

Research/Extension Program Overview

Wendong Zhang

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October 12, 2022



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Research & Extension Program Themes

- **Theme I: Agriculture & the Environment**
- **Theme II: Land Value, Land Ownership, Land Tenure, Land Use**
- **Theme III: Chinese Agriculture & its Global Trade Implications**
- Other Useful information:
 - Appointment: 50% Research & 50% Extension
 - Faculty Affiliate, Cornell Institute for China Economic Research (CICER)
 - Faculty Fellow, Cornell Atkinson Center for a Sustainable Future
 - Highlights at Iowa State: Led Iowa land value survey; co-founded the ISU China Ag Center, State farm management specialist
 - Associate Editor for American Journal of Agricultural Economics & Journal of Soil and Water Conservation
 - Courses taught: Rural property appraisal, Ag & trade policy (Undergraduate)
 - Academic Vice President, ASFMRA (American Society of Farm Managers and Rural Appraisers) Iowa Chapter

Disamenity or Premium: Do Electricity Transmission Lines Affect Farmland Values and Housing Prices Differently?

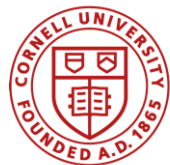
Qinan Lu, Ph.D. Candidate, University of Wisconsin–Madison

Nieyan Cheng, Assistant Professor, China University of Petroleum - Beijing

Wendong Zhang*, Assistant Professor, Dyson School of Applied Economics and Management, Cornell University; Associate Professor, Iowa State University (On leave)

Pengfei Liu, Assistant Professor, University of Rhode Island

ZTRAX Workshop, Aug. 30th, 2022



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Preview

Research Question

- How do TMLs impact nearby farmland prices and housing property values in the era of renewable energy? Disamenity or premium?

Data

- Farmland: *FarmlandFinder*.
- House: Zillow/ZTRAX.
- TMLs location: US Energy Information Administration.
- Wind Speed: National Renewable Energy Laboratory

Method

- Hedonic pricing model

Results

- Premium: Farmland value decreases 0.99% every 1000 meters away from the TMLs.
- Disamenity: House price increases 1.21% every 1000 meters away from the TMLs.
- Locating in high-wind areas brings more option values for farmlands, but not for houses.

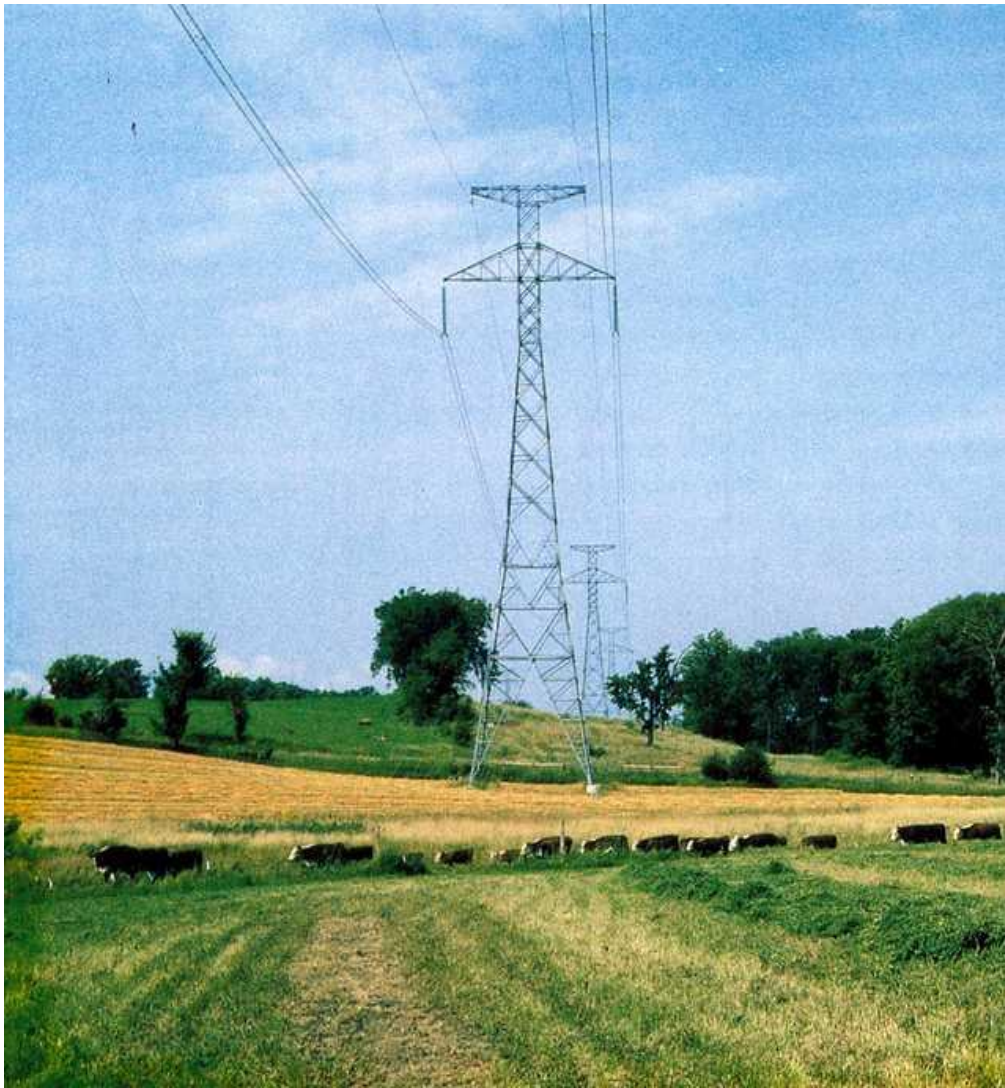
Previous Literature

TMLs and farmland values

- One paper found that the overhead TMLs depressed nearby farmland values in Italy (Sardaro et al., 2018)
- Some literature found that the TMLs does not find significant effects of TMLs on farmland values. (Brown, 1976; Jackson, 2010)
- A recent study shows that proximity to TMLs for farmland parcels could be positively valued AFTER construction of utility-scale solar facilities (Abashidze and Taylor, 2022)

TMLs and housing prices

- A bunch of literature has explored the adverse effects of electric transmission lines on housing property values due to:
 - Health risk and safety hazards (Priestley and Evans, 1990)
 - Visual aesthetics deterioration (Hamilton and Schwann, 1995; Des Rosiers, 2002; Chalmers, 2009)
 - Culture (Jackson, 2010)



Source: MINN Post (2020)

<https://www.minnpost.com/mnopedia/2020/02/in-the-1970s-some-minnesota-farmers-were-very-upset-about-a-plan-to-route-power-lines-across-their-fields/>



Source: Green Tech Media (2020)

<https://www.greentechmedia.com/articles/read/midwest-grid-operators-seek-to-unlock-clean-energy-transmission-on-the-seam>



Source: University of Nebraska-Lincoln (2017)

<https://cropwatch.unl.edu/2017/look-avoid-power-line-deaths-harvest>

Results: Baseline

Farmland Values	
Dependent variable	log of price
Sample	Pooled sample
Distance to TMLs	-0.0099*** (0.0008)
Gross acres	-0.0565*** (0.0070)
Gross acres ²	0.0005*** (0.0002)
Land percentage tillable	0.2131*** (0.0127)
Average NCCPI for agriculture	0.8483*** (0.0306)
% of Prime farmland	0.0440** (0.0180)
Soil texture: % of clay	0.3476*** (0.1016)
Soil texture: % of silt	-0.1447 (0.1183)
Soil texture: % of loam	-0.0193 (0.0178)
Average land slope	0.0025*** (0.0006)
Population in Urban Areas	0.0070*** (0.0004)
Distance to highway	-0.1330*** (0.0118)
Distance to railway	-0.0583*** (0.0047)
Distance to waterbody	0.0905*** (0.0151)
Distance to biodiesel	-0.0184*** (0.0008)
Distance to Grain Warehouse	-0.0427*** (0.0035)
County FE	YES
Year FE	YES
No. of Observations	18580
Adj. R-sq	0.423

Premium: Farmland value decreases by 0.99% every one kilometer further away from the TMLs.

Disamenity: Housing price increases 1.21% every one kilometer away from the TMLs.

House Prices	
Dependent variable	log of price
Sample	Pooled sample
Distance to TMLs	0.0121*** (0.0037)
Age	-0.0065*** (0.0007)
Age ²	0.0000* (0.0000)
No. of stories	0.0569** (0.0283)
No. of total rooms	0.0259*** (0.0035)
No. of total bedrooms	0.0139** (0.0069)
No. of full bath	0.2443*** (0.0114)
Distance to hospital	-0.0055*** (0.0010)
Distance to school	0.0129*** (0.0022)
Distance to university	-0.0052*** (0.0007)
County FE	YES
Year-Quarter FE	YES
No. of Observations	919521
Adj. R-sq	0.300

ABASHIDZE, NINO. Essays on Economic and Health Effects of Land Use Externalities. (Under the direction of Dr. Harrison Fell).

frequently. Furthermore, there appears to be no empirical research that quantifies the effect of ground-level solar installations on local property values. In the first essay of my dissertation, I examine the effect of utility-scale, ground-level solar systems on agricultural land values. Agricultural transactions data are spatially linked to data on solar farm installations and are analyzed in a hedonic framework. The results provide no evidence that the construction of a solar farm creates any positive or negative spillover effects on nearby agricultural land values through either production process channels or changes in aesthetic views of the land. However, the estimates suggest that landowners value being in close proximity to transmission infrastructure after a solar farm is built in the area. This suggests that the solar farm construction in the area signals suitability of the land for solar development and thus increasing the option value of the land.

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ABASHIDZE, NINO. Essays on Economic and Health Effects of Land Use Externalities. (Under the direction of Dr. Harrison Fell).

In the second essay of my dissertation, I link ground-level solar systems to housing prices in surrounding neighborhoods both in urban and rural areas. A novel, street network distance measure is utilized in the analysis to capture the visual externalities generated by solar farms. In a difference-in-differences-style framework, I explore the effect of the construction of a solar farm on houses in close proximity that are exposed to the externalities generated by a solar farm compared to houses located further away. The results provide evidence that the construction of a solar farm significantly decreases residential housing values for homes located less than one mile (measured via street network) from a farm and the effect is larger for houses located within a half-mile of a solar farm. The analysis also reveals that the construction of the solar farm reduces the number of house sales in close proximity. Interestingly, the results of stratified analysis indicate that the effect of solar farm construction is homogenous across communities.

PROPERTY VALUE IMPACTS OF COMMERCIAL-SCALE SOLAR ENERGY IN MASSACHUSETTS AND RHODE ISLAND

Vasundhara Gaur and Corey Lang

Department of Environmental and Natural Resource Economics
University of Rhode Island

September 29, 2020

While utility-scale solar energy is important for reducing dependence on fossil fuels, solar arrays use significant amounts of land (about 5 acres per MW of capacity), and may create local land use disamenities. This paper seeks to quantify the externalities from nearby solar arrays using the hedonic method. We study the states of Massachusetts and Rhode Island, which have high population densities and ambitious renewable energy goals. **We observe over 400,000 transactions within three miles of a solar site.** Using a difference-in-differences, repeat sales identification strategy, **results suggest that houses within one mile depreciate 1.7% following construction of a solar array, which translates into an annual willingness to pay of \$279.** Additional results indicate that the negative externalities are primarily driven by solar developments on farm and forest lands in non-rural areas. For these states, our findings indicate that the global benefits of solar energy in terms of abated carbon emissions are outweighed by the local disamenities.

Solar+saffron experiment could pave the path to more dual-use farms

By Billy Ludt | February 11, 2019



Saffron blooms underneath a solar panel in Vermont, its red stigma awaiting harvest. The University of Vermont and local solar developer Peck Solar are testing how the valuable spice will fare while paired with a solar array. University of Vermont



Saffron was planted in 12 test beds, made of three rows of four—the first in front of the solar array, second under the panels and third behind them. The spice made it through its first grow season in Vermont, and the test will finish after the next. Peck Solar

JOURNAL ARTICLE

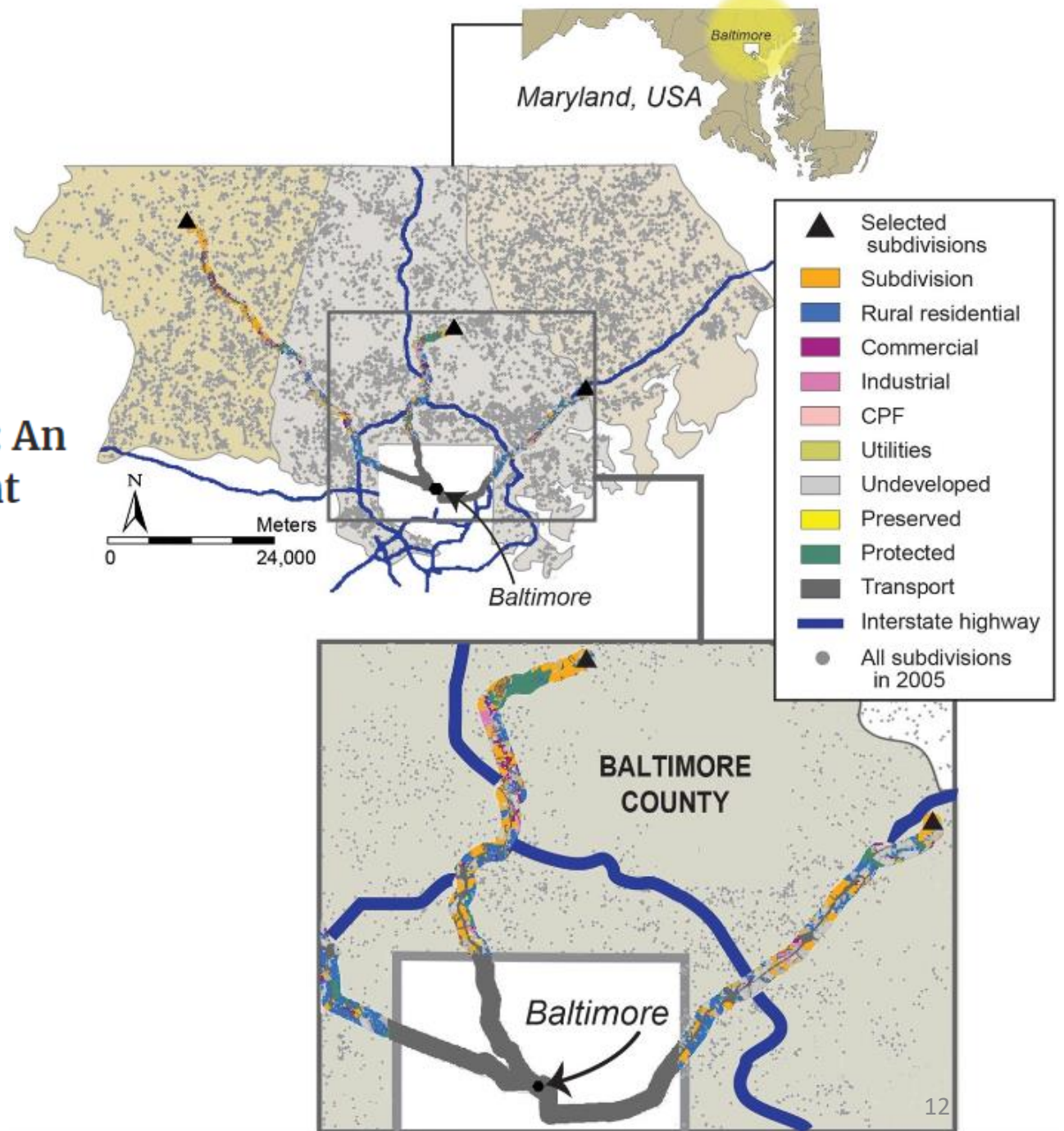
Spatial Heterogeneity, Accessibility, and Zoning: An Empirical Investigation of Leapfrog Development

Wendong Zhang ✉, Douglas H. Wrenn, Elena G. Irwin

Journal of Economic Geography, Volume 17, Issue 3, May 2017, Pages 547–570,

<https://doi.org/10.1093/jeg/lbw007>

Published: 04 April 2016 Article history ▼



Spatial Heterogeneity, Accessibility, and Zoning: An Empirical Investigation of Leapfrog Development

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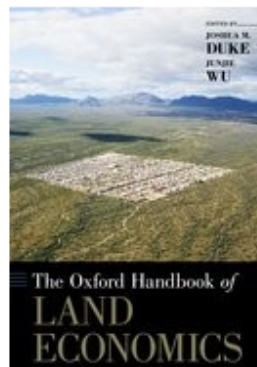
Wendong Zhang , Douglas H. Wrenn, Elena G. Irwin

Journal of Economic Geography, Volume 17, Issue 3, May 2017, Pages 547–570,

Abstract

Using data on subdivision development from 1960 to 2005 in the Baltimore, Maryland region, we develop a new, subdivision-specific measure of leapfrog development. Applying this measure, we find that about 80% of developable land that was more accessible to the urban center than newly built subdivisions remained undeveloped as of 1960. This amount declined by more than 50% over our 45-year study period to 36% in 2005. We compare this pattern with a hypothesized pattern generated by a parameterized intertemporal urban growth model and find that the observed pattern is consistent with urban economic theory, including the implied effects of zoning. Specifically, by fixing the allowable development density, low-density zoning eliminates the incentive to withhold more accessible land and thus reduces leapfrog development, a prediction that we confirm empirically. The results illustrate the efficacy of the urban growth model and the substantial influence of spatially heterogeneous zoning on urban land development patterns.

Theme II: Land Values, Ownership & Use



[The Oxford Handbook of Land Economics](#)

Joshua M. Duke (ed.), Junjie Wu (ed.)

Contents

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 - 2 Technology Adoption and Land Use
 - 3 Are Large Metropolitan Areas Still Viable?

CHAPTER

5 Modeling the Determinants of Farmland Values in the United States

Cynthia J. Nickerson, Wendong Zhang

<https://doi.org/10.1093/oxfordhb/9780199763740.013.005> Pages 111–138

Published: 02 September 2014



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Abstract

Farmland has long represented a significant component of both farm sector and farm household assets. This chapter provides a comprehensive overview of significant developments in modeling farmland values, with attention to methodological challenges and recent modeling innovations. After outlining the capitalization model that provides the theoretical underpinnings for most farmland value studies, the merits and efficacy of dynamic models using aggregate data, as well as increasingly popular cross-sectional hedonic models that use spatially disaggregate data are presented. Estimation issues in hedonic models are reviewed, with a focus on those deserving special consideration in the context of farmland values such as spatial dependence and heterogeneity and sample selection bias. Promising future research directions include greater use of nonparametric approaches, quasi-experimental designs, panel data analyses, and structural econometric models, which take advantage of spatially explicit farmland values data but avoid the restrictive assumptions of standard spatial lag and spatial error models.

Housing Market Bust and Farmland Values: Identifying the Changing Influence of Proximity to Urban Centers

Wendong Zhang, and Cynthia J. Nickerson

Abstract


This article estimates the impact of the 2007–2008 residential housing market bust on farmland values, using parcel-level farmland sales data from 2001–2010 for a 50-county region under urbanization pressure in western Ohio. Hedonic model estimates reveal that farmland was not immune to the residential housing bust; the portion of farmland value attributable to proximity to urban areas was almost cut in half shortly after the bust in 2009–2010. Nonetheless, total farmland prices remained relatively stable in the 2000s, likely due to increased demand for agricultural commodities. Our results are robust to different assumptions about the structure of the unobserved spatial correlation. (*JEL Q15, R14*)

Are Expert Opinions Accurate? Panel Data Evidence from the Iowa Land Value Survey

Wendong Zhang, Associate Professor

Sergio H. Lence, Professor and Marlin Cole Chair of International Agricultural Economics

Todd Kuethe, Associate Professor and Schrader Chair in Farmland Economics

 Author Affiliations

Abstract

Opinion surveys are the dominant method for gauging U.S. farmland values. However, there is no systematic evaluation of how opinions are formulated and change over time. Using panel data of agricultural professionals from the Iowa Land Value Survey over 2005–2015, we investigate how surveyed experts update their farmland value estimates. We find that experts almost fully correct their prior “errors” in a single period. Experts’ opinions also incorporate most of the prevailing price innovations in one period. Our Bayesian estimation technique simultaneously addresses the unobservability and nonstationarity of prevailing farmland values and the Nickell bias in short dynamic panels.

Synergistic research & extension publications

The impacts of interest rate changes on US Midwest farmland values

Albulena Basha, Wendong Zhang, Chad Hart

Agricultural Finance Review

ISSN: 0002-1466

Article publication date: 8 February 2021 [Reprints & Permissions](#)

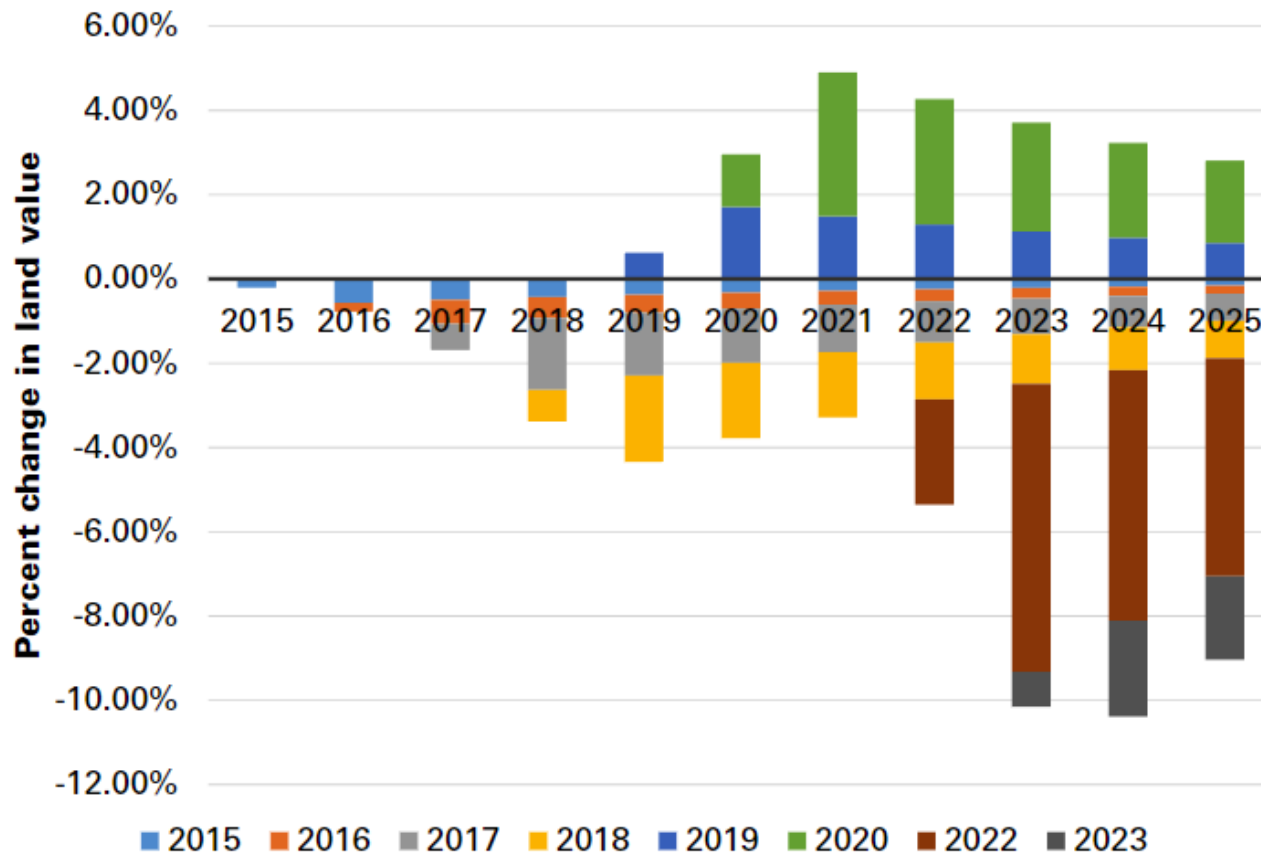
Issue publication date: 29 September 2021

Will the soaring farmland market continue to rise?

Ag Decision Maker
extension.iastate.edu/agdm

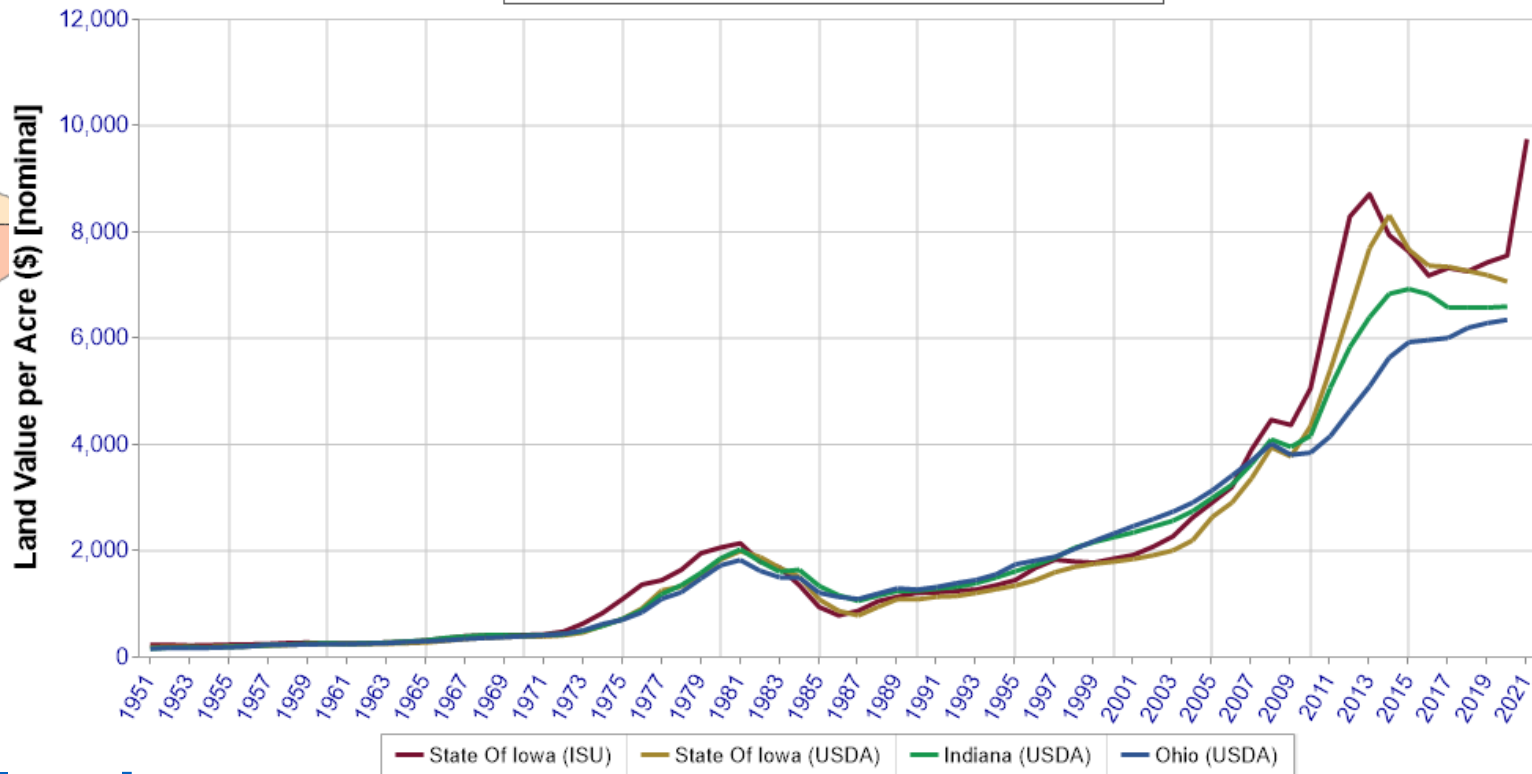
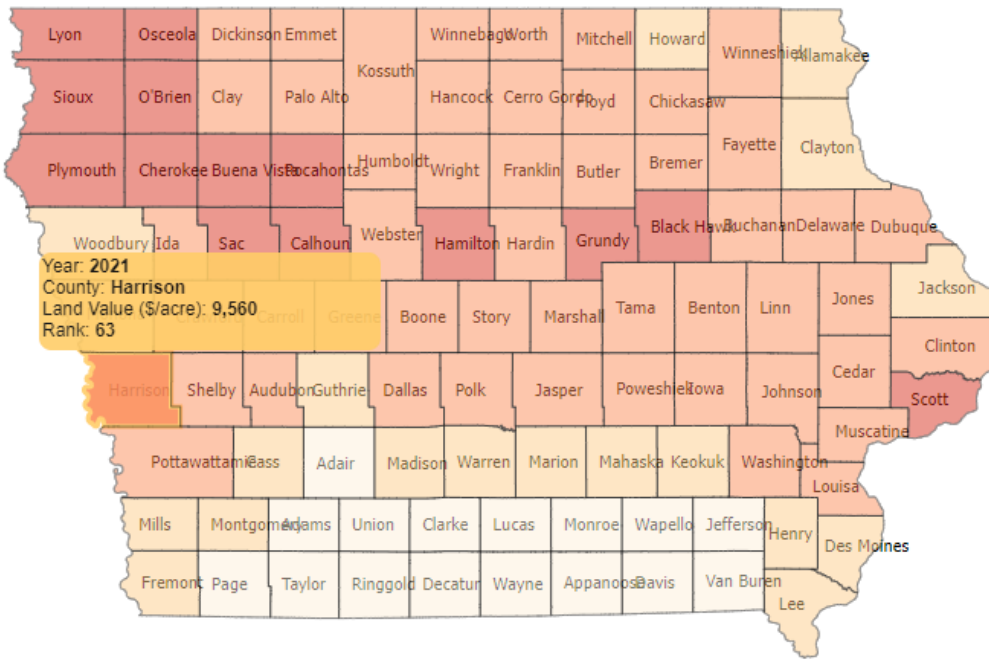
Special Report

Figure 1. The short- and long-term impacts of recent Federal Reserve interest rate moves on I-states' farmland values



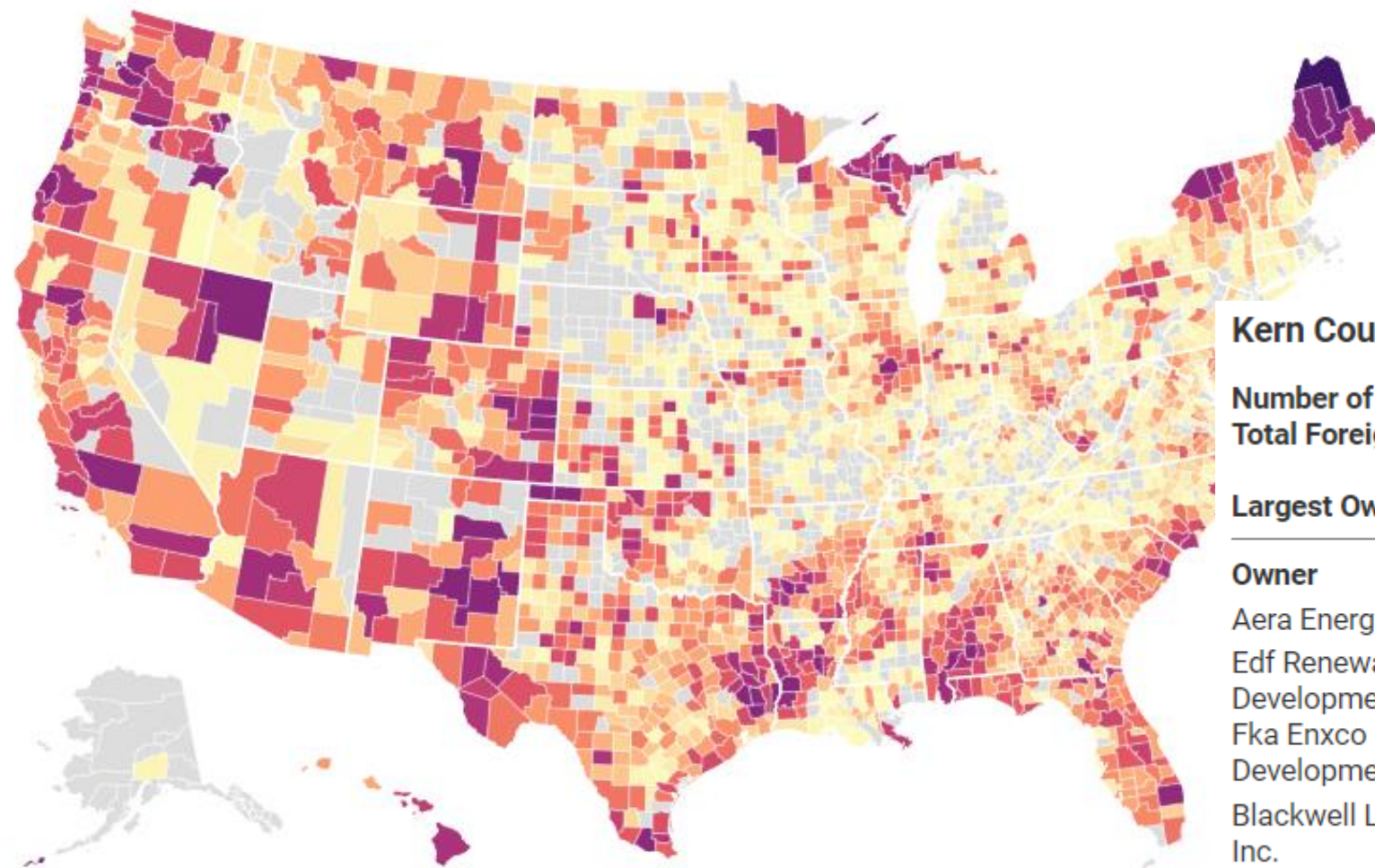
Note: the legend shows the policy years during which the Federal Reserve made changes in the benchmark federal funds rates. The 2022 and 2023 projections assume twelve and four hikes based on the Federal Reserve Dot Plot, or 3-percentage-point and 1-percentage-point increase.

Data Visualization: Iowa Land Value Survey & CARD Farmland Portal



www.card.iastate.edu/farmland

Acreage of Foreign-Owned Farmland by County



Map: Daily Yonder and Investigate Midwest • Source: USDA • [Get the data](#) • Created with [Datawrapper](#)

Atchison County, Missouri

Number of Foreign Owners: 8
Total Foreign-Owned Acres: 90,423

Largest Owners (up to 5)

Owner	Nation	Acres
Rock Creek Wind Project, L.L.C.	ITA	55,756
Outlaw Wind Project Llc	ITA	18,025
Edf Renewable Development Corp. Fka Enxco Development Corp.	FRA	9,977

Kern County, California

Number of Foreign Owners:
Total Foreign-Owned Acres

Largest Owners (up to 5)

Owner	Nation	Acres
Aera Energy L.L.C.	NLD	36,976
Edf Renewable Development Corp. Fka Enxco Development Corp.	FRA	14,314
Blackwell Land Co., Inc.	GBR	11,553
Paloma Farms, Inc	JPN	5,861

<https://investigatemitwest.org/2022/04/19/foreign-investment-in-us-cropland-nearly-triples-in-past-decade-usda-data-shows/>

House Republicans Ask GAO to Probe Foreign Ownership of U.S. Farmland

Why A Secretive Chinese Billionaire Bought 140,000 Acres Of Land In Texas

John Hyatt Forbes Staff

I write about wealth, billionaires and their companies.

Aug 9, 2021, 07:10am EDT

The inside story of Sun Guangxin's plan for a wind farm in the Lone Star state and how it incurred the wrath of U.S. lawmakers and environmentalists, becoming a flashpoint in U.S.-China relations.

Despite the political firestorm, he intends not only to keep GH America's land, but to lease it to other companies to build and operate solar panels and the Blue Hills Wind Development

<https://www.forbes.com/sites/johnhyatt/2021/08/09/why-a-secretive-chinese-billionaire-bought-140000-acres-of-land-in-texas/?sh=2d8de27a78c3>

Wendiam Patrick McCracken Sawadgo



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[Alabama Cooperative Extension System](#)

What drives landowners' conservation decisions? Evidence from Iowa

W.P.M. Sawadgo, W. Zhang, and A. Plastina

Abstract: Conservation practices such as no-till and cover crops have been shown to have on- and off-farm benefits. However, when benefits of a practice do not go to the provider, underinvestment may occur. Farmland rental arrangements where tenants may not reap the benefits of conservation investments are a commonly cited barrier to conservation practice adoption in agriculture and may result in lower adoption rates on rented land than on owner-operated fields. This issue is especially important since more than half of Midwestern farmland is rented out. This article examines the factors driving adoption of four key conservation practices—no-till, cover crops, buffer strips, and ponds/sediment basins—using a statistically representative survey of Iowa landowners. We find evidence supporting the hypothesis that adoption is lower on rented land for cover crops, buffer strips, and sediment basins, but not for no-till. Our results also show that the large proportion of the state's land owned by nonoperating landowners and absentee landowners could present a barrier to increasing adoption of conservation practices. Furthermore, landowners seem open to increasing the use of cover crops in the immediate future, and a sizable number are even willing to incentivize tenants by paying for part of the cover crop planting cost. Finally, almost half of landowners would be willing to increase the area of their land under conservation practices if they could receive conservation-related tax credits or deductions, suggesting a potential policy strategy to increase adoption.

Key words: absentee landowners—conservation practice—cover crops—land tenure—non-operating landowners—no-till

How to determine cropland rent – Iowa resource – Alejandro Plastina

Presentation: Cash Rent Consideration

<https://www2.econ.iastate.edu/faculty/plastina/presentations/Plastina-220210.pdf>

Information File and Excel Decision Tool on How to Compute a Cropland Cash Rent

<https://www.extension.iastate.edu/agdm/wholefarm/html/c2-20.html>

Farm Building Rental Rate Survey (2014)

<https://aglease101.org/wp-content/uploads/2020/10/NCFMEC-07.pdf>

Custom Rate Survey

<https://www.extension.iastate.edu/agdm/crops/pdf/a3-10.pdf>

Capitalization Rate (Cap Rate) or Rent to Value Ratio



Article title:	Trends in Farmland Price to Rent Ratios in Indiana
Author:	Michael Langemeier
Article ID:	PAER-2022-23
Publication date:	August 10, 2022

A standard measure of financial performance most commonly used for stocks is the price to earnings ratio (P/E). A high P/E ratio sometimes indicates that investors think an investment has good growth opportunities, relatively safe earnings, a low capitalization rate, or a combination of these factors. However, a high P/E ratio may also indicate that an investment is less attractive because the price has already been bid up to reflect these positive attributes. This paper computes a ratio equivalent to P/E ratio for farmland, the farmland price to cash rent ratio (P/rent), and discusses trends in the P/rent ratio.

<https://ag.purdue.edu/commercialag/home/paer-article/trends-in-farmland-price-to-rent-ratios-in-indiana-3/>

Central NY Farmland Cash Rental Rate Survey Findings

- https://dyson.cornell.edu/wp-content/uploads/sites/5/2021/09/EB-2021-02_Central-NY-Farmland-Cash-Rental-Rate-Survey-Findings-VD.pdf

Jennifer Ifft and Nicole Tommell

Table 1. Chenango County Results

	Low	Medium	High
	Cropland		
Rental rate	\$31	\$68	\$105
Share of total cropland	28%	42%	30%
Average silage yield - tons/acre	13	18	24
	Pasture		
Rental rate	\$22	\$32	\$43

64 people responded to the survey, but only 56 provided information on their occupation. The majority were farmers, but many other groups were represented. Each respondent listed the counties they were familiar with, for a total of 80 county-level observations

Farmer Decision Making

Land Economics

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Full Text (PDF)

Hongxing Liu, Wendong Zhang, Elena Irwin, Jeffrey Kast, Noel Aloysius, Jay Martin, and Margaret Kalcic

Best Management Practices and Nutrient Reduction: An Integrated Economic-Hydrologic Model of the Western Lake Erie Basin

Land Economics November 2020 96:510-530;



Journal of Great Lakes Research

Volume 42, Issue 6, December 2016, Pages 1343-1356



What motivates farmers to apply phosphorus at the “right” time? Survey evidence from the Western Lake Erie Basin

Wendong Zhang ^a , Robyn S. Wilson ^b, Elizabeth Burnett ^b, Elena G. Irwin ^c, Jay F. Martin ^d



Land Use Policy

Volume 79, December 2018, Pages 609-621



Do farmers adopt fewer conservation practices on rented land? Evidence from straw retention in China

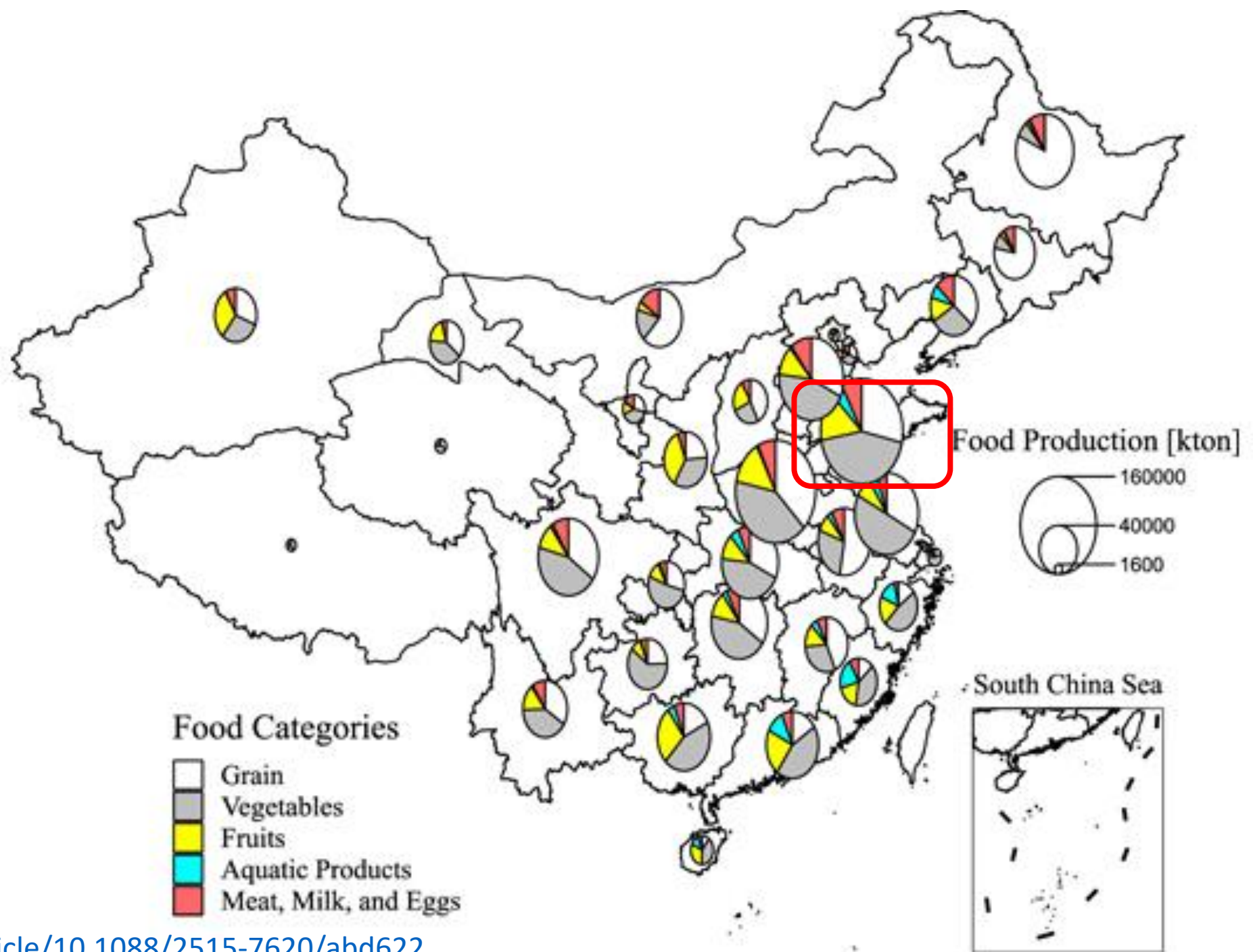
Li Gao ^a , Wendong Zhang ^b , Yingdan Mei ^a , Abdoul G. Sam ^c , Yu Song ^d , Shuqin Jin ^e

Agricultural transformation in my hometown

Greenhouse – plastic film - Shandong Province



Food Production in China, 2018



Extension Work on Conservation

Voices of Iowa Women Landowners on Conservation

PUBLISHED
6/15/2022

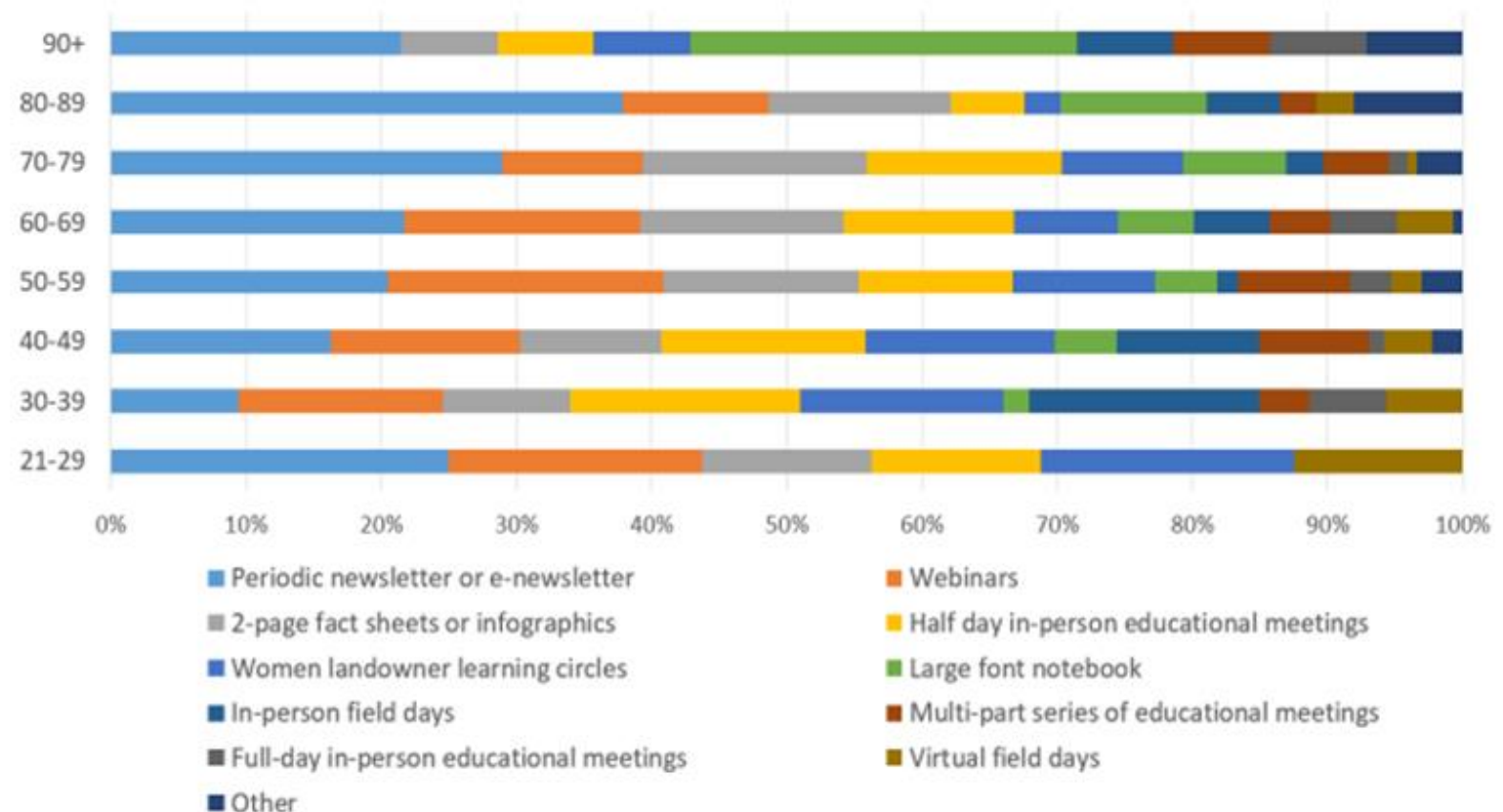


Figure 2. Women landowners' preferred methods to receive information and educational programming by age group.

Thank you!

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