The Incidence of Foreign Market Accessibility on Farmland Rental Rates

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Selected Paper prepared for presentation at the International Agricultural Trade Research Consortium's (IATRC's) 2019 Annual Meeting: Recent Advances in Applied General Equilibrium Modeling: Relevance and Application to Agricultural Trade Analysis, December 8-10, 2019, Washington, DC.

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2019 IATRC Annual Meeting, Washington, DC, December 9th

Background and motivation

- U.S. agriculture and its profitability are closely linked to the export market environment.
- Yet, empirical evidence on whether (and how) the changes in market accessibility affect factor prices is rather limited: Notable exceptions are Taylor and Brester (2005) and Donaldson and Hornbeck (2016).
- We focus on the relationship between the changes in tariffs that U.S. export crops face and farmland cash rental rates.

Research questions

- How do export tariffs that U.S. agriculture faces affect farmland cash rental rates?
- What is the localized impact of the 2018 Chinese retaliatory tariff on U.S. soybeans?

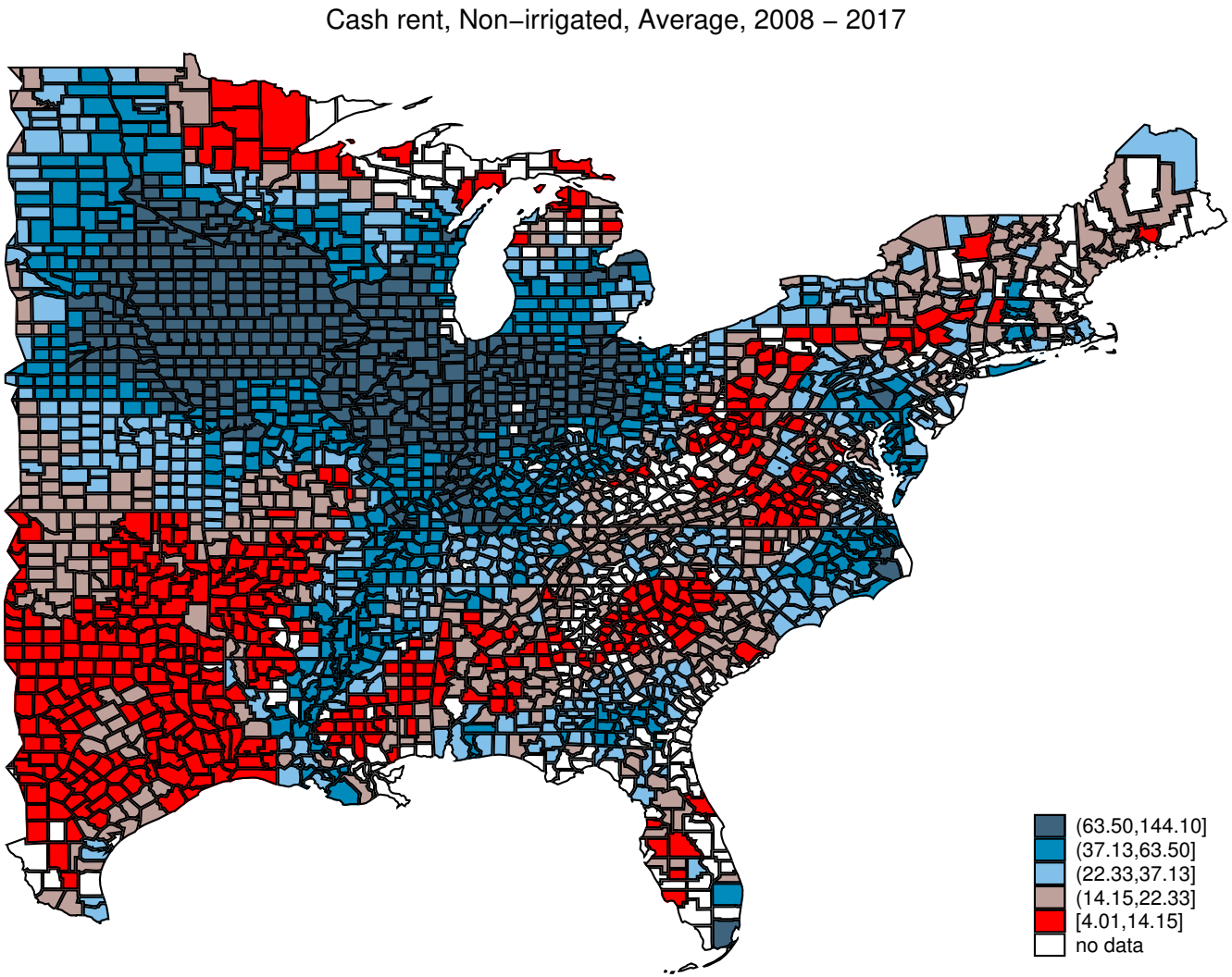
Key challenges

- Cash rents are observed at county-level: How do we measure "localized" export tariffs?
  - Aggregation across different destinations for each crop
  - Aggregation across different crops in each county
- The two aggregation issues are crucial in identifying the effect of localized export tariffs on cash rents.
  - **Contemporaneous destination-specific export volumes (thus, shares) and contemporaneous crop shares can be correlated with unobservables that affect cash rents.**

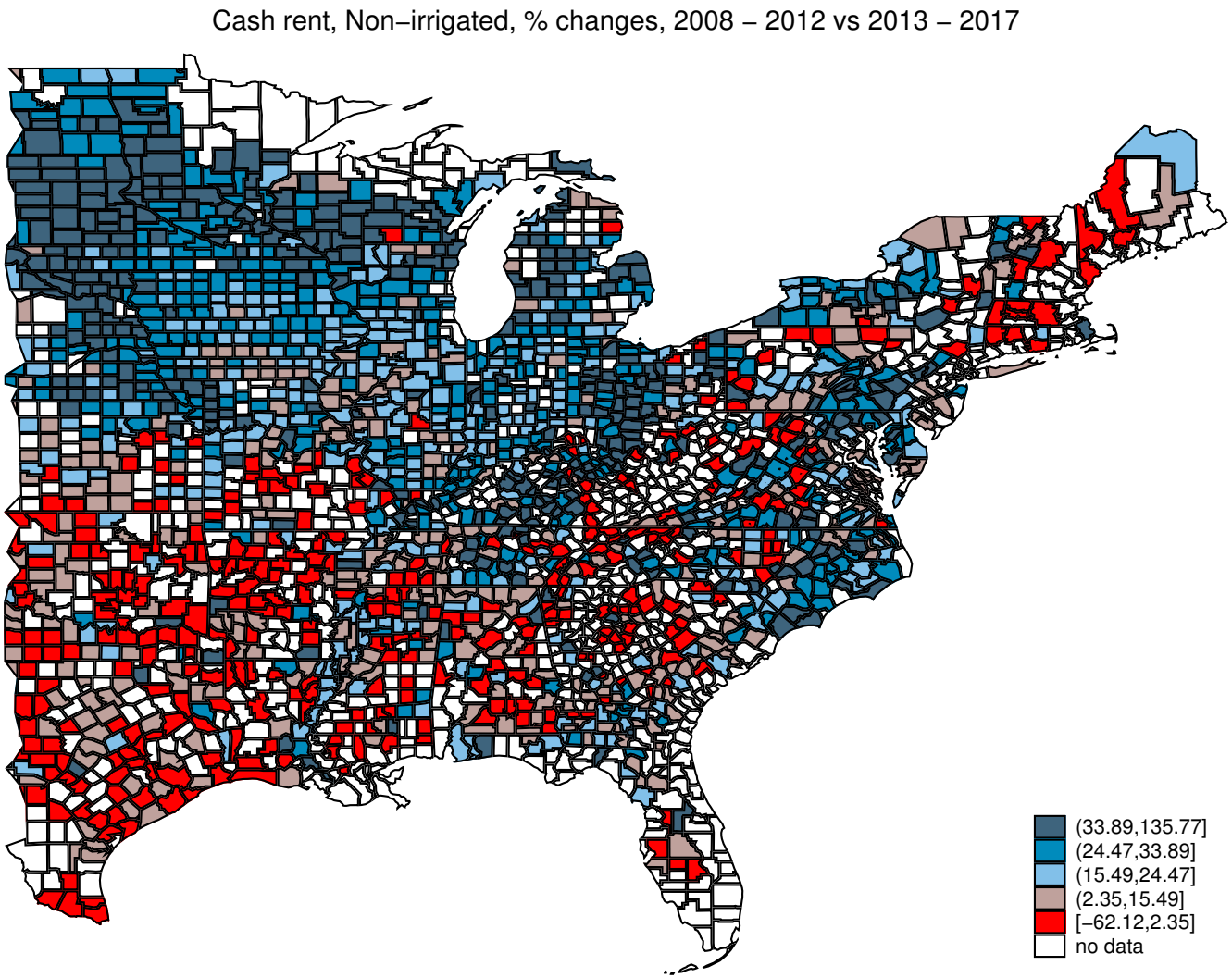
Cash rent and production data

- We use annual county-level cash rents data for non-irrigated fields in the U.S. dryland from 2008 to 2017 (NASS survey): 2,165 counties total.
- Per-acre cash rents are adjusted by Producer Price Index (1982=100, BLS)
- We focus on the seven field crops: barley, corn, oats, sorghum, soybeans, upland cotton, and wheat: annual county-level planted acreage data from NASS survey.
- To compute the share of each crop, we use county-level data on total cropland, and total harvested irrigated cropland from NASS census (we use the difference between the two as the denominator).

Average cash rent



Changes in cash rent



Tariff and trade data

- We extract the importer-exporter pair level data for the seven field crops using 4-digit Harmonized Tariff Schedule (HS) codes (1001; 1003; 1004; 1005; 1007; 1201; 5201).
- Tariff data are from TRAINS and trade volume data are from UN Comtrade.
- Both data are extracted from the World Integrated Trade Solution (WITS).

TRAINS tariff data

Two issues with the TRAINS tariff data:

- Missing tariff lines: Most Favored Nation rates are missing for some years in some countries. We use the most recent years for the missing years in those countries.
- TRQ: In general, TRAINS reports out-of-quota rates. Chinese imports of U.S. corn and wheat are less than the quota during the sample period – we replace the reported out-of-quota rates with in-quota rates for these two cases.

Constructing crop-specific tariffs

For importing country d for crop j in year t, we denote the ad valorem tariff as τ_{jdt} (we treat the domestic consumption as an "export" to the U.S., i.e. $d = US$, with $\tau_{jUSt} = 0$).

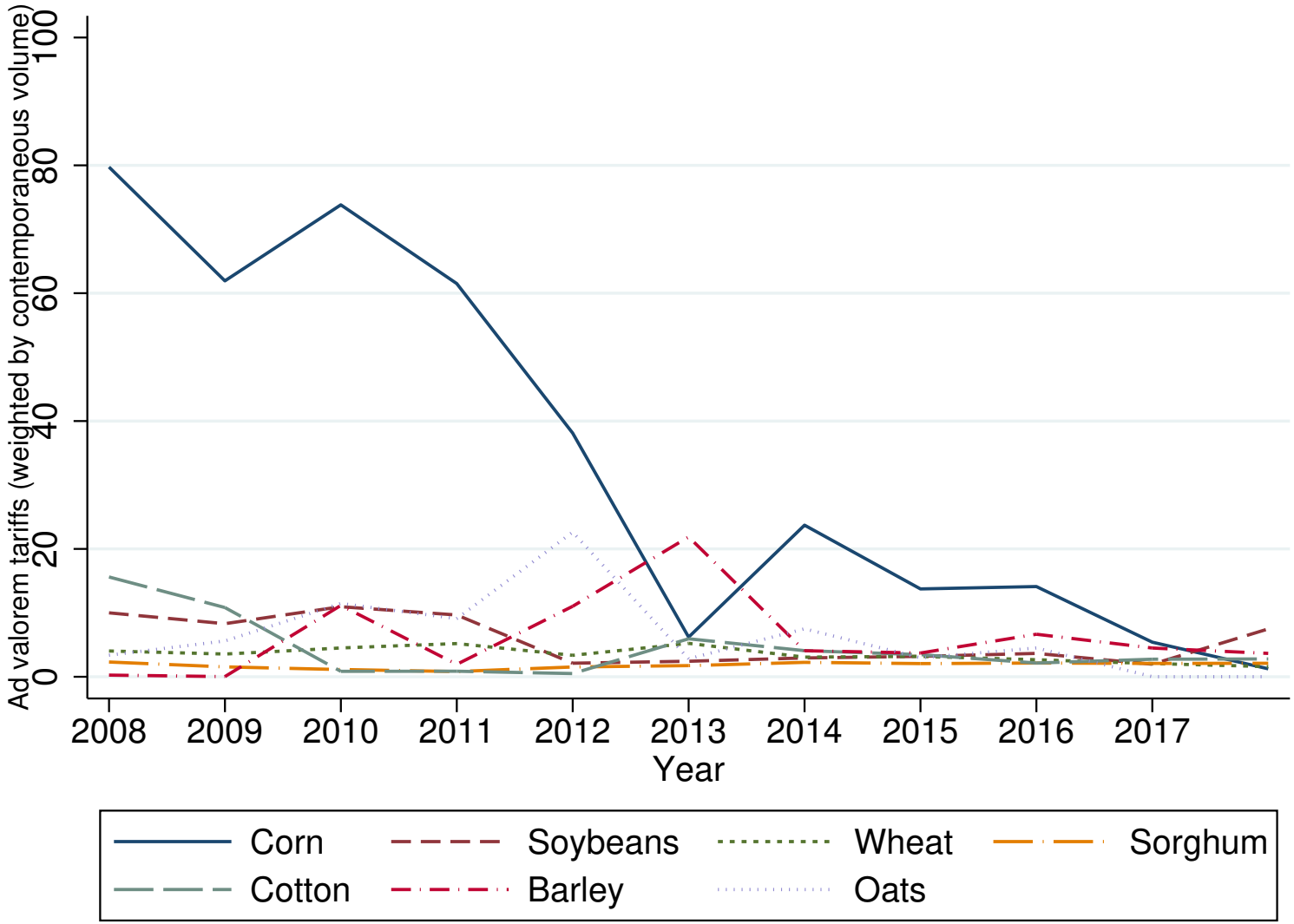
For crop j, in year t, the crop-specific tariff for crop j in year t, τ_{jt}, is

$$\tau_{jt} = \sum_{d} \theta_{jdt} \times \tau_{jdt} \tag{1}$$

where θ_{jdt} is a weight.

A naïve approach is to use $\theta_{jdt} = \frac{Imported\ Volume_{jdt}}{\sum_d Imported\ Volume_{jdt}}$.

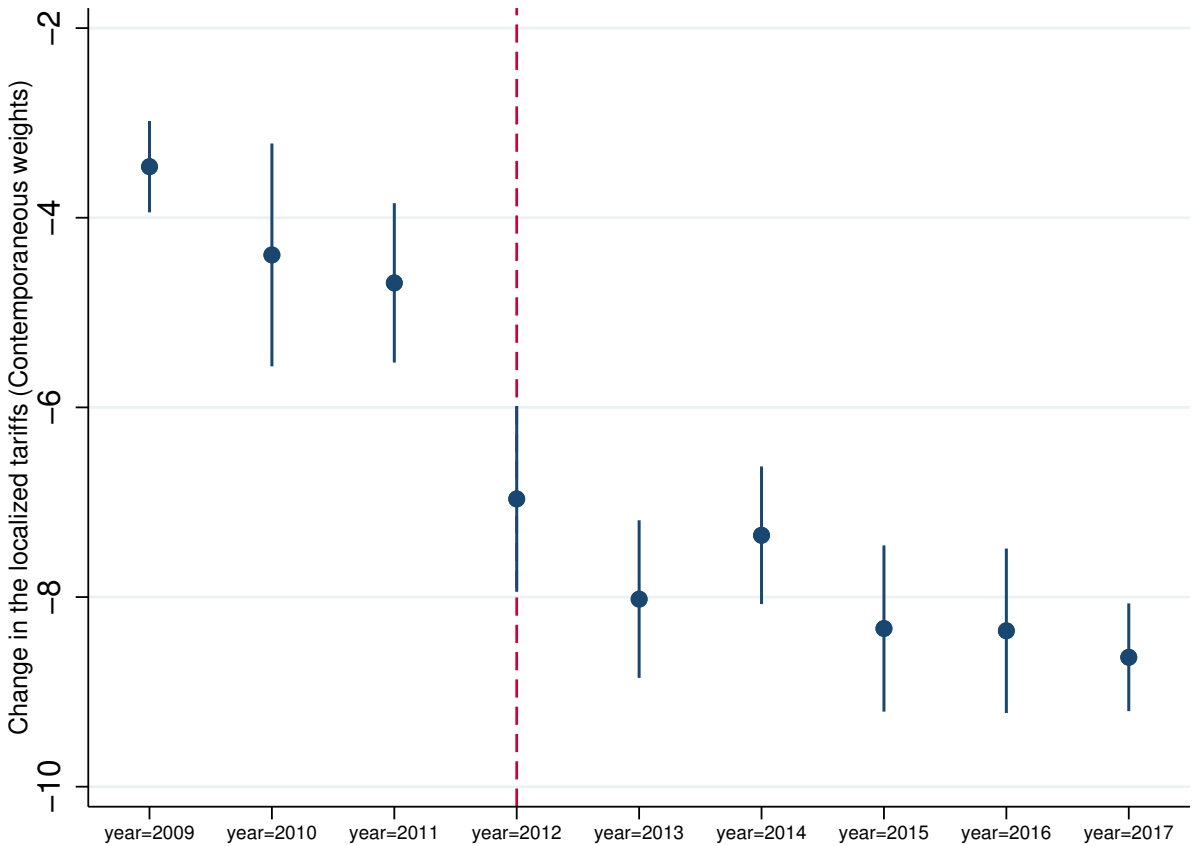
Trends in crop-specific tariffs



Preliminary event study: 2012

- The free trade agreement between the U.S. and South Korea became effective in 2012.
- The localized tariff, $LT_{it} = \sum_j \tau_{jt} \times S_{ijt}$, which is computed based on contemporaneous crop shares, dropped significantly in 2012.
- Contemporaneous crop shares can be correlated with unobservables (possible endogeneity bias).
- Thus, we present preliminary evidence via shift-share design (e.g. Bartik 1993; Autor, Dorn, and Hanson 2013; Kovak 2013; Adão, Kolesár, and Morales 2019).

Trends in localized tariffs



Note: The base year is 2008. The reported coefficients are the estimated year fixed effects after controlling for state-specific quadratic trends, weather covariates, and county fixed effects. The standard errors are clustered at the state and year levels.

Event study via shift-share design

We estimate the following regression equation for each year t (shift-share design):

$$\Delta Rent_{it} = \beta_0 + \beta_1 \Delta LT_{it} + \Gamma \Delta Z_{it} + u_s + \varepsilon_{it} \tag{2}$$

where $\Delta Rent_{it} = Rent_{it} - \overline{Rent}_{i\ 2009-2011}$, and
$\Delta LT_{it} = \sum_j (\tau_{jt} - \bar{\tau}_{j\ 2009-2011}) \times S_{ij\ 2011}$.

By weighting the crop-specific shocks with the "initial" shares (S_{ij}), we mitigate the possible bias from S_{ijt} being correlated with unobservables that affect cash rents.

Preliminary evidence

VARIABLES	(1) Year 2012 Rent Change (USD/acre PPI 1982=100)	(2) Year 2013 Rent Change (USD/acre PPI 1982=100)	(3) Year 2014 Rent Change (USD/acre PPI 1982=100)	(4) Year 2016 Rent Change (USD/acre PPI 1982=100)	(5) Year 2017 Rent Change (USD/acre PPI 1982=100)
Tariff Shock	-0.939***	-1.460***	-2.467***	-2.687***	-1.887***
	(0.197)	(0.246)	(0.432)	(0.336)	(0.240)
Observations	1,890	1,880	1,906	1,902	1,895
Weather Covariates	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes

Note: The base period is 2009 – 2011. Standard errors are clustered at the state level.

Estimating the incidence of localized export tariffs

Estimation equation

The preliminary evidence is based on cross-sectional analyses. We now leverage within-variations throughout the sample period.

Thus, our main empirical specification is

$$Rent_{it} = \beta_0 + \beta_1 LT_{it} + \Gamma Z_{it} + u_i + v_t + \varepsilon_{it} \tag{3}$$

where LT_{it} is the localized (ad valorem) export tariff, and Z_{it} is the vector of other covariates including weather variables and state-specific quadratic time trends.

Measuring localized export tariff

We define the localized (ad valorem) export tariff rate for county i in year t as

$$LT_{it} = \sum_j \tau_{jt} \times S_{ijt} \tag{4}$$

where S_{ijt} is the weight for crop j. And note that $\tau_{jt} = \sum_d \theta_{jdt} \times \tau_{jdt}$.

What are the right measures of S_{ijt} and θ_{jdt}?

Identification issues with contemporaneous shares

We face the possibility of $Cov(LT_{it},\ \varepsilon_{it}) \neq 0$ in eq 3 because of

- $Cov(S_{ijt},\ \varepsilon_{it}) \neq 0$: Non-tariff demand/supply shifters
- $Cov(\theta_{jdt},\ \varepsilon_{it}) \neq 0$: Destination-specific profitability

Thus, we use

- $S_{ij0} = \frac{Planted\ Acreage_{ij0}}{Non-irrigated\ Cropland_{i0}}$
- $\theta_{jd0} = \frac{Imported\ Volume_{jd0}}{\sum_d Imported\ Volume_{jd0}}$

Both of them are computed by using the five-year averages over the years 2003 -2007.

Results

VARIABLES	(1) Real Cash Rent (USD/acre PPI 1982=100)	(2) Real Cash Rent (USD/acre PPI 1982=100)	(3) Real Cash Rent (USD/acre PPI 1982=100)
LT (Contemporaneous shares)	-1.191***		
	(0.204)		
LT (Contemporaneous export and initial crop shares)		-1.383***	
		(0.299)	
LT (Initial export and crop shares)			-1.960***
			(0.510)
Observations	16,540	16,540	16,540
Weather Covariates	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes

Note: Standard errors are clustered at the state and year levels.

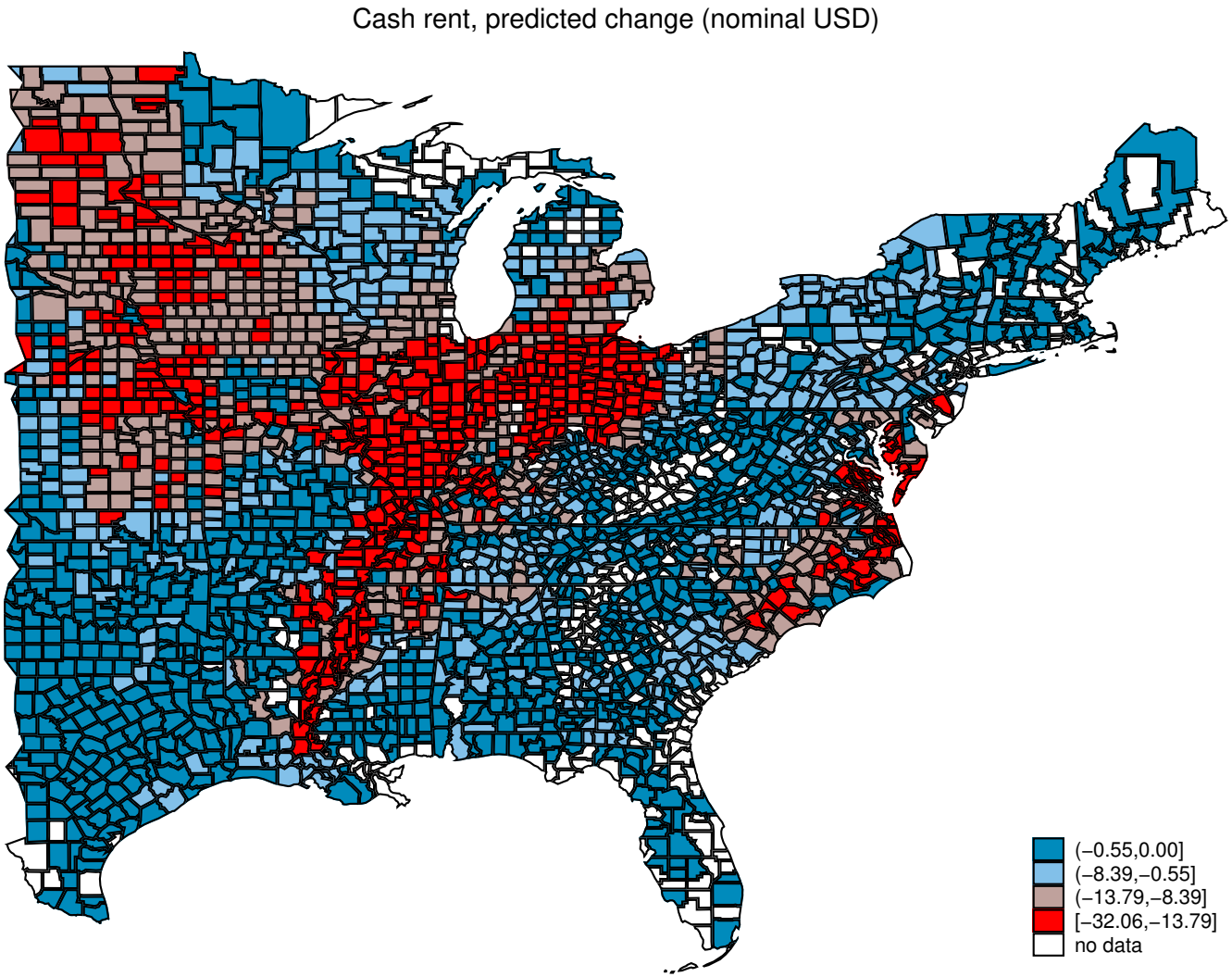
Predicted effect of the 2018 Chinese tariff

In July 2018, in response to the implementation of U.S. tariffs on Chinese products, China increased the tariff on U.S. soybeans from 2.5% to 25%. Based on our estimation of eq 3, we predict the effect on the increase in the soybeans tariff (i.e. $\hat{\beta}_1$ from col (3) $\times \Delta_{China} \hat{LT}_i$).

- No trade adjustment: The average predicted reduction is about \$7.06, which is 7.12% lower than the 2017 cash rents.
- Allowing trade volume reallocation (GTAP): The average predicted reduction is about \$0.43, which is 0.44% lower than the 2017 cash rents.

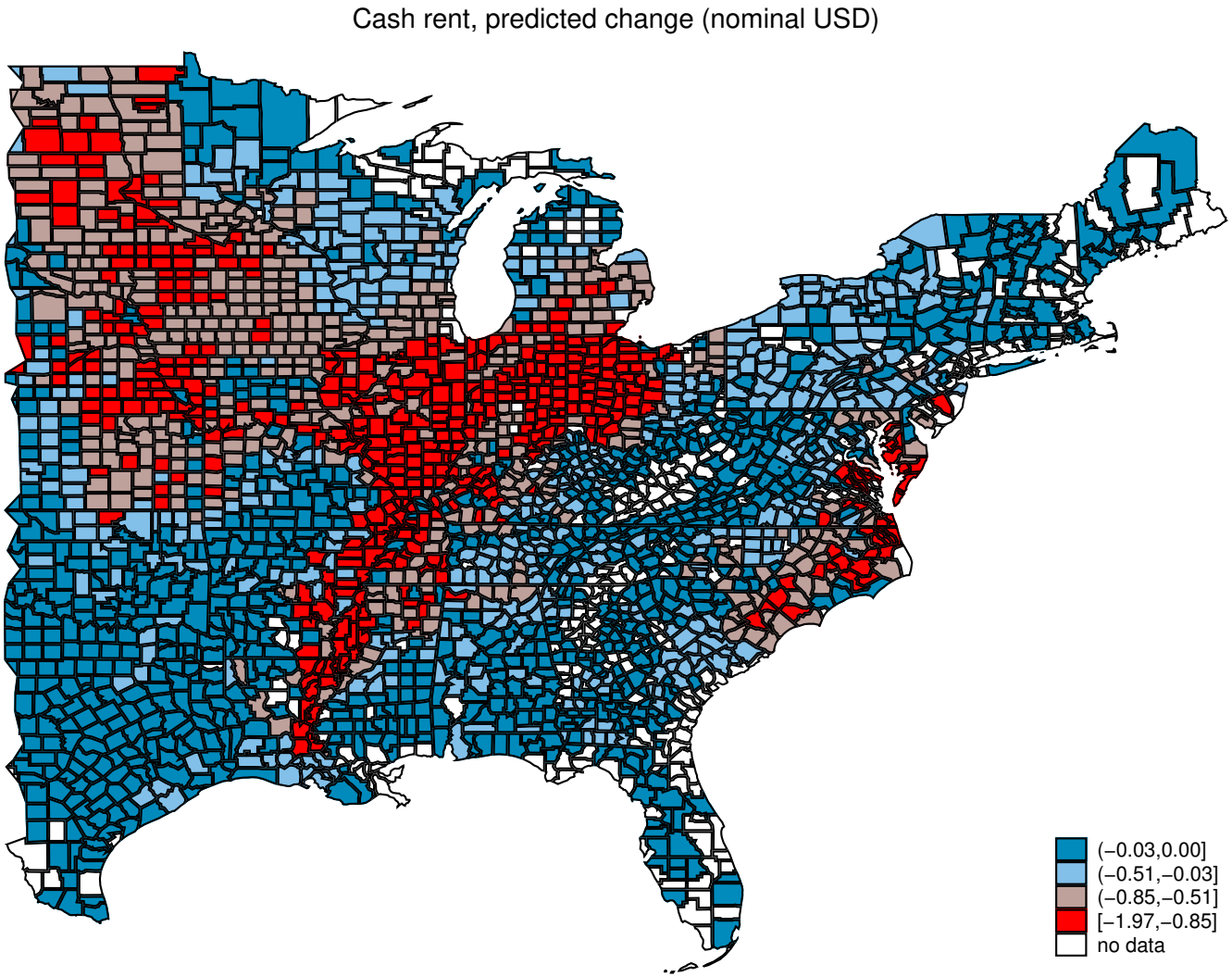
Predicted effect of the 2018 Chinese tariff

No adjustment



Predicted effect of the 2018 Chinese tariff

Trade allocation adjustment



Concluding Remarks

- We find that the changes in nominal tariffs in destination markets have substantial effects on land rents.
- Results are robust to different specifications that try to minimize confounding effects due to the adjustment of both, the crop and export destinations as tariffs in destinations change over time.
- Limitation: If the export destinations were lowering their tariffs to other countries at the same time as they were lowering their tariffs to the U.S, this could attenuate the estimates.
- Including the variation in tariffs faced by the U.S. vis-à-vis the variations in tariffs faced by U.S. competitors is part of our future research.