations have the strongest effects on corn basis spreads, while export volume changes dominate for soybeans. These findings underscore the heterogeneous response of basis spreads to projected market conditions, reflecting regional and port-specific dynamics. The results carry important implications for infrastructure investment, logistics planning, and policy, providing valuable insights to enhance the efficiency and resilience of the U.S. agricultural supply chain.

Keywords: Export projection, transportation network, basis spread, crop flows

1. Introduction

The United States (U.S.) agricultural sector entered the 2025/2026 marketing year under shifting market conditions that were expected to reshape how crops move from production areas to export facilities. Changes in crop production, external demand, total export merchandise, and shipping costs can alter the flow of commodities across the domestic transportation network, influencing local market prices and basis spreads—the price difference between local collection points and export facilities. Because grain exports, particularly corn and soybeans, account for a majority of U.S. crop transportation demand, even modest shifts in export patterns can have cascading effects on infrastructure use, transportation costs, and regional market dynamics. For example, between September 7 and December 7 of the 2024/2025 marketing year, barge traffic through Mississippi River locks increased by 13 percent for both corn and soybeans relative to the same period in 2023/2024 (U.S. Department of Agriculture, 2024), illustrating how stronger export demand can increase transportation congestion, limit barge availability, and thereby influence local price signals (Hailu et al., 2015; Hart & Holson, 2017).

While basis spreads are widely recognized as indicators of spatial market efficiency, their relationship with export dynamics and transportation network performance remains less understood. Previous studies have examined how basis spreads respond to local supply and demand conditions (Davis & Hill, 1974; Adjemian et al., 2011), transportation costs (Wilson & Dahl, 2011; Hailu et al., 2015; Hart & Holson, 2017), and weather-related factors such as precipitation and extreme events (Mobarok et al., 2023; Skevas et al., 2025; Mitchell & Biram, 2025). However, much less attention is paid to how export-driven changes in market conditions—particularly projected shifts in export volumes—affect the domestic transportation network and, consequently, basis spread levels. Export-driven price shocks, such as increases in foreign demand, are transmitted to domestic markets, often resulting in higher basis levels in regions with strong logistical connections to export terminals (McKenzie, 2005). Research from outside the U.S. context, such as de Lima et al. (2018), shows that increased soybean export volumes to China strained Brazilian port infrastructure, yet comparable analysis for the U.S. is lacking.

This gap is important because projected export growth and shifts in export destinations may amplify congestion on certain transportation routes, increase costs, and modify basis spreads across regions. To our knowledge no study has empirically assessed how projected market drivers—such as crop export volumes, crop production, shipping costs, and total export merchandise—jointly influence the domestic crop transportation network through their effect on basis spreads.

This study addresses that gap by providing the first empirical evaluation of how projected changes in key market drivers for the 2025/2026 marketing year affect basis spreads across approximately 4,000 collection points in the Corn Belt region. The analysis explicitly links local collection points to six U.S. exit ports and 13 foreign destinations, capturing the full structure of the export network. In doing so, it integrates export projections within a spatially connected transportation framework to estimate how future market conditions may alter the efficiency and resilience of the U.S. agricultural supply chain.

The findings have three key contributions. First, they quantify the effect of projected market conditions on domestic transportation performance as reflected in basis spread changes. Second, they reveal the geographic heterogeneity of these effects—showing which regions and ports are most exposed to shifts in export patterns. Third, the results provide insights for infrastructure investment, logistics planning, and policy design, supporting adaptive and resilient agricultural transport systems.

The remainder of the paper proceeds as follows. Section 2 outlines the empirical strategy for estimating the effects of projected market drivers on basis spreads. Section 3 describes the data sources, including basis spreads at collection points, export volumes by port and destination, and additional controls. Section 4 presents the main results, and Section 5 concludes with implications for infrastructure and logistics planning.

2. Methodology

The analysis proceeds in three stages. First a basis-spread regression is estimated using historical data, modeling the basis spread as a function of key market drivers, including crop export volumes, shipping costs, crop production, and total export merchandise. The estimated coefficients from this regression are stored and then applied in subsequent projections of the basis-spread.

Second, projections of the market-driver variables are obtained for the 2025/2026 marketing year. Using these projected values along with the stored coefficients from stage one, predicted basis spreads for 2025/2026 are generated. The same procedure, applied to observed values of the market drivers, generates estimated basis spreads for the most recent completed marketing year (2024/2025).

Finally, the impact of projected market changes is quantified by calculating the difference between the estimated basis spreads for 2025/2026 and those for 2024/2025. A detailed description of each stage of the analysis is provided below.

2.1 Basis spread regression

The basis spread regression is estimated for the period 2010-2022 as specified in Equation (1).

$$B_{ip,wt} = \alpha + \sum \beta_d E_{pd,wt} + \gamma_1 C_{ip,wt} + \gamma_2 P_{c,t} + \gamma_3 X_{wt} + \delta_i + \varepsilon_{ip,wt} \qquad (1)$$

In this model, $B_{ip,tw}$ represents the weekly average basis spread for collection point i shipping to destination port p in week w of year t. $E_{pd,tw}$ denotes the export volume sent from port p to destination country or region d in week w of year t. $C_{ip,tw}$ represents the transportation cost between collection point i and port of exit p in week w of year t. $P_{c,tw}$ is the annual crop production in the county c where collection point i is located. X_{tw} captures total merchandise exports, measured as the aggregate export value of all goods and services in the U.S. α and βs are parameters to be estimated, and ε is an error term. The term δ_i captures unobserved heterogeneity across collection points, reflecting characteristics of each collection point that influence basis spreads but are not explicitly included in the model, such as infrastructure, local management practices, or location-specific factors. A Hausman test is conducted to determine whether the δ_i terms are more appropriately modeled as fixed or random effects. Separate regressions are estimated for corn and soybeans, and the resulting coefficients are stored for use in a subsequent basis-spread projections.

Building on these estimates, destination-specific export volumes ($E_{pd,tw}$) are hypothesized to exert a negative effect on the basis spread. An increase in export volume directs more crop quantities toward exit ports, potentially straining the distribution system and generating inefficiencies in grain movement, which can reduce the basis spread. As export volumes change, transportation networks (including roads, rails and waterways) may experience disruptions, bottlenecks and capacity constraints, which can increase transportation costs. If some of these additional costs are absorbed locally, so that local prices rise less than port prices, then the basis spread declines. Destination-specific export volumes are not intended to represent bilateral flows along individual origin–port routes. Rather, they capture system-wide export demand shocks that affect interior basis spreads through shared transportation infrastructure, congestion, and price transmission. Under this interpretation, changes in exports to specific destinations can influence basis spreads across routes, even when shipments are not directly linked.

Transportation costs ($C_{ip,wt}$) are also expected to negatively effect the basis spread. Higher costs to move crops from local collection points to export ports can suppress local demand, lowering the prices observed at collection points or paid by processing facilities. As shipping costs rise, local prices decrease, leading to a reduction in the basis spread for a given port price. Transportation costs are treated as an exogenous cost shifter reflecting fuel prices, infrastructure conditions, and carrier pricing, rather than an equilibrium outcome of contemporaneous export volumes. Moreover, transportation rates are often set in advance (e.g. through contracts or posted tariffs), which weakens simultaneity between transportation costs and export volumes.

Similarly, the crop production variable ($P_{c,t}$) is anticipated to negatively affect the basis spread. Increases in local crop supply, tend to depress local prices relative to port prices, thereby reducing the basis spread. In contrast, total merchandise exports (X_{wt}) are expected to have a positive effect. Higher overall export activity reflects stronger macroeconomic demand that raises port prices and increases competition for transportation capacity. If transportation constraints or congestion limit the pass-through of these higher port prices to interior markets, local prices may rise by less than port prices, resulting in a widening of the basis spread. which can put upward pressure on local commodity prices relative to port prices, ultimately increasing the basis spread.

2.2 **Projection of key market drivers for the future marketing year 2025/26**

The projection of the U.S. export volumes for the 2025/2026 marketing year begins with country-level import growth rates obtained from the USDA Production, Supply, and Distribution (PSD) dataset (USDA-FAS, 2025). These growth rates are applied to the most recent U.S. export volumes reported by the Federal Grain Inspection Service (FGIS) for the 2024/2025 marketing year (USDA-AMS, 2025). Specifically, projected export volumes are calculated by multiplying each country's 2024/2025 US export volume by one plus its projected import growth rate[1], as shown in Equation 2.

$$E_{proj\_FGIS\_25\_26i} = E_{vol\_24\_25\_FGISi} \times (1 + growth_{25\_26\_PDSi}) \qquad (2)$$

where, $E_{proj\_FGIS\_25\_26i}$ is the projected export volume for country/region *i* in the 2025/2026 marketing year; $E_{vol\_24\_25\_FGISi}$ is the observed export volume for country/region *i* in the 2024/2025 marketing year (as reported in the FGIS dataset), and $growth_{25\_26\_PDSi}$ is the projected import growth rate for country/region *i* in 2025/2026, as reported in the PSD dataset.

It is important to note that projected import growth rates are used rather than direct export volume projections, as export projections for the 2025/2026 marketing year are not available. This approach relies on the assumption that U.S. exports to a given country or region grow at the same rate as that country's total imports. For instance, if a country's total imports are projected to increase by 10%, U.S. exports to that country are assumed to increase by 10% as well. This method is adopted because it provides a transparent, data-driven projection framework, avoiding the need for additional assumptions required by more complex forecasting models. It should also be noted that the projected import volumes reflect total imports from all trading partners, not exclusively from the United States.

Transportation costs are projected in two steps. First, the shipping cost per bushel per mile from collection points to potential exit ports is calculated following the methodology of Skevas et al. (2025) (see Section 3 for more details). Second, projected transportation costs for 2025/2026 are obtained by adjusting these values according to weekly percentage changes

[1] In Table A3 of Appendix 1, we present the growth rates for corn and soybeans between the projected imports for the year 2025/26 and the last historical year, 2024/25.

in diesel fuel prices relative to 2024/2025, based on projections from the U.S. Energy Information Administration (EIA) (U.S. EIA, 2023).

County-level production of corn and soybeans is projected using the annual percentage change in national production obtained from the USDA-PSD dataset, under the assumption that production in each county grows at the same rate as total national production. Total export merchandise is projected using export growth rates provided by the Deloitte Global Economic Research Center.

2.3 Estimating the predicted basis spread and the influence of export volume

The predicted basis spread is computed using the estimated parameters from Equation (1) in combination with the projected market-driver variables. This approach allows estimation of the basis spread for both the 2025/2026 and 2024/2025 marketing years, as shown in Equations (3) and (4).

$$\hat{B}_{ip,wt;25/26} = \hat{\alpha} + \hat{\beta}_1 E_{pd,tw;25/26} + \hat{\beta}_2 C_{ip,tw;25/26} + \hat{\beta}_3 P_{c,tw;25/26} + \hat{\beta}_4 X_{tw;25/26} \quad (3)$$

$$\hat{B}_{ip,wt;24/25} = \hat{\alpha} + \hat{\beta}_1 E_{pd,tw;24/25} + \hat{\beta}_2 C_{ip,tw;24/25} + \hat{\beta}_3 P_{c,tw;24/25} + \hat{\beta}_4 X_{tw;24/25} \quad (4)$$

The effect of projected market conditions on the basis spread is quantified as the difference between the predicted basis spreads for 2025/2026 ($\hat{B}_{ip,wt;25/26}$) and 2024/2025 ($\hat{B}_{ip,wt;24/25}$):

$$\Delta B_{25/26-24/25} = \hat{B}_{ip,wt;25/26} - \hat{B}_{ip,wt;24/25} \quad (5)$$

This calculation captures the influence of projected changes in export volumes, transportation costs, crop production, and total merchandise exports on the basis spread at each collection point, providing a measure of how future market conditions are expected to affect local pricing relative to port prices.

3. Data

The data used in this study are drawn from multiple sources. Export volumes are obtained from the Federal Grain Inspection Service (FGIS) of the USDA (USDA-AMS, 2025). This dataset covers weekly export volumes for the 2009/2010 through 2024/2025 marketing years, broken down by port of exit and destination country. It provides detailed insights into the temporal and spatial patterns of U.S. crop exports, highlighting the role of specific exit ports and destination markets.

Table 1 presents corn export volumes by port and country or region. U.S. corn exports are highly concentrated through the port of New Orleans, which accounts for over 80% of the total volume, followed by Vancouver with approximately 17%. Other ports, including Toledo, Norfolk, and Laredo, each contribute less than 1% of total exports. Because the table reports export shares conditional on the subset of ports used in this study, the share attributed to New Orleans is higher than unconditional national averages. By destination, the largest shares are directed to Japan (28%), South America (15%), and Mexico (14%), with additional significant volumes to Central America (13%), China (9%), and South Korea (6%).

Table 2 reports soybean export volumes by port and destination country or region. New Orleans serves as the primary gateway, handling 74.4% of total soybean exports, followed by Vancouver with 19.7%, while other ports contribute relatively minor shares. By destination, China is the dominant importer, receiving 56.7% of total exports. Additional major destinations include the European Union (12.2%), Other Asia and Oceania (8.3%), and Japan (4.8%).

Table 1. Corn export volumes by port and destination country/region, 2009/2010 to 2024/2025 (millions of bushels)

Country/Region	Toledo	New Orleans	Norfolk	Vancouver	Laredo	Total	Percentage by country/region
Canada	37.08					37.08	0.17%
Central America	0.75	2,749.06	66.38	13.32	0.14	2,829.65	12.93%
China		1,464.83	4.38	532.98		2,002.19	9.15%
Egypt	2.53	547.32				549.85	2.51%
Europe Union	36.01	444.01	0.22			480.24	2.19%
Japan		4,303.19	3.44	1,902.53		6,209.16	28.38%
South Korea		436.37	0.12	980.70		1,417.19	6.48%
Mexico	0.82	3,022.56		3.91	101.98	3,129.27	14.30%
Middle East		862.32	0.65	1.85		864.82	3.95%
Other Africa	21.59	341.67	30.23		0.03	393.52	1.80%
Other Asia and Oceania		169.89	5.18	118.19	0.02	293.29	1.34%
South America	2.63	3,278.76	50.89	14.08		3,346.36	15.29%
Taiwan		90.15	4.67	232.58		327.40	1.50%
Total	101.41	17,710.13	166.18	3,800.14	102.16	21,880.03	100.00%
Percentage by port	0.46%	80.94%	0.76%	17.37%	0.47%	100.00%	

Notes: See Appendix 1, Table A1 for details on how countries and regions were aggregated. Appendix 1, Table A2 provides the definitions used to align ports from the FGIS data with the six potential exit ports included in the analysis. Figures A1 in appendix 1 provides historical data by country or region and year for corn for readers interested in examining historical patterns. Export shares are calculated conditional on the ports used in this study. Other U.S. export ports, which account for roughly 10% of corn exports over the sample period, are not included. In addition, FGIS reports shipments to Mexico under an "Interior" category that aggregates multiple border crossings. When Interior–Mexico shipments are fully accounted for, the implied share of exports through New Orleans is approximately 58%, consistent with commonly reported benchmarks.

Table 2. Soybeans export volumes by port and destination country/region, 2009/2010 to 2024/2025 (millions of bushels)

Country/Region	Toledo	New Orleans	Norfolk	Vancouver	Laredo	Duluth	Total	Percentage by country/region
Canada	193.54						193.54	0.879%
Central America	0.20	196.42	29.09				225.72	1.025%
China		7,968.35	413.44	4,097.87	0.89		12,480.55	56.656%
Egypt	17.95	898.85	48.44				965.24	4.382%
Europe Union	81.58	2,499.08	94.22	2.20		0.91	2,677.09	12.153%
Japan	7.70	1,046.25	2.54	11.49			1,067.98	4.848%
South Korea		326.77	0.01				326.77	1.483%
Mexico		827.99	1.35		7.75		837.08	3.800%
Middle East	14.06	368.17	47.85				430.09	1.952%
Other Africa	3.49	135.28	88.62				227.39	1.032%
Other Asia and Oceania	0.06	1,543.83	154.44	137.20	0.33	0.06	1,835.85	8.334%
South America	2.31	382.85	17.08	1.07			403.30	1.831%
Taiwan		199.01	77.82	81.31	0.08		358.22	1.626%
Total	320.89	16,392.86	974.91	4,331.12	9.04	0.97	22,028.83	100.000%
Percentage by port	1.457%	74.415%	4.426%	19.661%	0.041%	0.004%	100.000%	

Notes: See Appendix 1, Table A1 for details on how countries and regions were aggregated. Appendix 1, Table A2 provides the definitions used to align ports from the FGIS data with the six potential exit ports included in the analysis. Figures A2 in appendix 1 provides historical data by country or region and year for soybeans for readers interested in examining historical patterns. Export shares are calculated conditional on the ports used in this study. Other U.S. export ports, which account for roughly 10% of corn exports over the sample period, are not included. In addition, FGIS reports shipments to Mexico under an "Interior" category that aggregates multiple border crossings. When Interior–Mexico shipments are fully accounted for, the implied share of exports through New Orleans is approximately 58%, consistent with commonly reported benchmarks.

Projected U.S. export data are obtained from the Production, Supply, and Distribution (PSD) database of the USDA-FAS (USDA-FAS, 2025), which provides comprehensive information on global agricultural production, supply, and distribution. The database includes key variables such as exports, imports, consumption, and ending stocks for a wide range of commodities, making it a central resource for analyzing international trade dynamics and market trends. For this analysis, historical annual import data by country or region from the 2010/2011 through 2024/2025 marketing years are used. Additionally, the PSD database provides updated import projections for the 2025/2026 marketing year, which are revised monthly; the most recent update was released in September 2025. Appendix 1 presents the data in detail: Table A3 shows the projected growth rates between the 2025/2026 and 2024/2025 marketing years for corn and soybeans, while Figures A3 and A4 display the historical import patterns by country or region for corn and soybeans, respectively.

Regarding collection points, the study covers 16 states in the U.S. Corn Belt region, including 3,742 locations for corn and 3,523 for soybeans. These collection points have access to six major export ports, identified as primary gateways for U.S. grain exports. Each collection point may have one or more potential least-cost routes to these ports, determined based on spatial proximity. In most cases, crops from a single state can be linked to multiple ports, allowing for multiple state-port shipment options and reflecting the potential for trade to flow in different directions. Table 3 summarizes the connections between collection points in each state and the six potential exit ports.

Table 3. Potential ports of exit by state location of collection points.

State	Potential port of exit
Arkansas	Laredo (TX), New Orleans (LA)
Colorado	Laredo (TX), Vancouver (WA)
Illinois	Duluth (MN), New Orleans (LA)
Indiana	Toledo (OH), New Orleans (LA)
Iowa	Duluth (MN), Laredo (TX), New Orleans (LA), Vancouver (WA)
Kansas	Laredo (TX), New Orleans (LA)
Kentucky	New Orleans (LA)
Michigan	Toledo (OH)
Minnesota	Duluth (MN), Vancouver (WA)
Missouri	Laredo (TX), New Orleans (LA)
Nebraska	Laredo (TX), Vancouver (WA)
North Dakota	Laredo (TX), Vancouver (WA)
Ohio	New Orleans (LA), Toledo (OH), Norfolk (VA)
Oklahoma	Laredo (TX), New Orleans (LA)
South Dakota	Duluth (MN), Vancouver (WA)
Wisconsin	Duluth (MN)

Concerning basis spread data, values for New Orleans are obtained from the USDA Office of the Chief Economist (USDA-OCE, 2024). For other ports—Duluth, Laredo, Norfolk, Toledo, and Vancouver—the basis spread is calculated as the difference between collection point prices (USDA-OCE, 2024) and port export prices (GeoGrain, 2024). Daily observations are aggregated to produce weekly averages for all ports.

Shipping costs are estimated using a least-cost approach that combines distance from each collection point to the exit port—derived from a GIS analysis of the multimodal transportation network (road, rail, and river)—with per-mile, per-bushel freight rates. Freight rate data are obtained from publicly available North Central freight rates (USDA-AMS, 2023a), average rail rates including fuel surcharges (USDA-AMS, 2023a; USDA-AMS, 2013), and barge rates from St. Louis (USDA-AMS, 2023b). Where necessary, ordinary least squares regressions are used to link transportation rates to diesel prices (U.S. Energy Information Administration, 2023) to estimate or extrapolate these costs. Additional details on traveled distances and transportation costs are provided in Skevas et al. (2025).

County-level crop production is calculated using acreage and yield data from the USDA Farm Service Agency. Corn and soybean acreage are obtained from annual acreage reports (USDA - FSA, 2023a) and multiplied by the corresponding county-level yields (USDA - FSA, 2023b). Monthly data on total merchandise exports are obtained from the

United States International Trade Commission (USITC) data portal, capturing the total value of all goods and services exported from the U.S. Projections for crop production, transportation costs, and total export merchandise for the 2025/2026 marketing year are described in detail in Appendix 2 and Figures A5–A10.

Finally, Tables 4 and 5 present summary statistics for corn and soybeans, respectively, providing an overview of the variables used in the empirical analysis.

Table 4. Summary statistics of variables of interest – corn (N = 1,549,200)

Variable	Unit	Mean	Std. Dev.	Min	Max
basis_spread	$/bushel	-0.328	0.448	-4.523	2.010
CostPerBushel	$/bushel	1.354	0.734	0.010	4.963
production	10 million bushel/county	2.076	1.432	0.000	6.789
export_total_merchandise	10 billion $	13.296	1.567	9.260	18.010
export_crop_volume_total	1 million bushels	2.592	2.890	0.001	28.826
expor_Vol_CANADA	1 million bushels	0.002	0.036	0.000	1.261
expor_Vol_CENTRAL_AMERICA	1 million bushels	0.003	0.059	0.000	8.911
expor_Vol_CHINA	1 million bushels	0.093	0.620	0.000	16.621
expor_Vol_EGYPT	1 million bushels	0.000	0.024	0.000	12.228
expor_Vol_EUROPE_UNION	1 million bushels	0.001	0.019	0.000	5.579
expor_Vol_JAPAN	1 million bushels	0.265	1.119	0.000	16.088
expor_Vol_KOREA_REP	1 million bushels	0.112	0.478	0.000	10.045
expor_Vol_MEXICO	1 million bushels	0.151	0.718	0.000	8.125
expor_Vol_MIDDLE_EAST	1 million bushels	0.037	0.324	0.000	10.368
expor_Vol_OTHER_AFRICA	1 million bushels	0.002	0.037	0.000	6.955
expor_Vol_OTHER_ASIA_AND_OCEANIA	1 million bushels	0.032	0.275	0.000	6.397
expor_Vol_SOUTH_AMERICA	1 million bushels	1.792	2.980	0.000	28.826
expor_Vol_TAIWAN	1 million bushels	0.104	0.533	0.000	6.814
expor_VolPort_Laredo	1 million bushels	0.042	0.082	0.000	0.533
expor_VolPort_NewOrleans	1 million bushels	1.966	2.959	0.000	28.826
expor_VolPort_NorFolk	1 million bushels	0.003	0.042	0.000	2.393
expor_VolPort_Toledo	1 million bushels	0.004	0.052	0.000	1.261
expor_VolPort_Vancouver	1 million bushels	0.577	1.450	0.000	11.643

Table 5. Summary statistics of variables of interest – soybeans (N = 1,342,063)

Variable	Unit	Mean	Std. Dev.	Min	Max
basis_spread	$/bushel	-0.664	0.761	-3.464	3.650
CostPerBushel	$/bushel	1.373	0.831	0.009	4.963
production	10 million bushel/county	0.926	1.096	0.000	6.748
export_total_merchandise	10 billion $	13.368	1.617	9.260	18.010
export_crop_volume	1 million bushels	2.899	4.815	0.001	54.637
expor_Vol_CANADA	1 million bushels	0.016	0.173	0.000	3.716
expor_Vol_CENTRAL_AMERICA	1 million bushels	0.000	0.007	0.000	1.602
expor_Vol_CHINA	1 million bushels	1.942	4.950	0.000	54.637
expor_Vol_EGYPT	1 million bushels	0.002	0.049	0.000	9.782
expor_Vol_EUROPE_UNION	1 million bushels	0.013	0.142	0.000	16.659
expor_Vol_JAPAN	1 million bushels	0.013	0.148	0.000	6.180
expor_Vol_KOREA_REP	1 million bushels	0.031	0.212	0.000	6.281
expor_Vol_MEXICO	1 million bushels	0.003	0.074	0.000	4.314
expor_Vol_MIDDLE_EAST	1 million bushels	0.040	0.322	0.000	5.159
expor_Vol_OTHER_AFRICA	1 million bushels	0.009	0.117	0.000	3.254
expor_Vol_OTHER_ASIA_AND_OCEANIA	1 million bushels	0.387	1.334	0.000	13.518
expor_Vol_SOUTH_AMERICA	1 million bushels	0.246	0.783	0.000	9.529
expor_Vol_TAIWAN	1 million bushels	0.196	0.654	0.000	4.929
expor_VolPort_Duluth	1 million bushels	0.000	0.004	0.000	0.122
expor_VolPort_Laredo	1 million bushels	0.003	0.013	0.000	0.136
expor_VolPort_NewOrleans	1 million bushels	0.821	1.557	0.000	54.637
expor_VolPort_NorFolk	1 million bushels	0.006	0.054	0.000	5.462
expor_VolPort_Toledo	1 million bushels	0.034	0.217	0.000	3.716
expor_VolPort_Vancouver	1 million bushels	2.035	4.929	0.000	34.670

4. Results

4.1 Basis spread regressions

The estimation results of the basis spread regression (i.e., Equation 1) are presented in Table 6, with Column 1 showing estimates for corn and Column 2 for soybeans. Hausman tests yield Chi-squared statistics of 2,864 for the corn model and 6,846 for the soybean model, with p-values effectively equal to zero. These results support the use of a fixed effects specification over a random effects specification. Accordingly, Table 6 reports results from the fixed effects models. For the estimates, we use total export volume by country. Total export volume by country is used in the main specification, with an alternative specification including total export volume shown in Table A5 (Appendix 3). The country-specific export volume specification is preferred because it yields a lower Akaike Information Criterion (AIC) compared to the total export volume specification. We also considered estimating models using export volume by port of exit. However, export volumes from certain ports were highly correlated with the shipping cost variable, raising potential multicollinearity concerns. Therefore, we did not pursue this alternative. These are linear regressions whose coefficients are not elasticities, so subsequent discussion recounts the units along with the parameters.

Table 6. Basis spread regression 2010 – 2022, corn and soybeans

VARIABLES	Corn	Soybeans
CostPerBushel	-0.262***	-0.411***
	(0.000547)	(0.000831)
Production	-0.0798***	-0.00835***
	(0.000638)	(0.000478)
export_total_merchandise	0.0227***	0.0634***
	(0.000157)	(0.000292)
expor_Vol_CANADA	-0.478***	-0.128***
	(0.00657)	(0.00242)
expor_Vol_CENTRAL_AMERICA	-0.132***	-0.517***
	(0.00376)	(0.0563)
expor_Vol_CHINA	-0.0707***	-0.0448***
	(0.000382)	(1.00e-04)
expor_Vol_EGYPT	-0.0629***	-0.255***
	(0.00905)	(0.00811)
expor_Vol_EUROPE_UNION	-0.225***	-0.211***
	(0.0114)	(0.00293)
expor_Vol_JAPAN	-0.0672***	-0.199***
	(0.000230)	(0.00269)
expor_Vol_KOREA_REP	-0.116***	-0.204***
	(0.000348)	(0.00536)
expor_Vol_MEXICO	0.0518***	-0.0819***
	(0.000479)	(0.00190)
expor_Vol_MIDDLE_EAST	-0.0810***	-0.0819***
	(0.000687)	(0.00125)
expor_Vol_OTHER_AFRICA	-0.263***	-0.165***
	(0.00609)	(0.00345)
expor_Vol_OTHER_ASIA_AND_OCEANIA	-0.0918***	-0.0688***
	(0.000817)	(0.000310)
expor_Vol_SOUTH_AMERICA	-0.0302***	-0.192***
	(9.25e-05)	(0.000548)
expor_Vol_TAIWAN	-0.103***	-0.136***
	(0.000429)	(0.000628)
Constant	-0.00146	-0.737***
	(0.00217)	(0.00362)
Observations	1,549,200	1,342,063
R-squared	0.629	0.636
AIC (Akaike Information Criterion)	371,029	1,720,376

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For crop export volume, negative coefficients are observed for all countries, as expected, except for Mexico in the corn regression. Increases in export volume imply higher crop flows toward exit ports, potentially straining the distribution system, creating inefficiencies in grain movement, and reducing the basis spread. As export volumes rise, transportation networks—including rail, barge, and truck—may experience bottlenecks and capacity constraints, increasing transportation costs. Higher transportation costs reduce local demand, lowering local prices and consequently decreasing the basis spread given port prices. For example, for exports to Canada, the negative coefficients on export volume (−\$0.48/bushel for corn and −\$0.13/bushel for soybeans) indicate that an increase of one million bushels in exports to Canada is associated with a decrease in the basis spread of \$0.48 for corn and \$0.13 for soybeans.

The positive coefficient of Mexico although counterintuitive, may reflect the strong integration between the U.S. and Mexican grain markets, particularly for corn. High export volumes, steady demand, and Mexico's reliance on U.S. supply can lead to rapid transmission of Mexican demand changes to local U.S. prices, especially near key export corridors such as Laredo and New Orleans. In some cases, the effect on local prices can exceed that on port prices, causing local prices to rise relative to port prices and increasing the basis spread. This occurs as local collection points compete for corn, pushing local prices upward faster than port prices.

Other variables behave in line with expectations for both corn and soybeans. Transportation costs exhibit a negative coefficient, indicating that higher shipping costs reduce local demand, depress local prices, and lower the basis spread given port prices. Crop production also shows a negative association with the basis spread; increases in local production exert downward pressure on local prices relative to port prices, reducing the basis spread. Conversely, total merchandise exports display a positive relationship with the basis spread. Higher overall demand for U.S. exports (including corn and soybeans) raises, local prices relative to port prices, resulting in an increased basis spread.

4.2 Effect of projected market drivers on basis spread

The basis spread is estimated using Equation (3) for the 2025/2026 marketing year and Equation (4) for 2024/2025. These calculations combine the parameter estimates reported in Table 6 with projected values for 2025/2026 and actual values for 2024/2025 of export volumes, shipping costs, crop production, and total export merchandise. Table 7 reports descriptive statistics for the estimated basis spreads for both marketing years, along with the week-to-week differences between the two years as expressed in Equation (5). These differences capture the impact of key market drivers on basis spreads within the Corn Belt for the 2025/2026 marketing year.

For both corn and soybeans, the differences are negative and statistically significant (-$0.03/bushel for corn and -$0.02/bushel for soybeans), indicating that projected changes in critical market drivers are, on average, associated with a decrease in the basis spread.

Table 7. Descriptive statistics estimated basis spread 2025/2026 vs. 2024/2025 ($/bushel)

	Corn (N = 96,877)		Soybeans (N = 79,883)	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Estimated basis spread 2025/2026	-0.4906	0.4442	-0.6557	0.6369
Estimated basis spread 2024/2025	-0.4587	0.4329	-0.6340	0.6162
Estimated Difference	-0.0319***	0.0420	-0.0217***	0.0575

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

To further explore distributional effects, differences across percentiles are analyzed. Figure 1 illustrates these results for corn and soybeans. For corn, differences are negative across the 10^{th} to 90^{th} percentiles and only slightly positive at the 100th percentile, indicating that basis spreads generally decreased in 2025/2026 relative to 2024/2025 for most of the distribution. The largest reduction occurs at the 10th percentile (-$0.08/bushel) and gradually diminishes toward zero at the 90th percentile.

Soybeans exhibit a similar but more variable pattern: negative differences dominate up to the 60th percentile (-$0.11/bushel at the 10th percentile), approaching zero around the 70th–80th percentiles. These results suggest that while basis spreads generally declined for both crops in 2025/2026, the effect is somewhat more variable for soybeans than for corn.

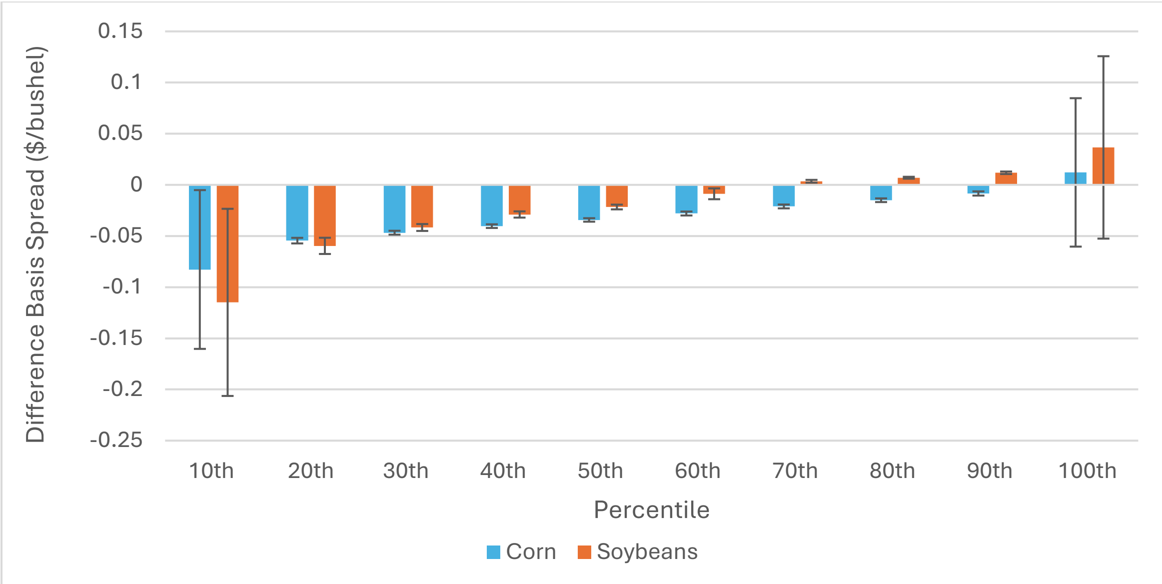

Figure 1. Change in Estimated Basis Spreads from 2024/2025 to 2025/2026 – Corn and Soybeans

4.3 Effect of projected export volume at county level and port of exit

Figures 2 and 3 show the county-level effects of the main market determinants on the basis spread, defined as the difference between the estimated 2025/2026 and 2024/2025 basis spreads, for corn and soybeans, respectively.

For corn (Figure 2), the basis spread declined slightly across most counties, with a mean change of -$0.026/bushel. Most counties experienced reductions ranging from -$0.036/bushel to -$0.014/bushel, with the largest decreases observed in Minnesota, Iowa, Nebraska, Michigan, South Dakota, and North Dakota.

For soybeans (Figure 3), most counties experienced modest decreases, with a mean change of -$0.021/bushel. The largest reductions occurred in Minnesota, North Dakota, South Dakota, Nebraska, and Iowa. The spatial distribution highlights regional heterogeneity, with soybean basis spread changes exhibiting greater variability than those for corn.

Overall, these results suggest that, on average, projected market conditions contributed to a modest decline in the basis spread across the study region, although a few counties experienced slight increases, reflecting localized variations in market dynamics.

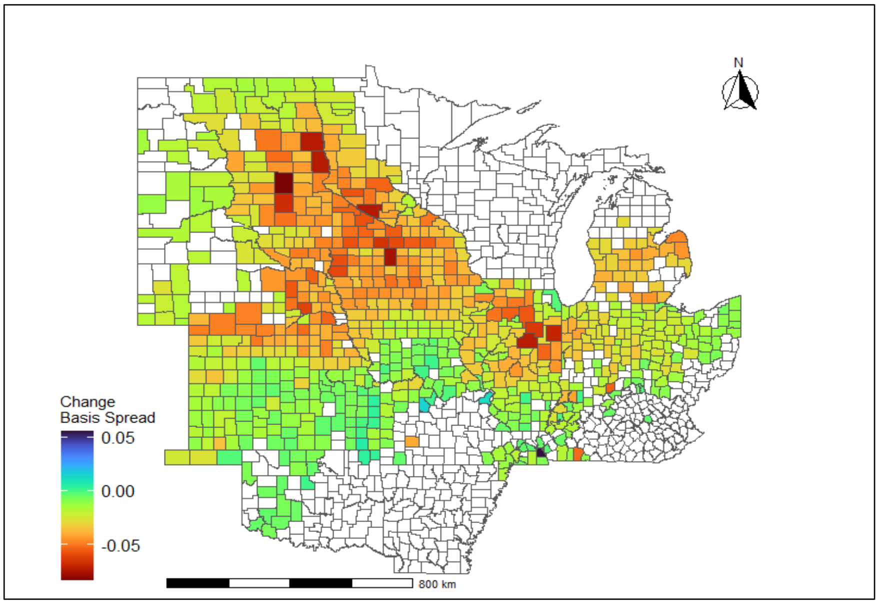

Figure 2. Average differences between 2025/2026 and 2024/2025 basis spread at county level

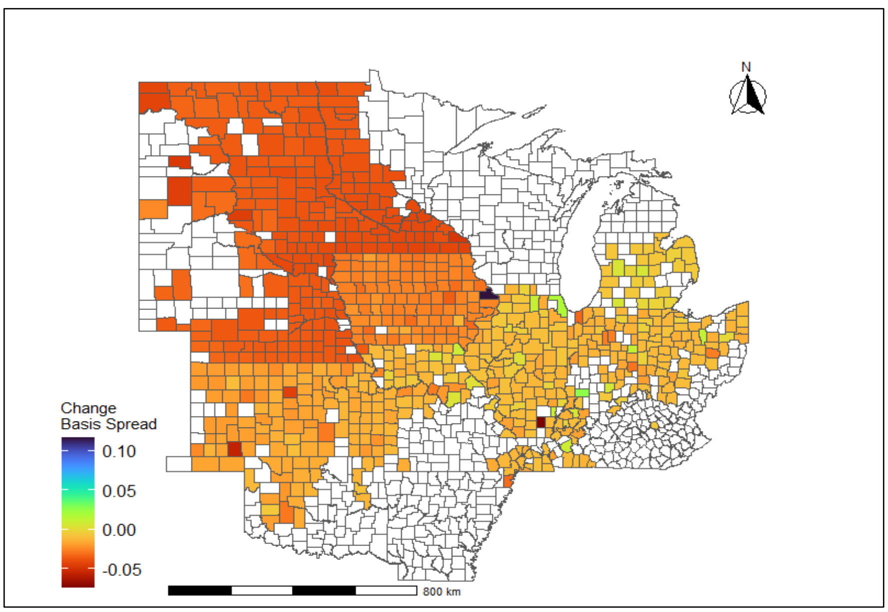

Figure 3. Average differences between 2025/2026 and 2024/2025 basis spread at county level

The average difference in basis spread is calculated at the county level, considering that each collection point in our study may have one or more potential exit ports. For this analysis, all collection points with potential shipments to one of the five ports under consideration are included.

Figure 4 illustrates county-level changes in corn basis spreads between 2025/2026 and 2024/2025 by port of exit. Overall, most counties experienced decreases, consistent with patterns observed in Figure 2. The largest reductions occurred in counties exporting through Laredo and Vancouver. Toledo shows uniformly moderate declines, while Norfolk exhibits the smallest changes. Notably, New Orleans displays localized increases in some counties despite the overall downward trend.

Figure 5 illustrates county-level changes in soybean basis spreads. Most counties experienced modest declines, with Vancouver showing the largest and most consistent reductions. Smaller decreases were observed for Laredo and Toledo, while changes in Norfolk were minimal. New Orleans again stands out, with some counties experiencing substantial localized increases despite the overall decline.

These results for both corn and soybeans demonstrate that the magnitude and direction of basis spread changes vary across ports, reflecting regional differences in market conditions and transportation factors. County-level basis spreads respond heterogeneously to changes in key market drivers, including export volume, production, transportation costs, and total export merchandise.

The impact of individual market drivers is also of interest. Appendix 4 details the approach used to estimate the effect of each explanatory variable. For instance, an increase in export volume is associated with an average reduction in the basis spread of −\$0.0036 for corn and −\$0.0136 for soybeans. Appendix 4 provides detailed results on the effects of individual explanatory variables, the combined impact of export volume and crop production, and county level results.

Among the individual market drivers, production changes had the largest average effect for corn, with an estimated −\$0.0222/bushel impact on the basis spread, followed by shipping costs, which showed an offsetting average increase of \$0.0228/bushel. For soybeans, export volume exhibited the strongest influence, reducing the basis spread by an average of −\$0.0136/bushel, while changes in shipping costs also contributed a negative, though slightly smaller, effect (−\$0.0101/bushel). These results suggest that, for corn, both supply-side (production) and cost-side fluctuations (shipping) dominate the spatial and temporal variation in the basis spread, while for soybeans, export-driven demand shifts are the most important determinant.

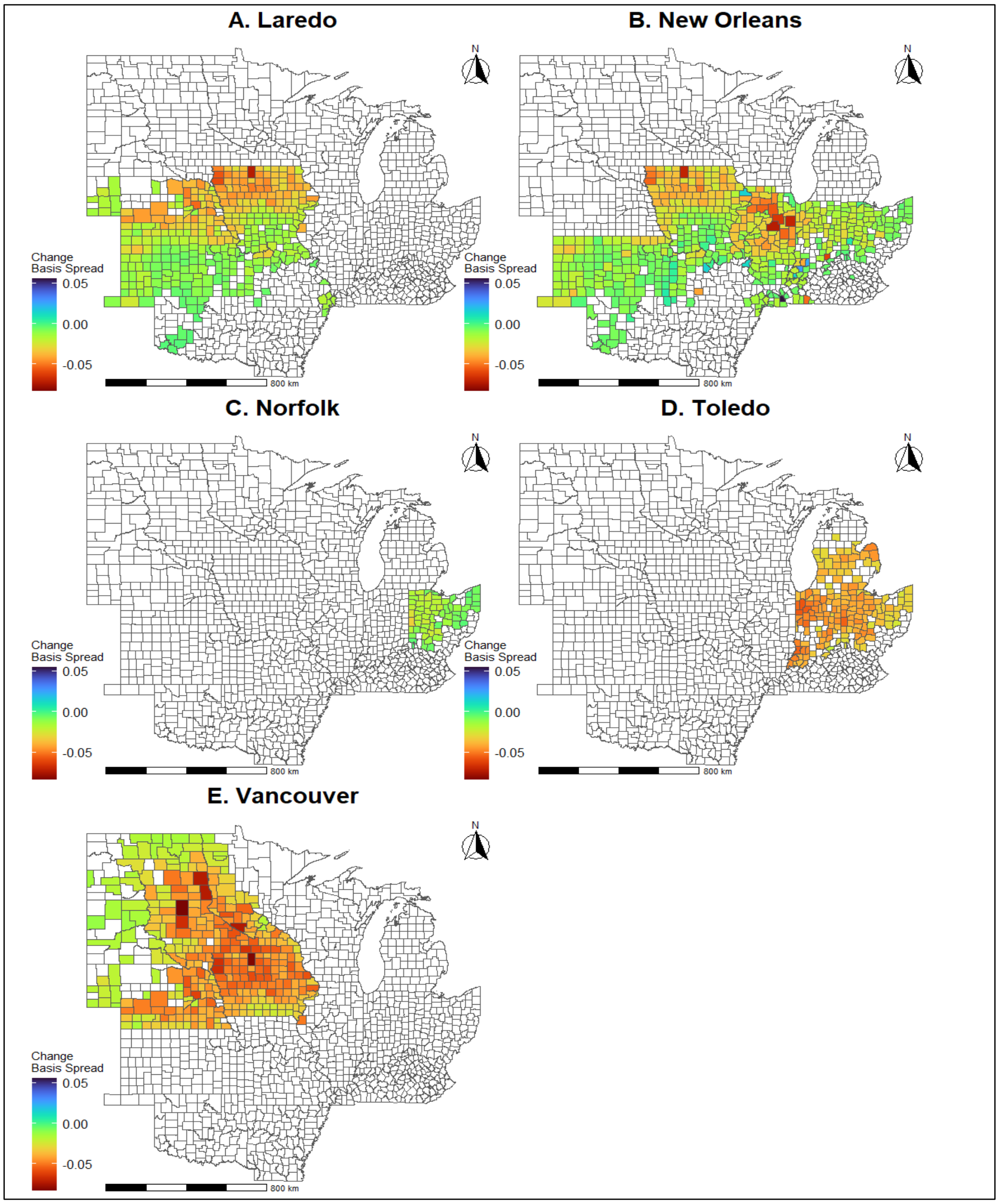

Figure 4. **Average differences between 2025/2026 and 2024/2025 basis spread at county level by port of exit – corn**

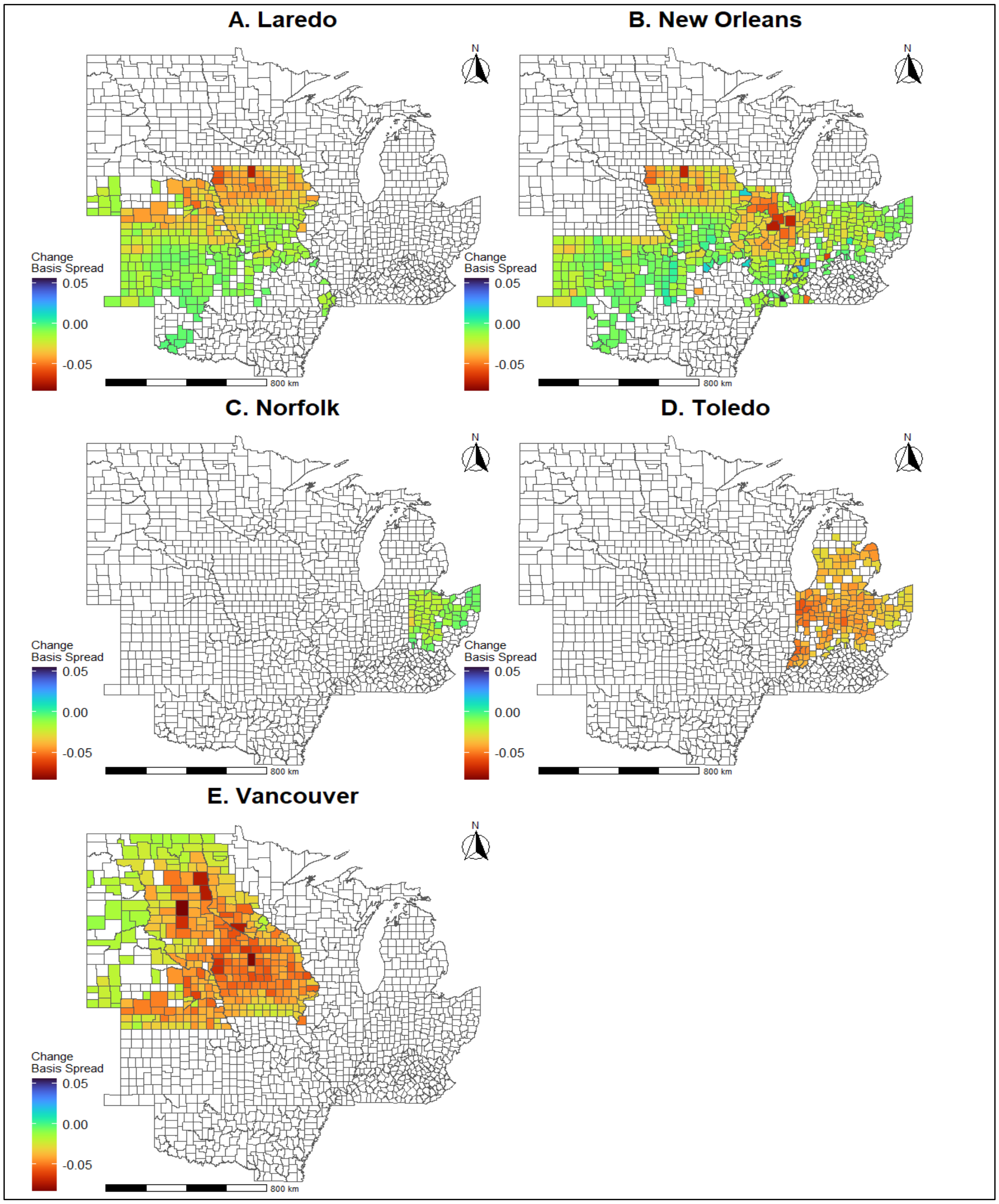

Figure 5. Average differences between 2025/2026 and 2024/2025 basis spread at county level by port of exit – soybeans

In most cases, negative changes in the estimated basis spread between 2024/2025 and 2025/2026 are observed, primarily driven by shifts in export volumes, production, and transportation costs. These results align with the expected effects outlined in the methodology. First, changes in export volumes alter foreign demand for U.S. crops, potentially generating congestion or disruptions in the transportation network. Such bottlenecks can lower local prices relative to port prices, leading to weaker basis spreads. Second, increases in production expand local supply, which similarly exerts downward pressure on local prices relative to port prices and reduces the basis spread. According to PSD–USDA projections, corn production is expected to rise by 13.1% between 2024/2025 and 2025/2026, while soybean production is projected to decline by 1.5% during the same period. Third, higher transportation costs tend to reduce local demand, further depressing local prices relative to port prices and narrowing the basis spread. However, the U.S. Energy Information Administration indicates that diesel prices, and therefore transportation costs, will decrease by 2.7% slightly offsetting this effect.

Spatially, the effects are most pronounced in northern and northwestern counties, including Minnesota, Iowa, Nebraska, Michigan, South Dakota, and North Dakota, where basis spreads show the largest decreases, particularly for soybeans. Soybean producers in these regions may face additional challenges due to the ongoing decline in Chinese demand. The northwestern Corn Belt is especially vulnerable, as basis spreads in this region are highly sensitive to disruptions in traditional export markets. Much of the transportation and storage infrastructure in this area, including railroads, ports, and river, was developed to serve Chinese demand. As exports to China decline, this infrastructure faces challenges in efficiently redirecting soybeans to alternative buyers, leading to limited marketing outlets. As a result, local cash prices may fall, and basis spreads have weakened, especially in more remote regions farther from major export markets.

5. Conclusions and Discussion

This study provides an empirical assessment of how projected market drivers for the 2025/2026 marketing year influence U.S. basis spreads and, by extension, the agricultural transportation network. By linking projections of crop production, export volumes, total merchandise exports, and shipping costs to collection point–level basis spreads, we demonstrate that anticipated changes in these market drivers are associated with a modest decline in average basis levels for both corn and soybeans.

County-level analysis reveals that basis spreads for both crops generally declined in 2025/2026 compared to 2024/2025, with average reductions of −\$0.026/bushel for corn and −\$0.021/bushel for soybeans. The most pronounced decreases occurred in northern and northwestern counties, including those in Minnesota, Iowa, Nebraska, South Dakota, and North Dakota.

When disaggregated by port of exit, the results indicate that basis spread changes are not uniform across regions. For corn, the largest reductions occurred in counties exporting through Laredo and Vancouver, while Toledo and Norfolk exhibited more moderate declines. In contrast, New Orleans displayed localized increases, despite the overall downward trend. For soybeans, Vancouver showed the most consistent decreases, followed by smaller declines through Laredo and Toledo, minimal changes in Norfolk, and localized increases in New Orleans. These spatial patterns highlight the heterogeneous response of county-level basis spreads to key market drivers, shaped by regional conditions and port-specific transportation dynamics.

The results underscore the central role of export-driven demand (crop and total export merchandise), transportation costs, and production patterns in shaping basis spread dynamics. Among these, production and shipping cost fluctuations exerted the largest effects on corn basis spreads, while export volume changes were the dominant factor for soybeans. These findings highlight that supply- and cost-side factors are more influential for corn, whereas demand-side conditions drive basis spread adjustments for soybeans. Moreover, the findings highlight the vulnerability of U.S. soybean markets in the northern Corn Belt, where heavy dependence on the Chinese market has limited the adaptability of infrastructure and supply chains to shifting trade flows.

Overall, these findings carry important implications. Infrastructure planning, might take into account the sensitivity of costs to move commodities to ports of exit, such as the importance to soybean spread of the distribution system from the Northern Corn Belt to the PNW and to China’s soybean imports. In particular, the results highlight the potential role of congestion during periods of high export demand, suggesting that policies might focus not only on long-term infrastructure expansion but also on improving peak-capacity management and coordination across transportation modes. Logistics optimization can benefit by exploiting USDA – or other – projections of market conditions to draw out the impacts on basis spread. Firms could move product differently, shift storage locations, or take other steps to ease system stress and save money. Policies that intend to increase efficiency and resiliency can be based on forward-looking estimates of basis spreads that take into account production expectations, trade outlook, and other factors. Given the strong regional heterogeneity identified in the results, such policies may be more effective if they are geographically targeted, particularly toward northern and northwestern regions that are more vulnerable to basis declines. Moreover, policy makers and businesses can estimate the impacts of trade changes resulting from trade disruptions or trade deals on the crop distribution system, basis spreads, and fundamentally on buyers and sellers of the main to US row crops. The findings also suggest that greater diversification of export markets may help reduce vulnerability to demand shocks from individual trading partners, particularly in the case of soybeans.

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Appendix 1. Export volume information

Table A1. Aggregation of countries and regions

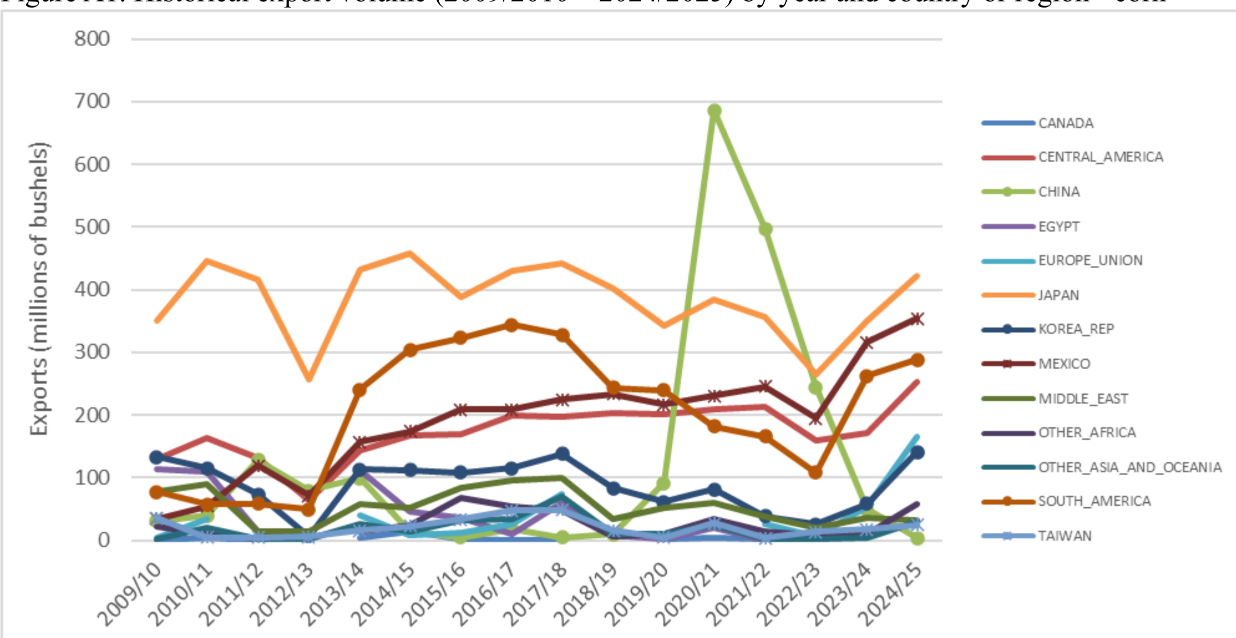
Country/Region	Country/Region
-MEXICO	-MIDDLE_EAST
-JAPAN	ISRAEL
-CHINA	SYRIA
-KOREA REP	UN ARAB EM
-TAIWAN	LEBANON
-EGYPT	JORDAN
-CANADA	OMAN
-CENTRAL_AMERICA	YEMEN
EL SALVADOR	QATAR
COSTA RICA	BAHRAIN
GUATEMALA	SAUDI ARABIA
HONDURAS	-OTHER_ASIA_AND OCEANIA
DOMINICN REP	VIETNAM
PANAMA	INDONESIA
JAMAICA	MALAYSIA
NICARAGUA	PHILIPPINES
CUBA	HONG KONG
TRINIDAD	THAILAND
BARBADOS	MACAO
GUYANA	SINGAPORE
HAITI	BANGLADESH
ST. VINCENT	AFGHANISTAN
ST. LUCIA	IRAN
GRENADA	SRI LANKA
SURINAME	NEPAL
-SOUTH_AMERICA	BURMA
VENEZUELA	INDIA
CHILE	NEW ZEALAND
ECUADOR	FRENCH POLY
COLOMBIA	MAYOTTE
PERU	AUSTRALIA
BRAZIL	-OTHER_AFRICA
-EUROPE UNION	MOROCCO
SPAIN	ALGERIA
PORTUGAL	TUNISIA
NETHERLANDS	LIBYA
IRELAND	SUDAN
GERMANY	NIGERIA
ITALY	SENEGAL
UN KINGDOM	GHANA
TURKEY	MOZAMBIQUE
ROMANIA	SOMALIA
BELARUS	CONGO (KINS)
FRANCE	CAPE VERDE
BULGARIA	CAMEROON
SWITZERLAND	TANZANIA
ICELAND	CHAD
	REP SOUTH AFRICA

Table A2. Ports from the FGIS dataset matched to the six potential exit ports used in the analysis

FGIS Data Set				Potential exit ports
Port	AMS Region	FGIS Region	State	Port
INTERIOR	INTERIOR	INTERIOR	Texas	Laredo
MISSISSIPPI R.	GULF	EAST GULF		New Orleans
S. ATLANTIC	ATLANTIC	EAST COAST		Norfolk
TOLEDO	LAKES	LAKES		Toledo
DULUTH-SUPERIOR	LAKES	LAKES		Duluth
COLUMBIA R.	PACIFIC	WEST COAST		Vancouver

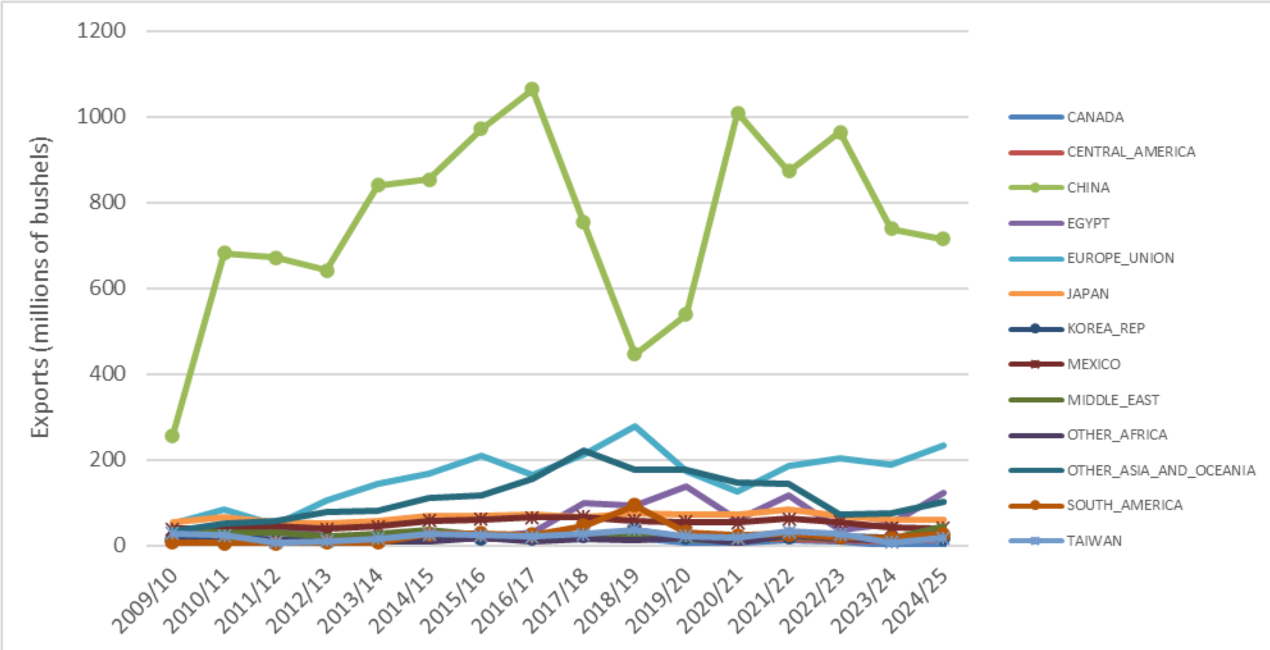
Note: AMS = Agricultural Marketing Service Region; FGIS= Federal Grain Inspection Service Region

Figure A1. Historical export volume (2009/2010 – 2024/2025) by year and country or region - corn



Source: Grain Inspection Service (FGIS) dataset from USDA. The latest available data extends through June 2025. To complete the 2024/2025 marketing year, estimates for July and August 2025 are based on the annual growth rate. The final report will incorporate the full, updated marketing year once the data becomes available.

Figure A2. Historical export volume (2009/2010 – 2024/2025) by year and country or region - soybeans



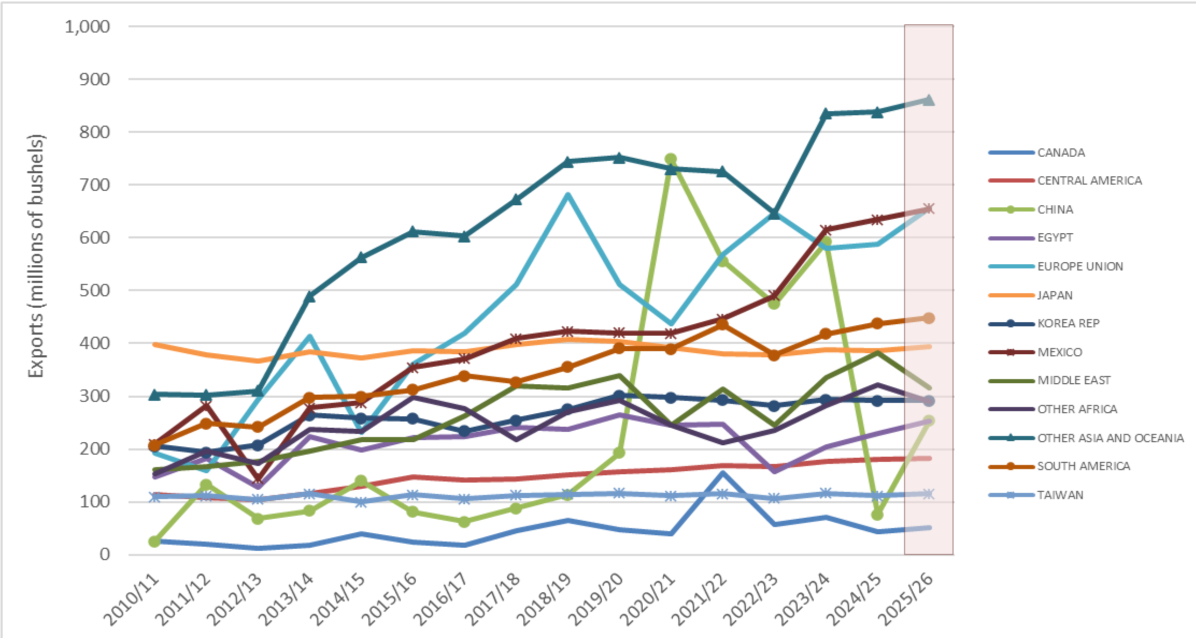
Source: Grain Inspection Service (FGIS) dataset from USDA. The latest available data extends through June 2025. To complete the 2024/2025 marketing year, estimates for July and August 2025 are based on the annual growth rate from the 2024/2025 Production, Supply, and Distribution (PDS) dataset. The final report will incorporate the full, updated marketing year once the data becomes available.

Table A3. Growth rate between 2024/25 (last year) and 2025/26 (projected year) – corn and soybeans

Country/Region	Growth Rate Corn	Growth Rate Soybeans
CANADA	17.65%	44.58%
CENTRAL_AMERICA	0.77%	-7.04%
CHINA	233.33%	5.16%
EGYPT	11.11%	4.44%
EUROPE_UNION	11.68%	-3.37%
JAPAN	1.97%	0.00%
KOREA_REP	0.00%	0.87%
MEXICO	3.20%	4.69%
MIDDLE_EAST	-17.14%	-3.04%
OTHER_AFRICA	-9.73%	1.51%
OTHER_ASIA_AND_OCEANIA	2.88%	13.97%
SOUTH_AMERICA	2.26%	1.48%
TAIWAN	3.41%	11.32%

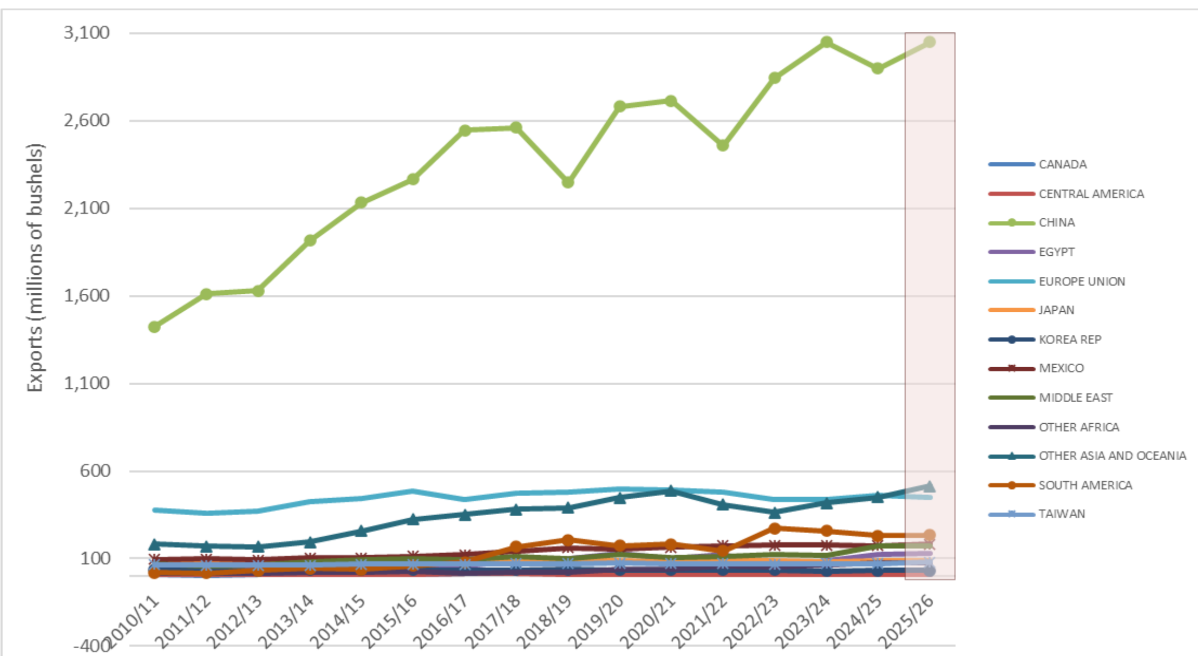
Note: growth rate is defined as [(projected value 2025/2026 – last year value 2024/2025)/ last year value 2024/2025]*100

Figure A3. Historical and projected import volume by country or region – corn



Note: The shaded area represents the projection for the 2025/26 year. Source provided by Production, Supply, and Distribution (PDS) data set from USDA

Figure A4. Historical and projected import volume by country or region - soybeans



Note: The shaded area represents the projection for the 2025/26 year. Source provided by Production, Supply, and Distribution (PDS) data set from USDA

Appendix 2. Prediction of control variables

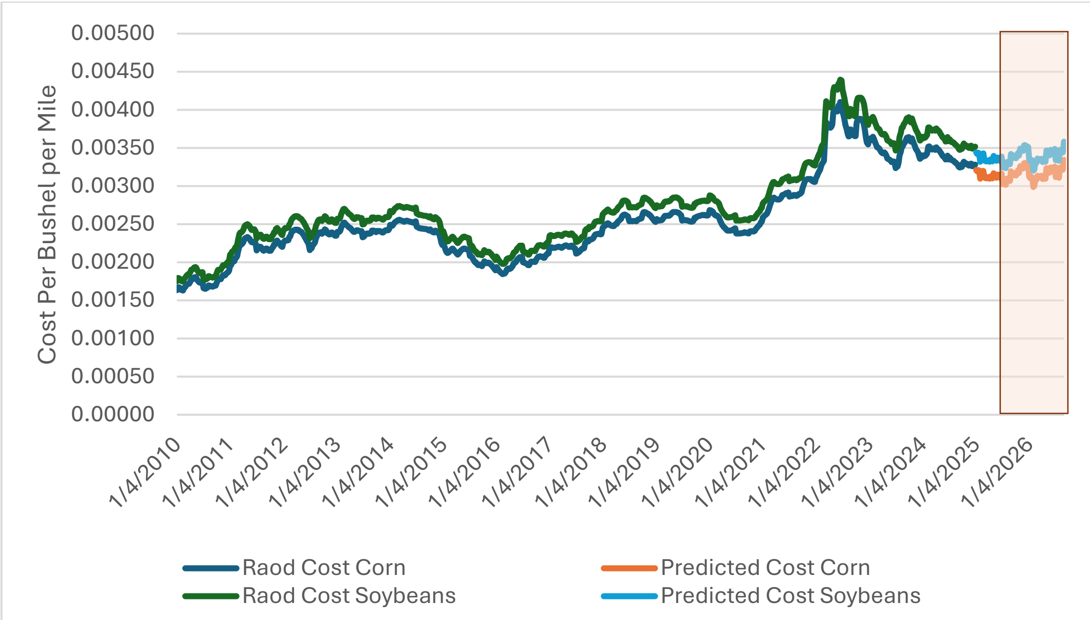
To assess the effect of projected market drivers on the basis spread, it is necessary to forecast the variables included in the regression model. Table A4 summarizes these variables, detailing their historical coverage, update frequency, projected years, data sources, and the forecasting methods applied for the 2025/2026 marketing year (September 2025–August 2026). The control variables include transportation costs (road, rail, and river), crop production (corn and soybeans), and total U.S. merchandise exports. Figures A5 to A10 illustrate the historical trends and forecasted values for each control variable. Overall, the projections closely follow historical patterns, supporting their reliability for the analysis.

Table A4. Prediction of the control variables

Variable	Period available	Frequency	Updated Period	Predicted Period	Source to predict	Method
Road cost	2010-2022	Weekly - Total US	January 2023 to August 2025	September 2025 to August 2026	U.S. Energy Information Administration (EIA)	Using projected diesel fuel prices (per gallon), the cost per bushel per mile for 2025/2026 is projected by applying weekly percent changes from 2024/2025. For example, the cost per bushel for the last week of 2025 is derived from the percent change in diesel prices between the last week of 2024 and the projected diesel price for the last week in 2025.
River cost	2010-2022	Weekly - Total US	January 2023 to August 2025	September 2025 to August 2026		
Rail cost	2010-2022	Weekly - Total US	January 2023 to August 2025	September 2025 to August 2026		
Corn Production	2010-2022	Annual county level	January 2023 to August 2024	September 2024 to August 2026	Production, Supply, and Distribution (PDS) data set from USDA	We estimate crop production for 2024/2025 and 2025/2026 using the annual percent change in each crop's actual and projected national production. Since county-level data are only available through 2023/2024, we project production at the county level by applying the annual percent change in national production from the PSD database. Specifically, we use the actual national production value for projecting 2024/2025 and the projected value for projecting 2025/2026.
Soybeans production	2010-2022	Annual - county level	January 2023 to August 2024	September 2024 to August 2026		
Total Export Merchandise	2010-2022	Monthly - Total US	January 2023 to December 2024	January 2025 to August 2026	Deloitte Global Economics Research Center	We use export growth projections provided by Deloitte, which forecast a 0.7% increase in total exports in 2025 (January to December) and 1% in 2026 (January to December). To estimate monthly export volumes for 2025/2026, we apply this annual growth rate proportionally to each month of 2024/2025.

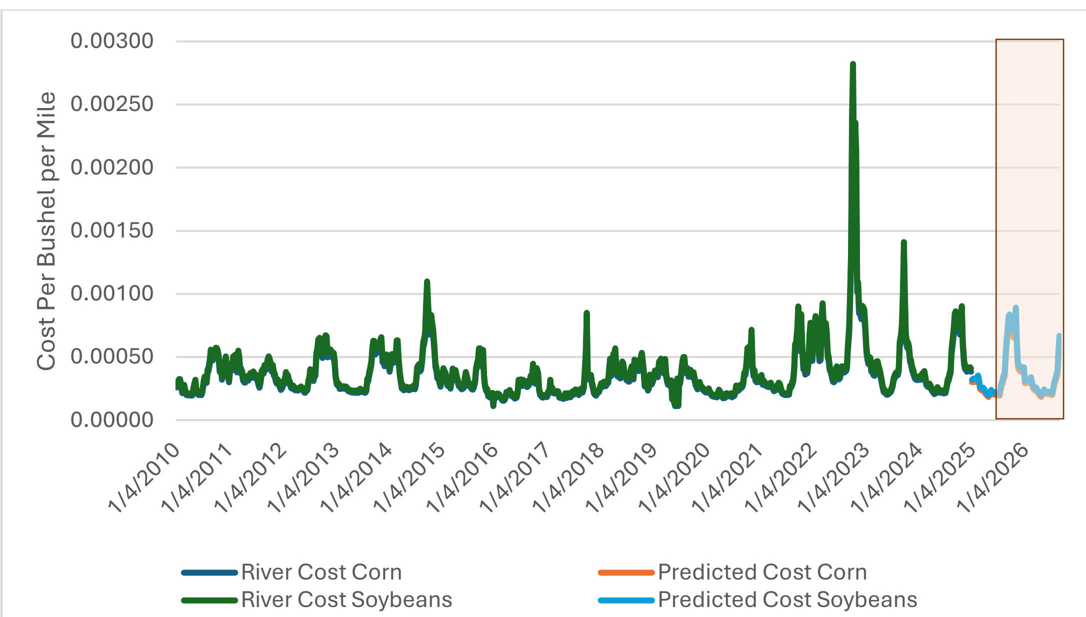
Sources: EIA: https://www.eia.gov/petroleum/gasdiesel/; PDS USDA: https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery: Deloitte: https://www2.deloitte.com/us/en/insights/economy/us-economic-forecast/united-states-outlook-analysis.html
Note: we are predicting the marketing year 2025/2026 from September 2025 to August 2026

Figure A5. Road cost 2010/2011 – 2025/2026



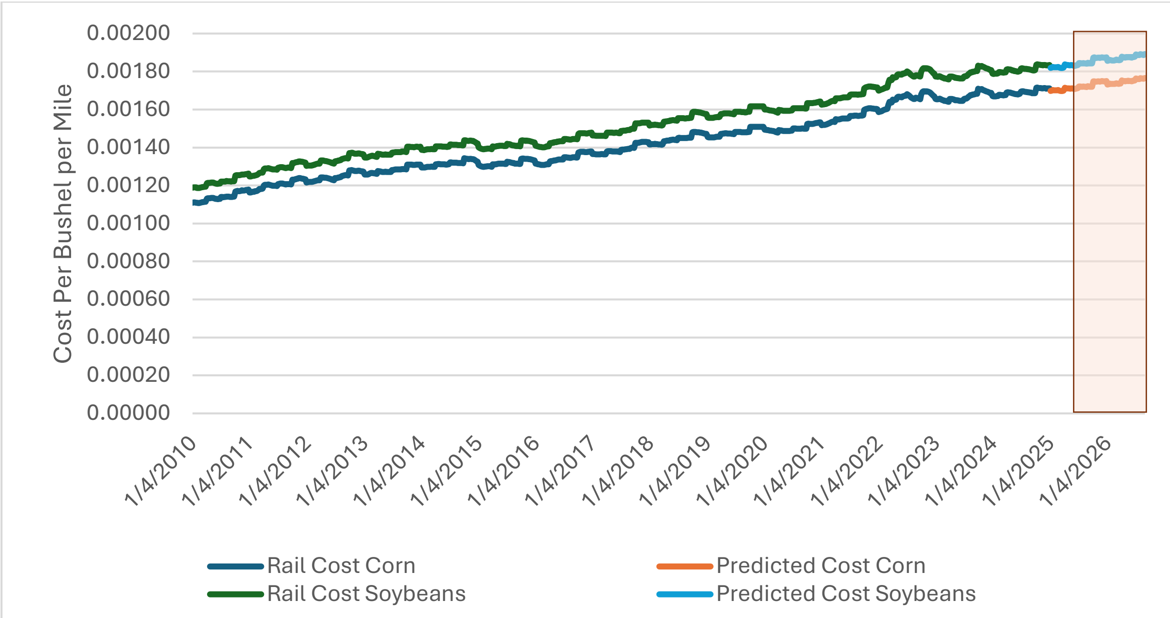
Note: Predictions are generated using the data sources and forecasting methods outlined in Table A2. The shaded region corresponds to the forecast period for the 2025/2026 marketing year (September 2025 to August 2026), which is used to estimate the basis spread for that year.

Figure A6. River Cost 2010/2011 – 2025/2026



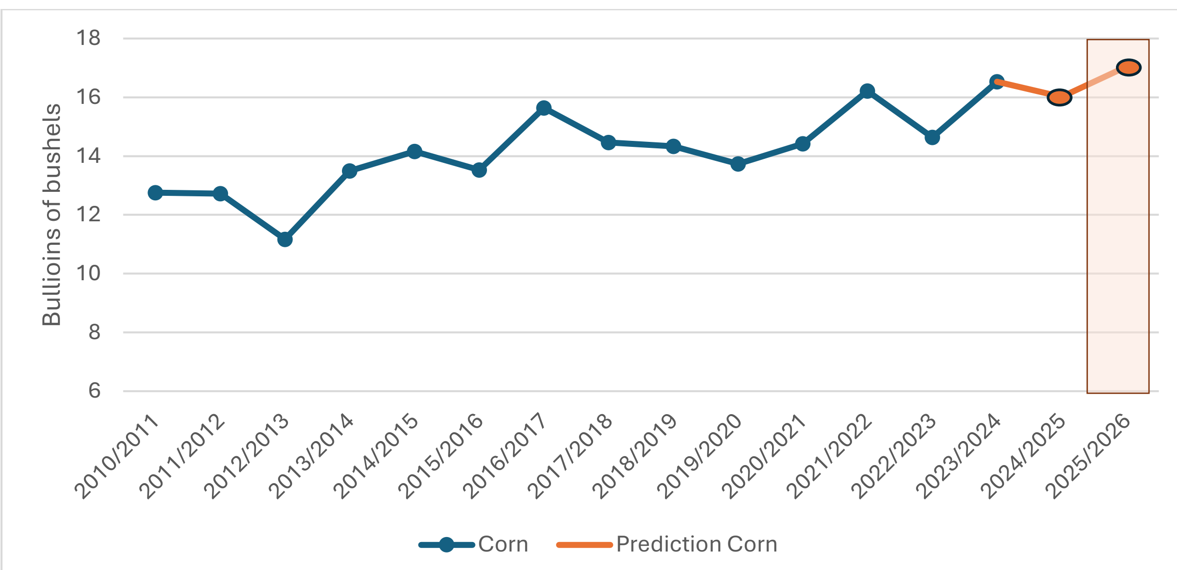
Note: Predictions are generated using the data sources and forecasting methods outlined in Table A2. The shaded region corresponds to the forecast period for the 2025/2026 marketing year (September 2025 to August 2026), which is used to estimate the basis spread for that year.

Figure A7. Rail Cost 2010/2011 – 2025/2026



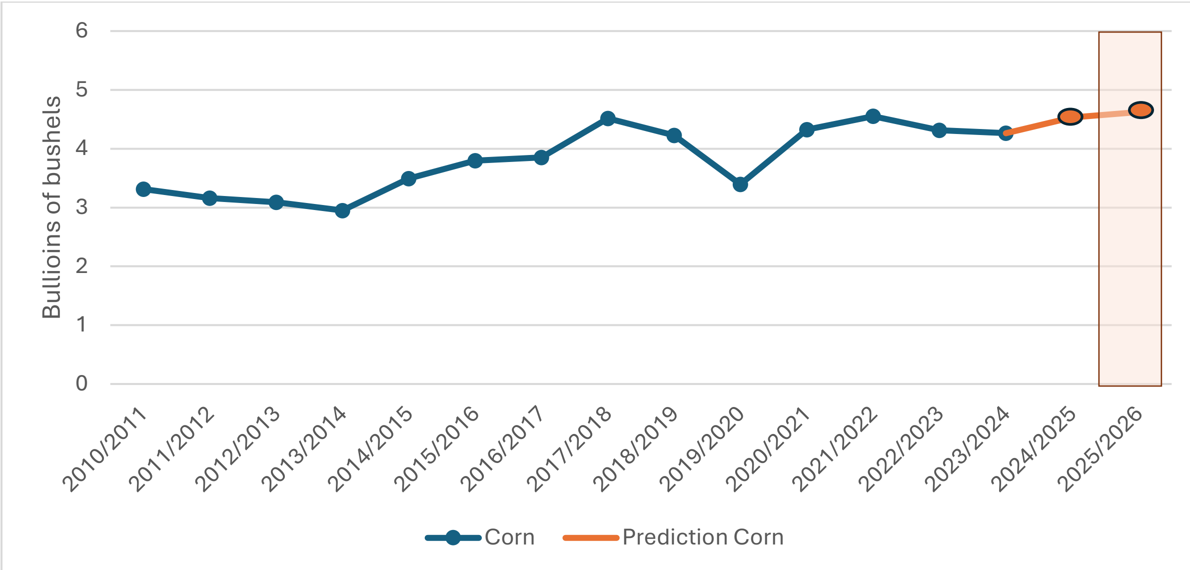
Note: Predictions are generated using the data sources and forecasting methods outlined in Table A2. The shaded region corresponds to the forecast period for the 2025/2026 marketing year (September 2025 to August 2026), which is used to estimate the basis spread for that year.

Figure A8. Corn Production 2010/2011 – 2025/2026



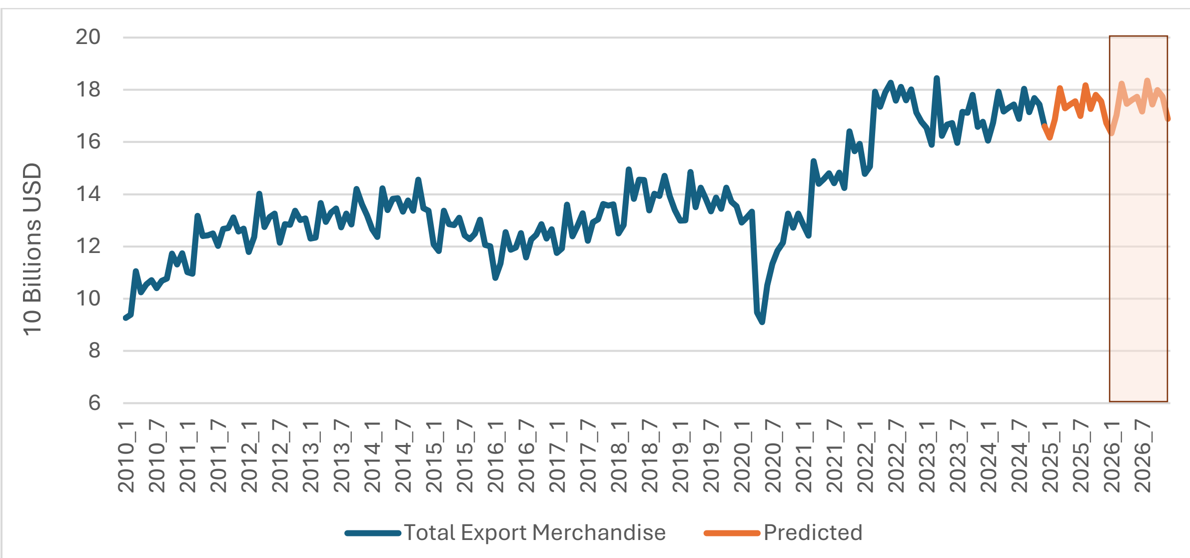
Note: Note: Predictions are generated using the data sources and forecasting methods outlined in Table A2. The shaded region corresponds to the forecast period for the 2025/2026 marketing year (September 2025 to August 2026), which is used to estimate the basis spread for that year.

Figure A9. Soybeans production 2010/2011 – 2025/2026



Note: Note: Predictions are generated using the data sources and forecasting methods outlined in Table A2. The shaded region corresponds to the forecast period for the 2025/2026 marketing year (September 2025 to August 2026), which is used to estimate the basis spread for that year.

Figure A10. Total export merchandise 2010/2011 – 2025/2026



Note: Note: Note: Predictions are generated using the data sources and forecasting methods outlined in Table A2. The shaded region corresponds to the forecast period for the 2025/2026 marketing year (September 2025 to August 2026), which is used to estimate the basis spread for that year.

Appendix 3: Alternative basis spread regressions

Table A5. Basis spread regression – corn and soybeans

	Corn		Soybeans	
VARIABLES	(1)	(2)	(3)	(4)
CostPerBushel	-0.333***	-0.272***	-0.340***	-0.395***
	-0.000464	-0.000578	-0.000796	-0.000816
production	-0.0757***	-0.107***	-0.00572***	-0.00829***
	-0.00066	-0.000631	-0.000493	-0.000456
export_total_merchandise	0.0350***	0.0285***	0.0545***	0.0471***
	-0.000158	-0.000153	-0.000297	-0.000278
export_crop_volume_total	-0.0392***		-0.0501***	
	-0.00009		-9.86E-05	
VolPort_Duluth				3.206***
				-0.0942
VolPort_Laredo		1.024***		14.01***
		-0.00317		-0.0308
VolPort_NewOrleans		-0.0201***		-0.0666***
		-9.79E-05		-0.000275
VolPort_NorFolk		-0.231***		0.371***
		-0.00546		-0.00768
VolPort_Toledo		-0.291***		-0.146***
		-0.00465		-0.00204
VolPort_Vancouver		-0.0640***		-0.0395***
		-0.000224		-9.88E-05
Constant	-0.0834***	-0.0803***	-0.775***	-0.648***
	-0.00224	-0.00212	-0.00371	-0.00344
Observations	1,549,200	1,549,200	1,342,063	1,342,063
R-squared	0.598	0.639	0.612	0.669
AIC (Akaike Information Criterion)	493,815	326,403	1,802,818	1,589,377

*** p<0.01, ** p<0.05, * p<0.1

Appendix 4: Methodology and estimates of the effect of the individual explanatory variables on the basis spread

A potential way to isolate the contribution of a single explanatory variable, such as projected export volumes, to the variation in the basis spread is to use the following formula:

$$\Delta BS_{xi} = \hat{\beta}_{xi}(Pro_{xi,2025-2026} - Act_{xi,2024-2025}) \quad \text{(A1)}$$

Where ΔBS_{xi} represent the effect of the explanatory variable xi on the basis spread, $\hat{\beta}_{xi}$ is the estimated coefficient of xi obtained from the basis spread regression for the period 2010–2022 using total export volume (rather than country-specific export volumes). $Pro_{xi,2025-2026}$ represents the projected value of variable xi for the 2025/2026 marketing year, while $Act_{xi,2024-2025}$ corresponds to the observed value of variable xi in the 2024/2025 marketing year.

We can also calculate the effect of a simultaneous change in two explanatory variables of interest. Specifically, we focus on the impact of export volume and production on the basis spread. In this case, the effect can be derived using the following formula:

$$\Delta BS_{expvol\&prod} = \hat{\beta}_{prod}(Pro_{expvol,2025-2026} - Act_{expvol,2024-2025}) + \hat{\beta}_{expvol}(Proj_{prod,2025-2026} - Actual_{prod,2024-2025}) \quad \text{(A2)}$$

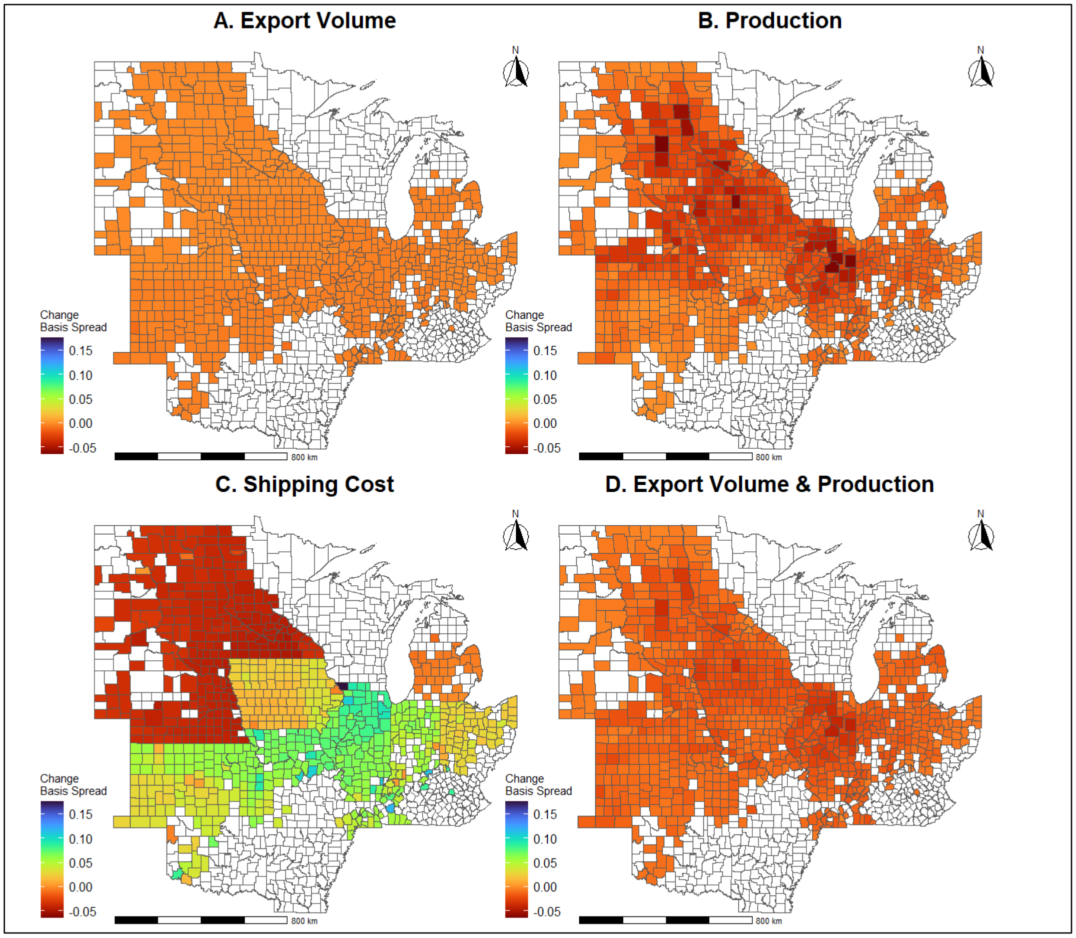
Where $\Delta BS_{expvol\&prod}$ represents the combined effect of export volume and production on the basis spread, $\hat{\beta}_{prod}$ and $\hat{\beta}_{expvol}$ are the estimated coefficients associated with production and export volume, respectively, obtained from the basis spread regression for the period 2010–2022. The term $Pro_{expvol,2025-2026} - Act_{expvol,2024-2025}$ denotes the difference between the projected and actual values of export volume, while $Proj_{prod,2025-2026} - Actual_{prod,2024-2025}$ denotes the difference between the projected and actual value of production. Table A6 shows the effects of export volume, production, shipping costs, and their combined influence on the corn and soybean basis spread between 2015/2016 and 2024/2025 marketing years. Figures A11 and A12 illustrate county-level variations in basis spreads for corn and soybeans, respectively.

Table A6. Effect of the explanatory variables on the basis spread between 2025/2026 and 2024/2025 ($/bushel)

Effect	Mean	Std. Dev.	Min	Max
Corn				
Export Volume	-0.0036	0.0082	-0.4154	0.3926
Production	-0.0222	0.0139	-0.0650	0.0000
Shipping Cost	0.0228	0.0979	-0.2477	0.3612
Total Export Merchandise	0.0051	0.0009	0.0041	0.0063
Export Volume and Production	-0.0184	0.0173	-0.8206	0.7520
Soybeans				
Export Volume	-0.0136	0.0278	-1.2916	1.2275
Production	-0.0001	0.0001	-0.0004	0.0000
Shipping Cost	-0.0101	0.0261	-0.1542	0.0747
Total Export Merchandise	0.0078	0.0014	0.0063	0.0098
Export Volume and Production	-0.0027	0.0033	-0.1474	0.1398

Note: The effect of total export merchandise is not included because this variable does not vary at the county level; it takes the same value for all counties within a given month.

Figure A11. Effect of individual explanatory variables on basis spread – Corn ($/bushel)

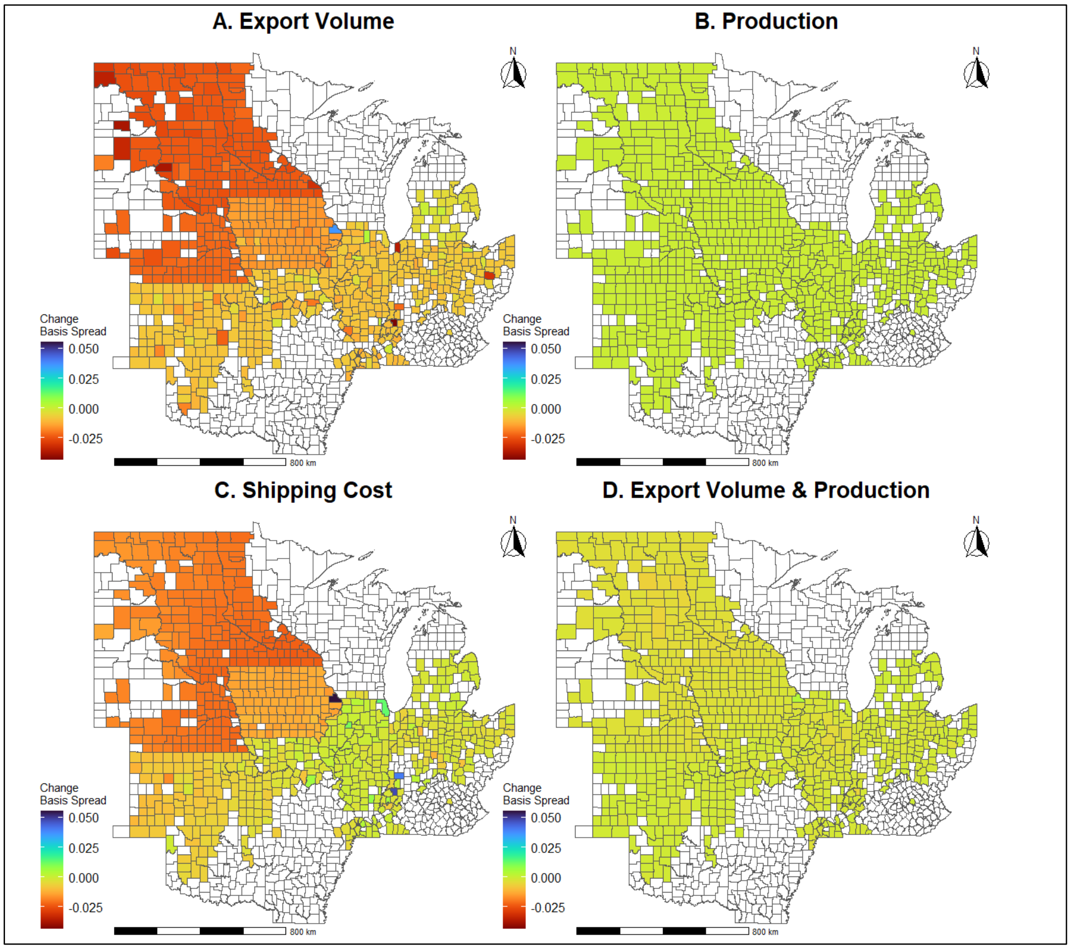


Notes:

Effect	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Export Volume	-0.0109	-0.0049	-0.0037	-0.0036	-0.0017	0.0053
Production	-0.065	-0.0228	-0.0134	-0.0156	-0.006	0.0000
Shipping Cost	-0.0496	-0.036	0.0281	0.0195	0.0579	0.1759
Export Volume & Production	-0.0438	-0.0188	-0.0141	-0.0151	-0.0108	0.0101

The effect of total export merchandise is not included because this variable does not vary at the county level; it takes the same value for all counties within a given week.

Figure A12. Effect of individual explanatory variables on basis spread – Soybeans ($/bushel)



Notes:

Effect	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Export Volume	-0.0434	-0.022	-0.0097	-0.0136	-0.0082	0.0364
Production	-0.0004	-0.0001	-0.0001	-0.0001	0.0000	0.0000
Shipping Cost	-0.0242	-0.018	-0.0069	-0.0094	-0.0026	0.0553
Export Volume & Production	-0.0065	-0.0032	-0.0022	-0.0024	-0.0014	0.0035

The effect of total export merchandise is not included because this variable does not vary at the county level; it takes the same value for all counties within a given week.

Appendix 5. Correlation matrix of the explanatory variables

Table A7. Correlation matrix – corn

Num.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	CostPerBushel	1.000															
2	production	0.156	1.000														
3	export_total_merchandise	0.200	0.020	1.000													
4	Vol_CANADA	-0.092	-0.037	0.009	1.000												
5	Vol_CENTRAL_AMERICA	-0.027	-0.023	-0.001	-0.003	1.000											
6	Vol_CHINA	0.234	0.036	0.046	-0.009	-0.006	1.000										
7	Vol_EGYPT	-0.005	-0.001	-0.003	0.000	0.000	-0.001	1.000									
8	Vol_EUROPE_UNION	-0.038	-0.015	-0.006	-0.002	-0.001	-0.004	0.000	1.000								
9	Vol_JAPAN	0.365	0.083	0.016	-0.014	-0.010	-0.035	-0.001	-0.006	1.000							
10	Vol_MEXICO	-0.024	-0.009	0.149	-0.014	-0.010	-0.035	-0.001	-0.006	-0.055	1.000						
11	Vol_KOREA_REP	0.305	0.078	-0.035	-0.013	-0.009	-0.031	-0.001	-0.005	-0.050	-0.049	1.000					
12	Vol_MIDDLE_EAST	-0.069	-0.012	-0.051	-0.007	-0.005	-0.017	-0.001	-0.003	-0.027	-0.027	-0.024	1.000				
13	Vol_OTHER_AFRICA	-0.059	-0.028	-0.002	-0.003	-0.002	-0.008	0.000	-0.001	-0.013	-0.012	-0.011	-0.006	1.000			
14	Vol_OTHER_ASIA_AND_OCEANIA	0.089	0.025	-0.046	-0.007	-0.005	-0.017	-0.001	-0.003	-0.027	-0.027	-0.024	-0.013	-0.006	1.000		
15	Vol_SOUTH_AMERICA	-0.500	0.016	-0.004	-0.036	-0.026	-0.090	-0.003	-0.016	-0.143	-0.140	-0.126	-0.069	-0.032	-0.070	1.000	
16	Vol_TAIWAN	0.105	0.045	-0.036	-0.012	-0.008	-0.029	-0.001	-0.005	-0.046	-0.045	-0.041	-0.022	-0.010	-0.022	-0.117	1.000

Table A8. Correlation matrix – soybeans

Num.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	CostPerBushel	1.000															
2	production	0.207	1.000														
3	export_total_merchandise	0.207	0.371	1.000													
4	Vol_CANADA	-0.129	-0.038	-0.008	1.000												
5	Vol_CENTRAL_AMERICA	-0.010	-0.003	-0.002	-0.001	1.000											
6	Vol_CHINA	0.548	0.146	0.077	-0.036	-0.006	1.000										
7	Vol_EGYPT	-0.051	0.008	0.004	-0.004	-0.001	-0.016	1.000									
8	Vol_EUROPE_UNION	-0.124	-0.025	0.031	-0.009	-0.001	-0.037	-0.004	1.000								
9	Vol_JAPAN	-0.046	-0.014	-0.018	-0.008	-0.001	-0.036	-0.004	-0.009	1.000							
10	Vol_MEXICO	-0.093	-0.017	-0.043	-0.013	-0.002	-0.056	-0.006	-0.013	-0.013	1.000						
11	Vol_KOREA_REP	-0.025	-0.015	-0.035	-0.003	-0.001	-0.014	-0.001	-0.003	-0.003	-0.005	1.000					
12	Vol_MIDDLE_EAST	-0.092	-0.023	-0.029	-0.011	-0.002	-0.048	-0.005	-0.012	-0.011	-0.018	-0.005	1.000				
13	Vol_OTHER_AFRICA	-0.073	0.016	0.052	-0.007	-0.001	-0.031	-0.003	-0.007	-0.007	-0.011	-0.003	-0.010	1.000			
14	Vol_OTHER_ASIA_AND_OCEANIA	-0.122	-0.003	0.028	-0.027	-0.004	-0.114	-0.012	-0.027	-0.026	-0.042	-0.011	-0.036	-0.023	1.000		
15	Vol_SOUTH_AMERICA	-0.241	-0.023	0.035	-0.029	-0.005	-0.123	-0.013	-0.029	-0.029	-0.045	-0.012	-0.039	-0.025	-0.091	1.000	
16	Vol_TAIWAN	-0.051	0.015	-0.018	-0.028	-0.004	-0.118	-0.012	-0.028	-0.027	-0.043	-0.011	-0.037	-0.024	-0.087	-0.094	1.000