United States Department of Agriculture

Dollar Store Expansion, Food Retail Competition, and Rural Employment*

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The findings and conclusions in this presentation are those of the authors and should not be construed to represent any official USDA, or U.S. Government determination or policy. We are grateful to Hyun Suh and Enrique Figueroa for their excellent research assistance.

Who are we?

Sandro Steinbach, Associate Professor, North Dakota State University

- Food retail economics
- Statistical modeling of market structure and consumer choices
- Big data economics

Keenan Marchesi, Economist

USDA-ERS

- Food markets and retailing
- Spatial and applied econometrics
- Food acquisition

Rigoberto Lopez, Professor, University of Connecticut

- Food systems
- Marketing
- Industrial Organization
- Public policy

What do we do?

- Study retail competition in rural food markets and measure the impact of dollar store (DS) entry on independent grocery retailers (IGRs).
- Use food retail establishment data for census tract areas spanning all U.S. states from the National Establishment Time-Series (NETS) database for 2000 to 2019.
- Estimate the IGR response to DS entry in the local retail market using TWFE and event studies methods.
- Evaluate spatial spillovers in food retail sales and employment using spatial lag models.

Related Literature

- Most DS studies focus on the healthfulness of the food assortment and how DS could limit access to healthy food (Volpe et al., 2018; Cai et al., 2017; Caspi et al., 2015; Racine et al., 2016).
- Arcidiacomo et al. (2016) find that Walmart's entry negatively impacts supermarkets but that smaller stores, such as IGRs, thrive.
- Chenarides et al. (2021) measure the effects of DS entry, finding that DS entry is likely to benefit large format stores and supercenters.

Data

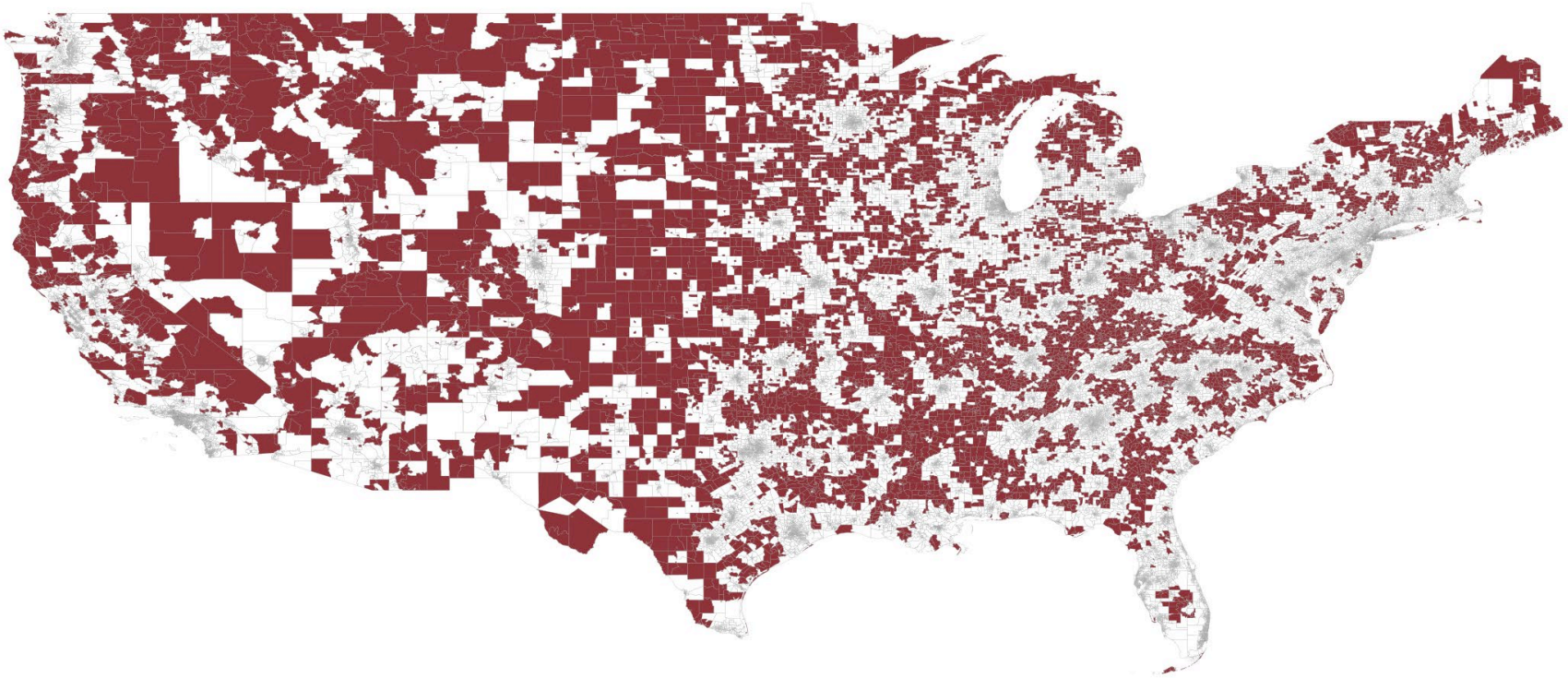
- National Establishment Time Series (NETS) database, 1990 to 2019

- Grocery Stores (NAICS 445110)
  - Independent Grocery Stores (IGR): classified as 'standalone', HQ DUNS = establishment DUNS
  - Local grocery chains: fewer than 3 retailers w/in same state as IGR

- Dollar stores
  - Searches on company and tradename
    - Key words and known retailers

- Rural-Urban Commuting Area (RUCA) 2010
  - Classification system for census tracts based on population density, urbanization, and daily commuting
  - RUCA 4 – 10 (non-metropolitan)

Rural & Isolated Retail Markets



Generalized DiD

- Use a non-linear two-way fixed effects (TWFE) model to control for unobserved factors at the census tract and year levels:

$$y_{it} = \exp\left(\alpha_i + \alpha_t + \alpha_{m,t} + DS_{it}\,\delta\right)\eta_{it}.$$

- DS_{it} is an indicator for the presence of the *j*-th dollar store in census tract *i* in year *t.*
- Account for market attractiveness through market-year ($\alpha_{m,t}$) fixed effects.
- Estimate relationship using Poisson Pseudo Maximum Likelihood Estimator (zeros, heteroskedasticity, count outcome).

Two-Way Fixed Effect Results

	IGR Count	IGR Employment	IGR Sales
Panel A: All census tracts			
Dollar Store Entry	-0.023***	-0.038***	-0.059***
	(0.004)	(0.007)	(0.017)
Pseudo R-squared	0.305	0.693	0.827
Observations	1,069,824	1,069,824	1,069,824
Panel B: Conditional average treatment effects			
Urban census tracts – DS entry	-0.017***	-0.028***	-0.048**
	(0.004)	(0.008)	(0.020)
Rural census tracts – DS entry	-0.051***	-0.074***	-0.096***
	(0.009)	(0.016)	(0.022)
Pseudo R-squared	0.305	0.693	0.827
Observations	1,069,824	1,069,824	1,069,824

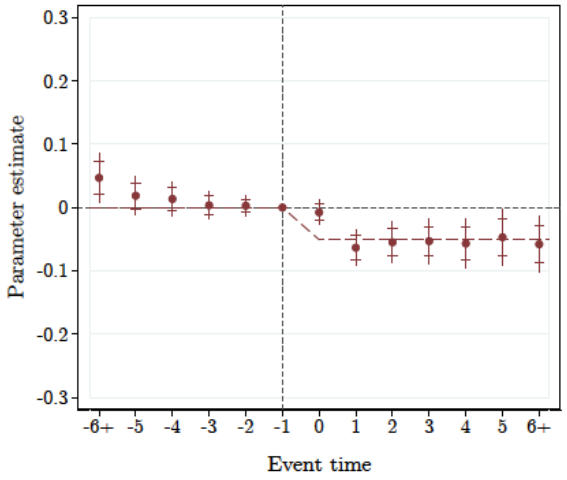
Event Studies

- To assess the potential for dynamic treatment effects, we adopted a non-linear panel regression model for count data with dynamic treatment effects (Freyaldenhoven et al., 2021):

$$y_{it} = \exp\left(\alpha_i + \alpha_t + \alpha_{m,t} + \sum_{m=-6}^{6} \delta_m \, DS_{i,t-m}\right)\eta_{it}.$$

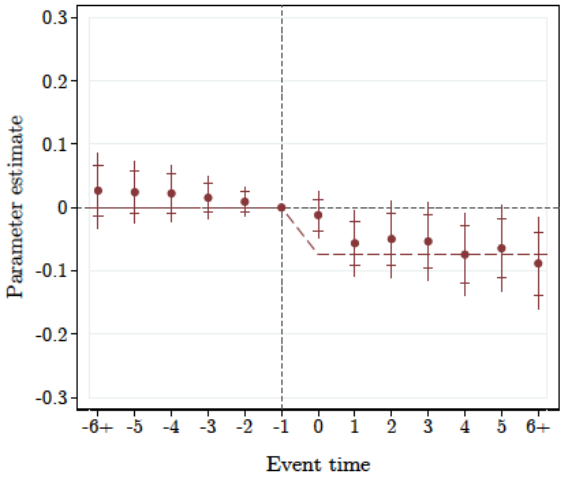
- We deploy the parsimonious assumption that all latent confounders are invariant at the census tract, year, and market-year level.
- We binned the endpoints of the event window to show long-term trends and tested for pre-trends and leveling-off treatment effects.

Dynamic Treatment Effects for Rural and Isolated Markets



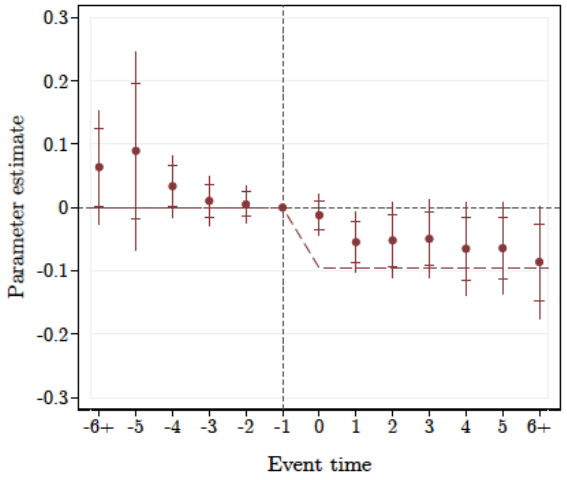
Pre-trends p-value: 0.171 -- Leveling off p-value: 0.315 -- Static effect p-value: 0.000
Pseudo R-squared: 0.305 -- Observations: 1,069,824

Count of IGRs



Pre-trends p-value: 0.118 -- Leveling off p-value: 0.071 -- Static effect p-value: 0.000
Pseudo R-squared: 0.693 -- Observations: 1,069,824

Employment of IGRs



Pre-trends p-value: 0.056 -- Leveling off p-value: 0.257 -- Static effect p-value: 0.000
Pseudo R-squared: 0.827 -- Observations: 1,069,824

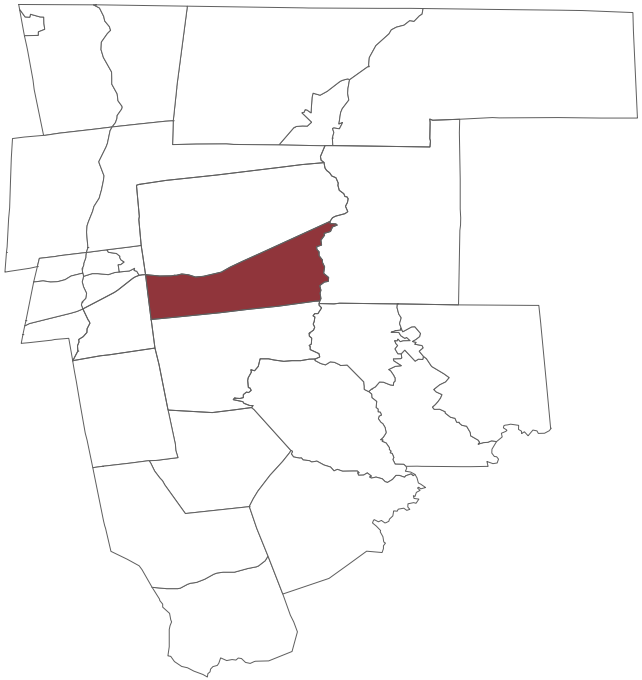
Sales of IGRs

Spatial Spillovers

- DS entry in adjacent census tracts could impact IGRs (Arcidiacomo et al., 2020).
- Use a spatial lag term of dollar store entry to measure potential spillover effects:

$$y_{it} = \exp(\alpha_i + \alpha_t + \alpha_{m,t} + \delta_1 D_{it} + \delta_2 WDS_{it})\eta_{it}$$

- Test entry versus density of entry effects.



Census Tract 5331.02, Tolland County, Connecticut

Spatial Spillover Effects for Rural and Isolated Markets

	IGR Count	IGR Employment	IGR Sales
Panel A: Number of entries in adjacent census tracts			
Urban treatment effect	-0.018***	-0.030***	-0.050**
	(0.004)	(0.008)	(0.020)
Rural treatment effect	-0.051***	-0.073***	-0.095***
	(0.009)	(0.016)	(0.022)
Spatial Lag	-0.009***	0.011***	0.014***
	(0.001)	(0.002)	(0.004)
Panel B: Share of adjacent census tracts with entry			
Urban treatment effect	-0.018***	-0.029***	-0.049**
	(0.004)	(0.008)	(0.020)
Rural treatment effect	-0.051***	-0.074***	-0.095***
	(0.009)	(0.016)	(0.022)
Spatial Lag	-0.059***	0.050***	0.047***
	(0.010)	(0.019)	(0.031)

Differences across Rurality Concepts

	IGR Count	IGR Employment	IGR Sales
Panel A: Number of entries in adjacent census tracts			
Urban census tracts	-0.017***	-0.032***	-0.042***
	(0.004)	(0.008)	(0.016)
Rural census tracts	-0.047***	-0.073***	-0.112**
	(0.009)	(0.016)	(0.044)
Panel B: Any entry in adjacent census tracts			
Metropolitan census tracts	-0.017***	-0.028***	-0.048**
	(0.004)	(0.008)	(0.020)
Micropolitan census tracts	-0.038***	-0.082***	-0.110***
	(0.012)	(0.021)	(0.029)
Small town and rural census tracts	-0.081***	-0.056***	-0.062***
	(0.016)	(0.021)	(0.026)
Pseudo R-squared	0.305	0.693	0.827
Observations	1,069,824	1,069,824	1,069,824

Heterogeneity over Time and between Regions

	IGR Count	IGR Employment	IGR Sales
Panel A: Over Time			
2000 to 2004	-0.014	-0.013	-0.011
	(0.013)	(0.020)	(0.028)
2005 to 2009	-0.037***	-0.040**	-0.056**
	(0.010)	(0.016)	(0.025)
2010 to 2014	-0.070***	-0.119***	-0.158***
	(0.010)	(0.017)	(0.022)
2015 to 2019	-0.063***	-0.136***	-0.158***
	(0.012)	(0.020)	(0.027)
Panel B: Across Regions			
Northeast	-0.057**	-0.091**	-0.101**
	(0.026)	(0.036)	(0.039)
Midwest	-0.073***	-0.086***	-0.123***
	(0.017)	(0.026)	(0.038)
South	-0.042***	-0.048*	-0.088**
	(0.014)	(0.027)	(0.043)
West	-0.041*	-0.091**	-0.056
	(0.025)	(0.042)	(0.039)

Additional Robustness Check

- Following Arcidiacono et al. (2020), we include census tract fixed effect, time dummies, and linear market trends.
  - Choice implies main findings conditional on these fixed effects absorbing 'unobserved correlation', which could bias results.
- Re-estimate main findings excluding each fixed effect.
  - Limited evidence for treatment heterogeneity conditional on this choice.
- Causal inference depends not only on parallel trends holding but also on using a credible and transparent comparison group.
  - Remove the always-treated census tracts.
- Despite the larger magnitude for most economic outcomes, not statistically different from the main results.
  - 'True' causal effects lie between main findings and estimates that exclude always-treated units.

Contributions

- Expands the empirical literature on the impact of market entry in the food retail industry

- DS entry harms IGRs

- Provide evidence of treatment heterogeneity of DS entry
  - DS entry effects are more prominent and persistent in rural communities

Thank you for your attention. Any questions?