Global Container Shipping Disruptions, Pop-Up Ports, and U.S. Agricultural Exports

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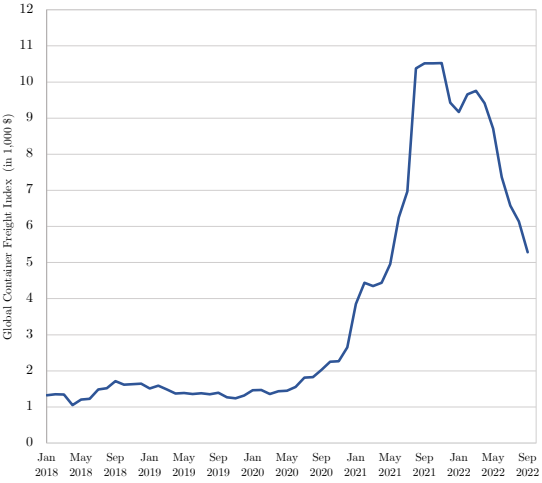
Outlook

- We assess the impact of the Commodity Container Assistance Program on containerized agricultural exports from U.S. ports using detailed export data at the U.S. port level.
- We find that the Commodity Container Assistance Program (CCAP) increased agricultural exports by 1.0% from March to September 2022, while the evidence is statistically insignificant.
- Between March and September 2022, the program incurred costs of $2.8 million, while monthly containerized agricultural exports from participating ports were about $18.6 million above the counterfactual during that period.
- Our heterogeneity analysis revealed that Commodity Container Assistance Program did not benefit trade in any particular good group while causing heterogeneous trade effects across HS chapters.

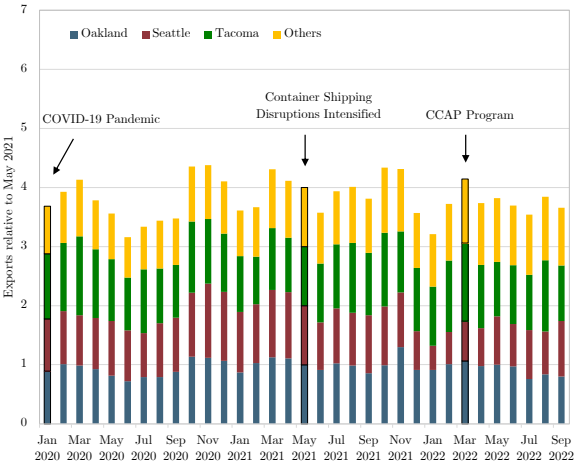
Global Container Shipping Disruptions

- The Covid-19 pandemic caused considerable disruptions to agricultural production, processing, and distribution, resulting in substantive ramifications for global trade.
- Freight rates from Asia to the U.S. rose so fast that more and more containers were being shipped back to Asia empty instead of carrying U.S. agricultural goods.
- Containerized agricultural exports were 22 percent below the counterfactual level from May 2021 to January 2022, which amounted to more than USD 10 billion in trade losses (Carter et al., 2022).



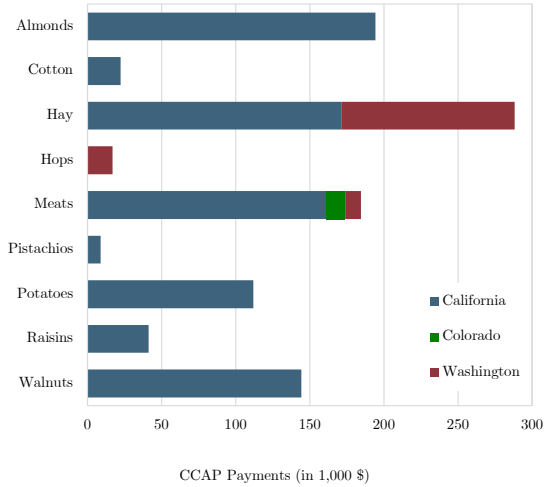
Commodity Container Assistance Program

- In response to the maritime shipping disruptions and empty container issue, the United States Department of Agriculture implemented the Commodity Container Assistance Program (CCAP) in January 2022.
- CCAP established "pop-up" sites at Howard Terminal in the Port of Oakland, Terminal 46 in the Port of Seattle, and West Hylebos Terminal in the Port of Tacoma.

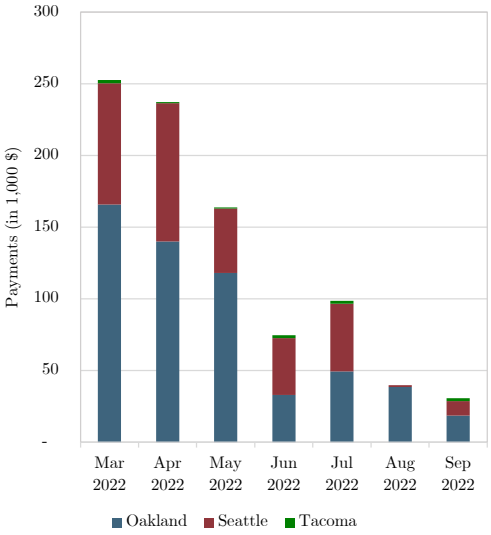


Commodity Container Assistance Program

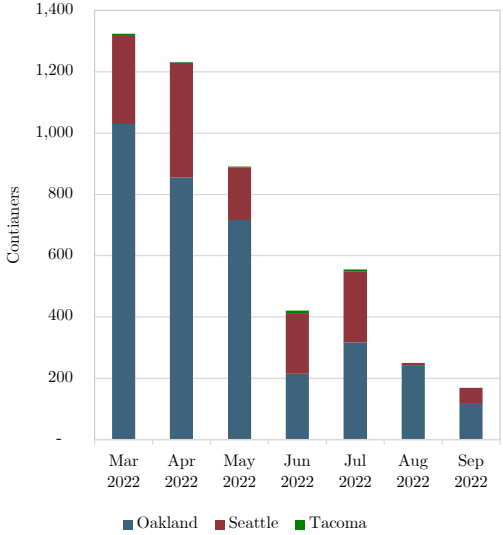
- The Agricultural Marketing Service provided $1.8 million start-up costs for the "pop-up" site at the Port of Oakland as part of the CCAP.
- The program provides payments to cover the additional logistics costs of handling containers shipped from U.S. ports.
- Between March and September 2022, the program approved funds for 5,500 containers, leading to payments of approximately $1 million to eligible owners or designated marketing agents of U.S. agricultural commodities.



Commodity Container Assistance Program



Payments



Containers

Panel Event Study

- Event study design to assess the dynamic treatment effects of Commodity Container Assistance Program on agricultural exports from U.S. ports:

$$y_{ijst} = \exp\left(\alpha_{ijs,mo} + \alpha_{ijs,yr} + \sum_{k=-6}^{6} \beta_{k,c} r_{ijs,t-k} \cdot \mathrm{CCAP}_{it}\right) \epsilon_{ijst} \,,$$

- where we denote the port with i, the export destination with j, the goods with s, and the month with t, and y_{ijst} represents the non-negative integer count of containerized exports.
- Include fixed effects $\alpha_{ijs,mo}$ and $\alpha_{ijs,yr}$ to account for the influence of unobserved factors that confound the relationship of primary interest.
- The term $\sum_{k=-6}^{6} \beta_{k,c} r_{ijs,t-k} \cdot \mathrm{CCAP}_{it}$ measures dynamic treatment effects of the Commodity Container Assistance Program on containerized agricultural exports from U.S. ports.
- We cluster standard errors at the port-destination-good level (Cameron and Miller, 2015; Weidner and Zylkin, 2021).

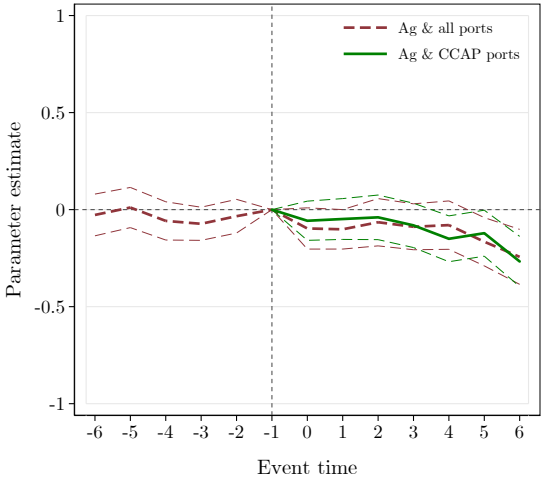
Identification Strategy

- The identification strategy requires a control group that shows the same trends in the pre-treatment period and is not affected by port congestion and container shortages in 2021/22 (Roth and Sant'Anna, 2021).
- We resort to U.S. containerized agricultural exports at the port-destination-good level from 2016 to 2020 as the control group (Carter et al.,2022; Steinbach, 2022).
- The regression specification addresses level differences in export volumes between goods and export destinations through the port-destination-good fixed effects.
- We follow common practice and rely on the Poisson pseudo-maximum likelihood (PML) estimator to identify the relationship between the treatment variables and the count outcome (Silva and Tenreyro, 2006)
- We account for the high-dimensional fixed effects by using a modified version of the iteratively re-weighted least-squares (IRLS) algorithm that is robust to statistical separation and convergence issues (Correia et al., 2019; 2020).

Data

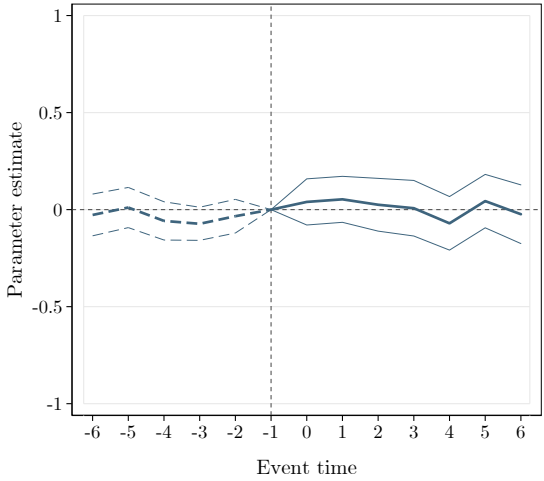
- We sourced port-level U.S. export data at the HS-4 digit level from the U.S. Census Bureau (2022), and we classified all goods into either agricultural (HS chapters 0 to 24) or non-agricultural (HS chapters 25 to 99) goods.
- The final balanced panel dataset covers the monthly value and quantity shipped out of 153 U.S. ports handling containerized agricultural goods destined to 237 export destinations and listed under 1,266 HS subheadings for September 2014 to September 2022 (592,244 unique port-destination-good pairs).
  - The baseline model compares trade flows in 2021/22 with trade flows in 2016/17, 2017/18, 2018/19, and 2019/20.
  - We define the ports of Oakland, Seattle, and Tacoma as treated ports, and all other ports as non-treated ports.

Main Results



Pre-trends p-value: 0.406 -- Pseudo R-squared: 0.942 -- Observations: 1,427,587

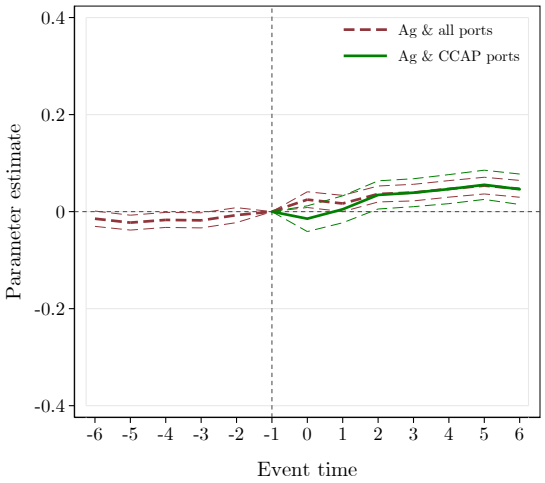
Quantity



Post-average: 0.011 (0.042) -- Pseudo R-squared: 0.942 -- Observations: 1,427,587

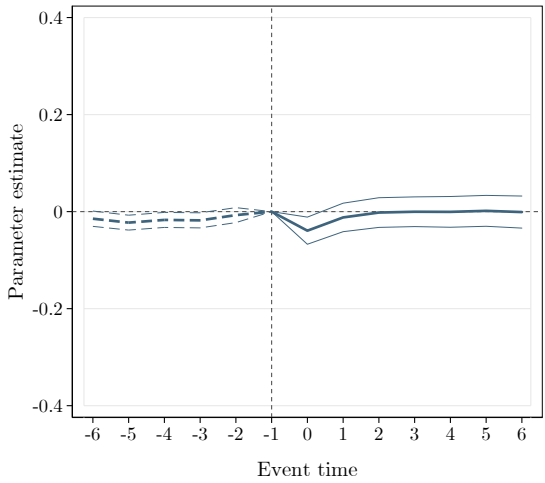
Net Quantity Effect

Main Results



Pre-trends p-value: 0.010 -- Adjusted R-squared: 0.829 -- Observations: 630,157

Unit Value



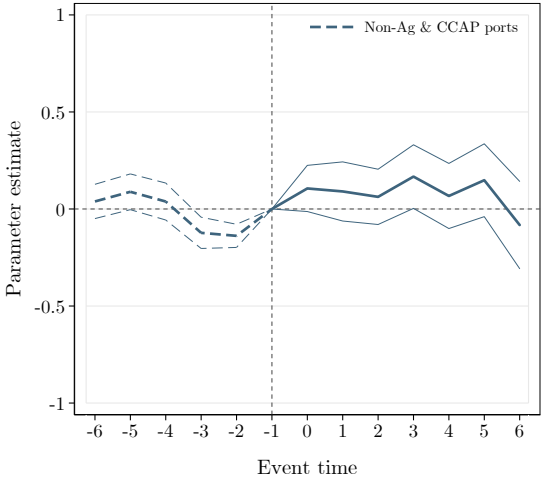
Post-average: -0.008 (0.009) -- Adjusted R-squared: 0.829 -- Observations: 630,157

Net Unit Value Effect

Robustness Checks

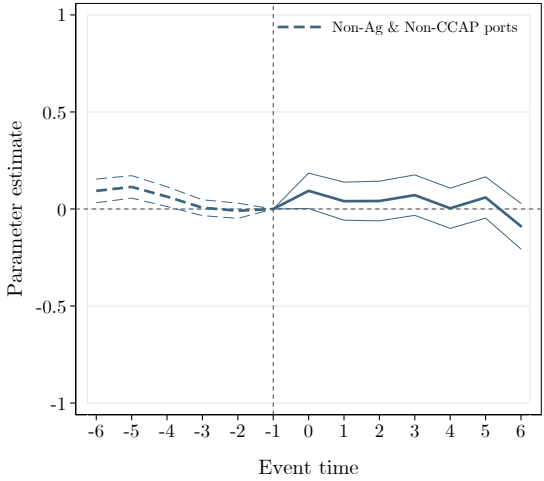
- These results are consistent across a range of robustness checks:
  - Different comparison group: We compared the treatment effects of the Commodity Container Assistance Program using two alternative comparison groups.
  - Extrapolated linear pre-trends: We estimate the baseline model under the alternative assumption that the linear pre-trends of the treated units would have continued along their pre-event paths.
  - Zero trade flows: We estimate alternative log-linear specifications without zero trade flows.
  - Different transport modes: We estimate the model with bulk agricultural export data to discover the potential substitution of bulk for containerized agricultural exports at treated ports.

Robustness Checks: Different Comparison Groups



Post-average: 0.080 (0.052) -- Pseudo R-squared: 0.960 -- Observations: 685,160

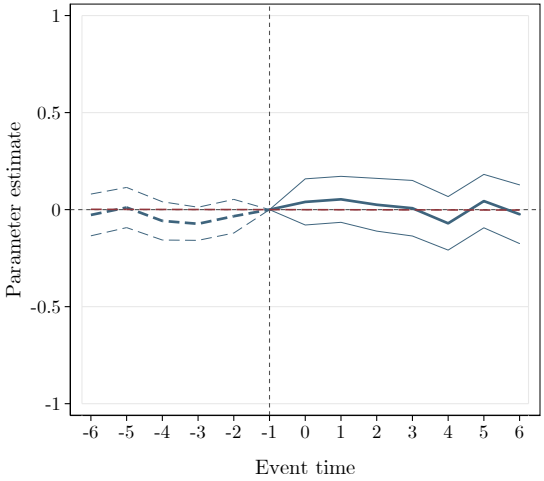
Net Quantity Effect, Non-Ag/CCAP ports.



Post-average: 0.032 (0.031) -- Pseudo R-squared: 0.952 -- Observations: 9,665,555

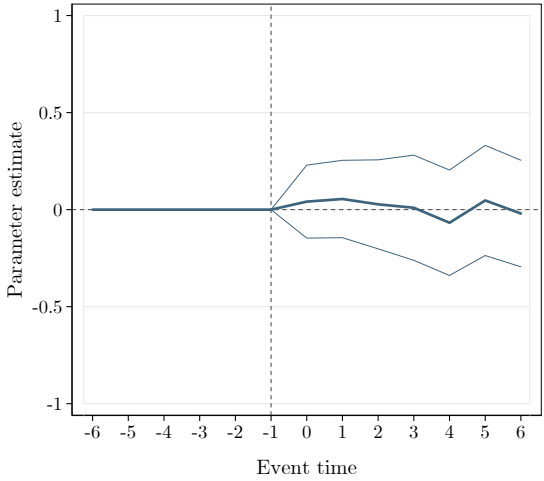
Net Quantity Effect, Non-Ag/Other ports.

Robustness Checks: Linear Pre-Trends



Linear trend: -0.000 (0.010) -- Pseudo R-squared: 0.942 -- Observations: 1,427,587

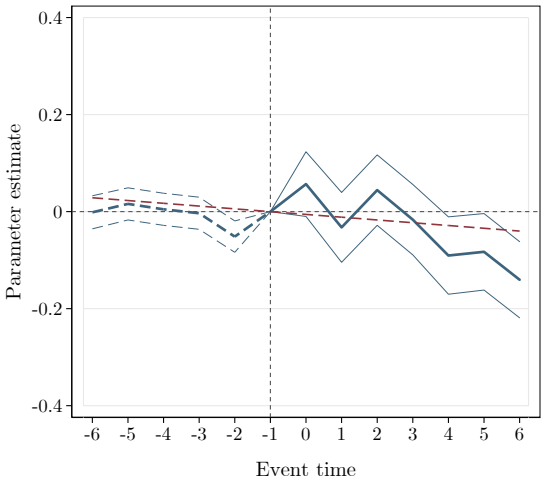
Net Quantity Effect, Overlaid Trend.



Post-average: 0.013 (0.113) -- Pseudo R-squared: 0.942 -- Observations: 1,427,587

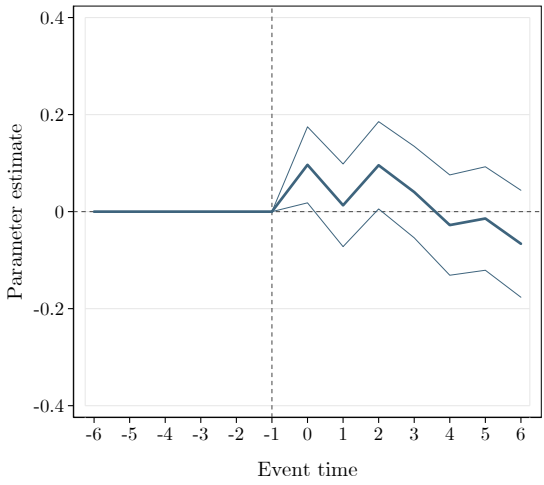
Net Quantity Effect, Subtracted Trend.

Robustness Checks: Pre-Trend Adjusted Log-Linear Regression



Linear trend: -0.006 (0.003) -- Pseudo R-squared: 0.811 -- Observations: 630,157

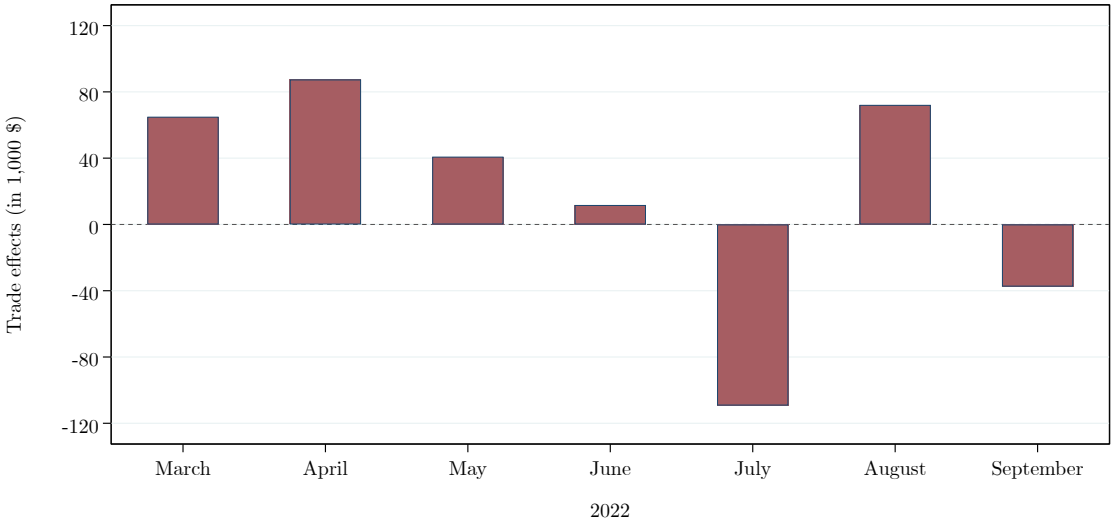
Net Quantity Effect, Overlaid Trend.



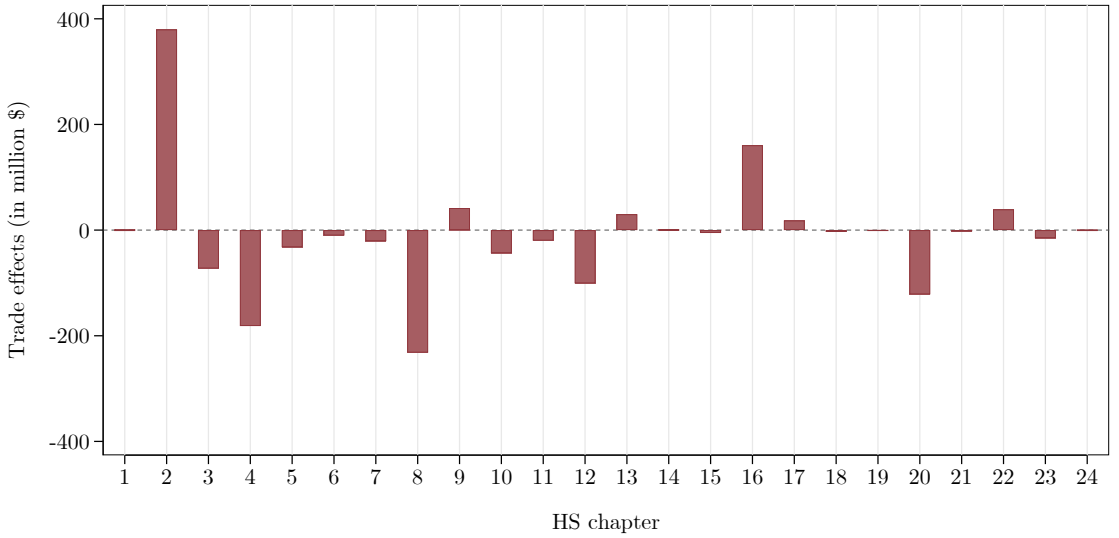
Post-average: 0.020 (0.038) -- Pseudo R-squared: 0.811 -- Observations: 630,157

Net Quantity Effect, Subtracted Trend.

Estimated Trade Effects Over Time



Estimated Trade Effects by Commodity



Conclusion

- We used an event study to measure the trade effects of the Commodity Container Assistance Program for U.S. containerized agricultural exports.
  - CCAP increased agricultural exports by 1.0% and induced export gains amounting to more than $18.6 million above the counterfactual from March to September in 2022.
  - At the same time, the program incurred $1.8 million start-up costs for the pop-up sites and $1 million CCAP payments.
- Exports of raw and prepared meat products from treated ports were 5.7% and 51.2% above the counterfactual between March and September 2022, while other goods experienced adverse trade effects.
- Our research is essential as it reveals that the program had **limited success** in facilitating U.S. containerized agricultural exports.

Contributions

- We show that participation in the Commodity Container Assistance Program was limited.
- Although the program represents a cornerstone of the Biden administration's short-run response to maritime shipping disruptions at the ports of Oakland, Seattle, and Tacoma, the program did little to strengthen agricultural exports from those Western ports.
- We find that containerized agricultural exports remained depressed in 2022. This study expands on earlier work concerned with the trade implications of maritime shipping disruptions for U.S. agriculture (Carter et al. 2021, 2022a,b; Steinbach 2022).
- This research speaks to the growing importance of maritime transportation and the reliance of U.S. agriculture on containerized shipments to Asian markets (Gray 2020; Beghin and Schweizer 2021; Carter and Steinbach 2022).

Thank you for your attention! Any questions?