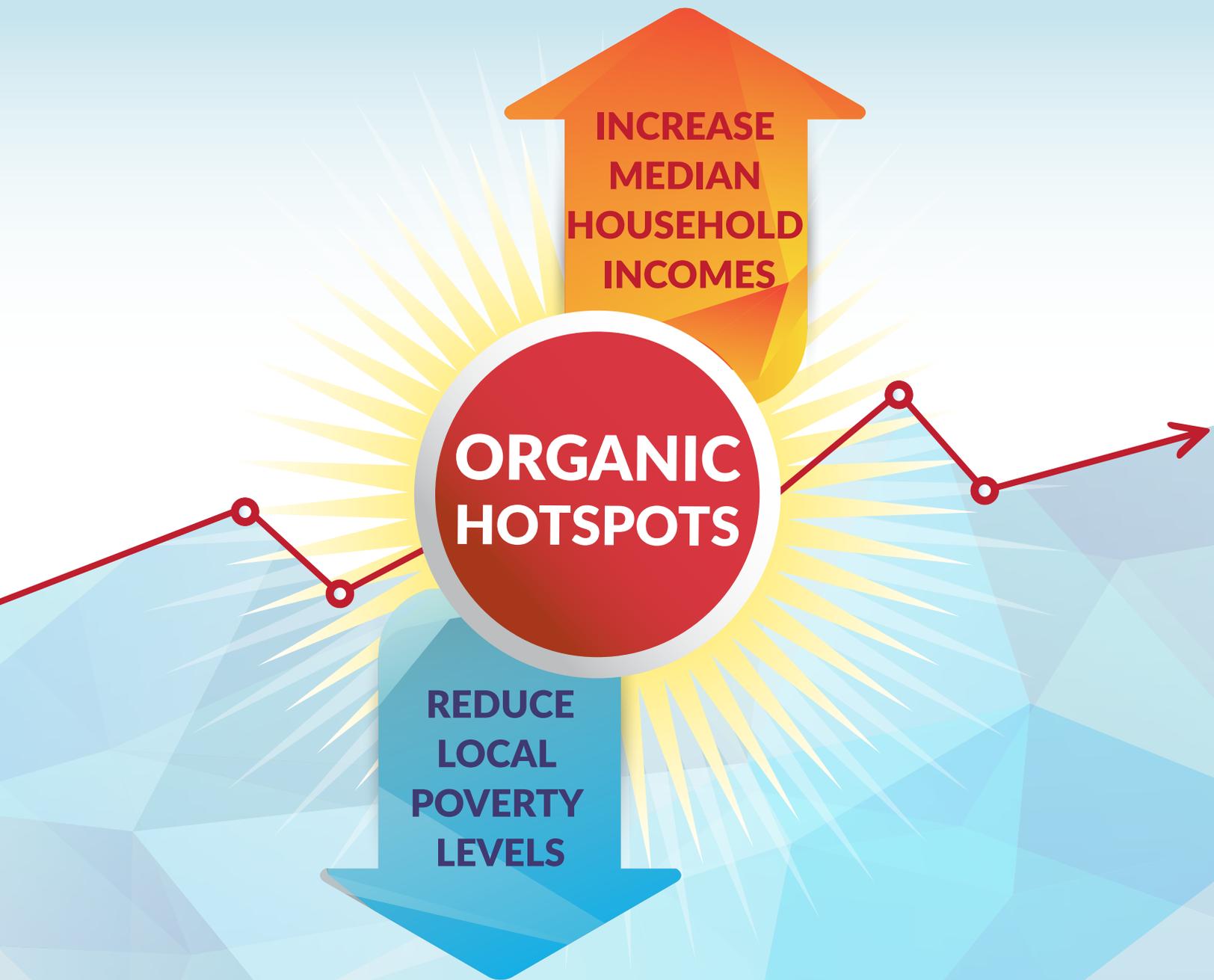


U.S. Organic Hotspots and their Benefit to Local Economies

Hotspot Identification, Formation, Impacts, and Policy Recommendations



PennState

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Prepared for the Organic Trade Association
May 2016

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A Challenge Issued in 1980

National organic standards, certification requirements, and cropping system comparisons are several of the policy and research recommendations implemented since identified in the U.S. Department of Agriculture's landmark 1980 report, "Report and Recommendations on Organic Farming." However, at least one challenge - a recommendation to assess the socioeconomic impacts from increased levels of organic agriculture - remains generally unanswered.

BACKGROUND

Despite research efforts by sociologists and other social scientists, the economic impact of organic agriculture has not been rigorously quantified. This White Paper systematically assesses the impact of organic agriculture on local economies.

Prepared for the Organic Trade Association, U.S. Organic Hotspots and their Benefit to Local Economies summarizes and discusses three research papers that investigate organic agriculture hotspots in the U.S. (see Marasteanu and Jaenicke, 2015, 2016a, and 2016b). Two of the papers are published or forthcoming in peer-reviewed research journals; the third, currently a working paper, has been submitted for review at a research journal.



ABOUT THE AUTHOR

Edward Jaenicke, an Associate Professor of Agricultural Economics, has been at Penn State University since 2001. He has authored or co-

authored more than 25 peer-reviewed research papers on economic and policy issues related to food and agriculture, as well as two other reports for the Organic Trade Association. This White Paper is based on three related research papers co-authored by Julia Marasteanu while she was a Ph.D. student at Penn State under Jaenicke's supervision.

ABOUT THE ORGANIC TRADE ASSOCIATION



The Organic Trade Association (OTA) is a membership-based business association for organic agriculture and products. OTA is the leading voice for the organic trade in the United States, representing over 8,500 organic businesses across 50 states. Its members include growers, shippers, processors, certifiers, farmers' associations, distributors, importers, exporters, consultants, retailers and others. OTA's mission is to promote and protect ORGANIC with a unifying voice that serves and engages its diverse members from farm to marketplace.

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EXECUTIVE SUMMARY

Organic is the fastest growing sector of the U.S. food industry. Organic food sales increase by double digits annually, far outstripping the growth rate for the overall food market. Organic crops command a significant price premium over conventionally-grown crops. As a result, interest in organic at the production level has grown as the demand for organic has risen. More farmers are transitioning to organic production, more organic businesses are sprouting.

But what does all this interest in organic and organic activity mean for local economies?

This White Paper systematically assesses the impact of organic agriculture on local economies. It identifies 225 counties in the United States as organic hotspots – counties with high levels of organic agricultural activity that have neighboring counties with high organic activity – and then looks at how these organic hotspots impact two key county-level economic indicators: the county poverty rate and the median household income.

The White Paper also identifies what factors create organic hotspots, how the effect of organic agricultural hotspots compare with those of general agriculture (combined organic and conventional agriculture), and finally recommends specific policies to foster more organic economic hotspots throughout the nation.

The findings are compelling and conclusive. For the first time economic health at the county level is linked to organic agriculture. Specifically, this White Paper finds that:

- **Counties within organic hotspots have lower poverty rates and higher median annual household incomes.** On average, county poverty rates drop by 1.3 percentage points, and median income rises by over \$2,000 in counties in organic hotspots. The same beneficial results are not found for general agricultural hotspots.
- **Outreach and knowledge transfer are critical in creating organic hotspots.** The prevalence of outreach services by organic certifiers is found to play one of the strongest roles in organic hotspot formation. Also, whether a certifier is government-sponsored, by a state department of agriculture for example, is another key factor in enabling organic hotspots.
- **Organic agriculture can be used as an economic development tool.** Policy makers at all levels – local, state and national – have a proven economic reason to support organic agriculture and to create more economy-stimulating organic hotspots.

Organic agriculture has been proven to benefit our environment and our bodies. This White Paper now shows that organic agriculture, and the business activities accompanying organic agriculture – can also benefit local economies and help secure the financial future of many.

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An expanded digital version with the Appendix, Technical Details for Hotspot Formation and Impact Estimation, is available for download on www.OTA.com/hotspots.

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1. WHAT IS AN ORGANIC HOTSPOT?

Using the *Local Moran's I* to Identify Hotspots:

Definition of Local Moran's I: Applied to our data, for each county's level of organic operations, the *Local Moran's I* tells us the correlation of one county's level of organic operations (adjusted by the average) to neighboring counties' levels.

Why we use it: Because the Local Moran's I is a statistical construct, we can test if regional clusters of organic operations occur in higher or lower rates than is to be expected by chance alone. The maps that follow show organic hotspots (in red) where chance alone or pure randomness is rejected.

A hotspot is a cluster of counties with two important characteristics: (a) they are counties with statistically high numbers of organic operations (farms and businesses), and (b) they have neighboring counties with high numbers of organic operations. The directory of the USDA National Organic Program (NOP) was used to identify the home county of all certified organic operators. These data plus a spatial statistic called the Local Moran's I were then used to identify and map the hotspots. With NOP's information about the type of organic information, we can identify and map five types of organic hotspots:

- (i) crop-based organic production hotspots,
- (ii) livestock-based organic production hotspots,
- (iii) organic production hotspots (crops and livestock),
- (iv) organic handler hotspots, and
- (v) all organic operations hotspots.

In addition to hotspots, we also identify outliers, which take two forms. One is a county with a high level of organic operations that has neighboring counties with low levels of organic operations. The second is the reverse, where a county with a low level of organic operations has high-level neighbors.

Using other data on all farms, not just organic farms, from the Census of Agriculture, we also identify general agricultural production hotspots as a comparison.

2. WHERE ARE ORGANIC HOTSPOTS?

Figure 1 shows the location of organic hotspots for all organic operations (i.e., crops, livestock, and handlers) for 2009 and 2013. Clusters of counties in a hotspot are filled in with red. Each of these counties has a high level of organic operations and there is strong statistical correlation across

counties in the cluster. For a county to be a hotspot, both it and its neighbors must have high levels of organic operations. An outlier is shown in pink or light blue. Pink counties have high levels of organic operations, but low-level neighbors; light blue counties have low levels, but high-level neighbors.

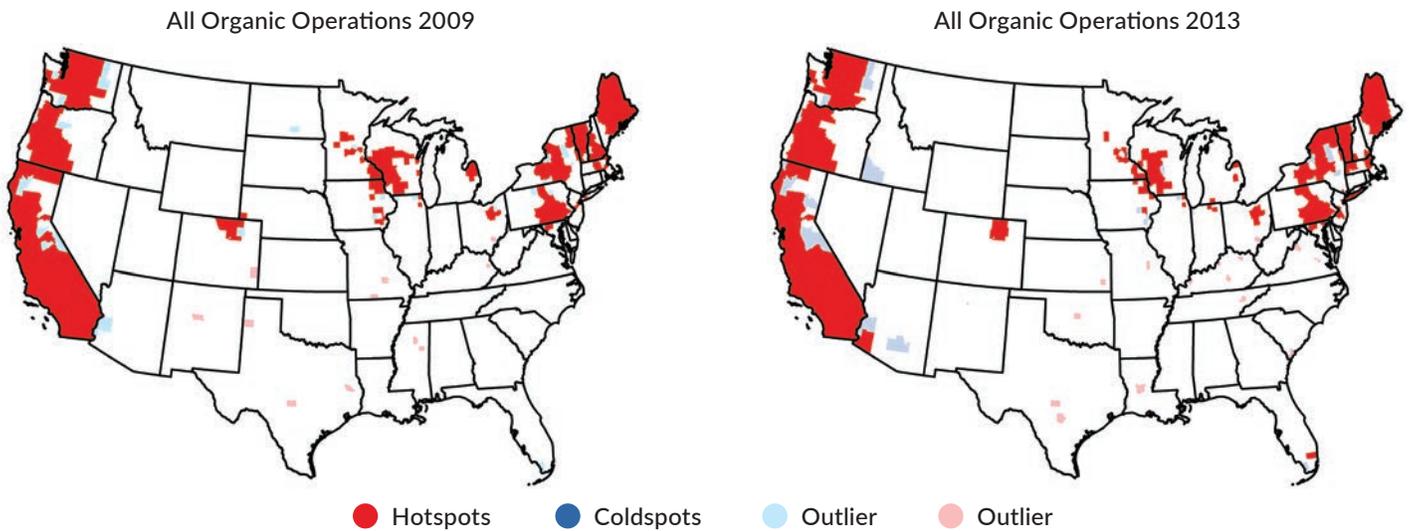
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The location of organic hotspots has not changed significantly from 2009 to 2013. They are particularly strong on the West Coast, where in 2013 a single hotspot of contiguous counties stretches from California to Washington. Smaller hotspots also appear in the northern Midwest anchored on Wisconsin, in several parts of New England and the northern Mid-Atlantic states, plus a few additional isolated areas. In 2013, a small organic hotspot appeared in south Florida, which had no hotspots in 2009.

Additional hotspot maps, available in the digital edition of this White Paper, show how organic hotspots vary by type of operation (as of 2009). Organic crop hotspots and handling hotspots to some degree mimic the location of organic hotspots based on all operations combined. However, organic hotspots based on livestock farms are much smaller and fewer.

Figure 1: Organic Hotspots, 2009 and 2013



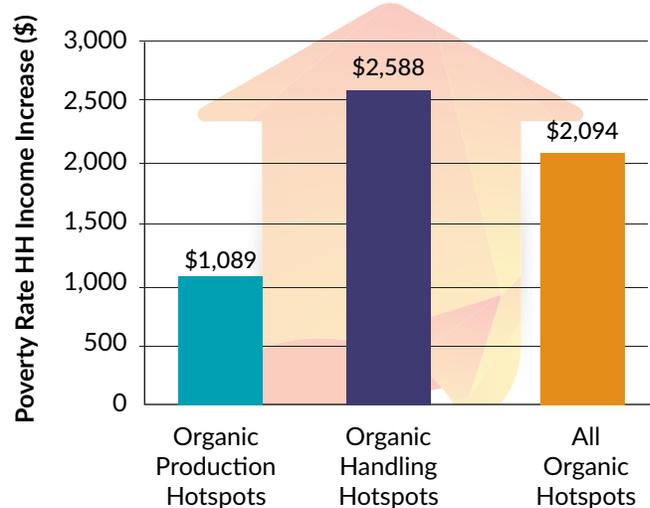
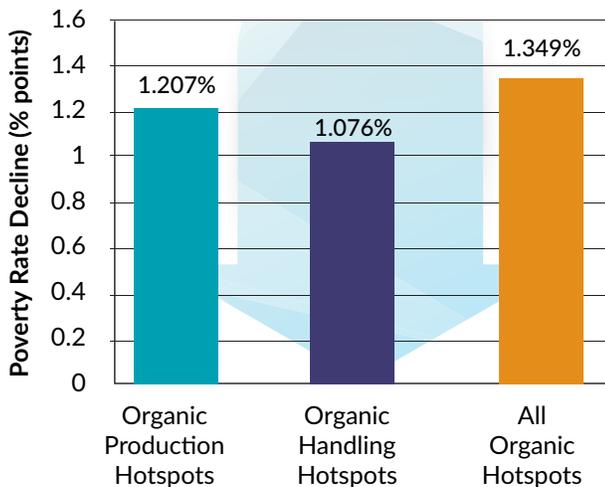
3. WHAT IS THE ECONOMIC IMPACT TO A COUNTY FROM BEING IN AN ORGANIC HOTSPOT?

Results: We find that a county's poverty rate drops by 1.3 percentage points and the median household income increases \$2,094 when the county is part of an organic hotspot. This remarkable result is perhaps the first to link local economic health (at the county level) to organic agriculture.

Figure 2 (next page) shows that the positive benefits for a county being in an organic hotspot can be found in all categories of organic hotspots. However, it was found that organic handling hotspots lead to the largest increase in median household income among the hotspot types, but the smallest decrease in poverty rates.

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Figure 2: Organic Hotspot Impacts on Poverty Rates and Household Income



Reverse Causality: How do we make sure to measure the causal impact of organic hotspots on economic activity when it is also possible that strong economic health might lead to organic hotspots?

To prevent reverse causality from affecting our estimated results we rely on two empirical techniques:

A. The technique of replacing the hotspot indicator with its prediction. This technique, along with controlling for other economic factors that affect a county's economic health, ensures that any non-randomness is accounted for in hotspot membership selection.

B. Use time-lagged economic variables. Our hotspot data are from 2009 while our economic activity data are from 2012. In addition our other economic variables are also lagged and range from 2000 to 2009. Since outcomes in 2012 cannot reasonably affect 2009 hotspots, this use of a time lag helps prevent reversal causality from affecting our estimates.

Putting these results in perspective: In 2012, the average poverty rate for all U.S. counties was 16.0% according to the U.S. Census Bureau. For the smaller number of counties used in this analysis, the poverty rate was 17.02%. So a decline of 1.349 percentage points reflects a 7.9 percent drop in relative terms compared to the average county. Similarly, in 2012, the average median household income for all counties in our analysis was \$44,483. Thus, the \$2,094 increase due to organic hotspots represents a 4.7 percent increase in relative terms.

Recent studies offer another context for comparison: Using 2014 data, the U.S. Census finds the presence of the Supplemental Nutrition Assistant Program (SNAP) was responsible for a 1.5 percentage point reduction in the overall poverty rate; the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) for a 0.1 percentage point decrease in the poverty rate.

Our result, a 1.3 percentage point decrease, applies only to organic hotspot counties, and not the entire U.S. Studying high-poverty counties, Partridge and Rickman (2005) find that 1 percentage point higher annual employment leads to a 0.55 percentage point reduction in its long-run poverty rate, which is less than our organic hotspot effect. In fact, our results are even stronger because we investigate all U.S. counties, not just high-poverty counties.

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4. HOW DO ECONOMIC IMPACTS FROM ORGANIC HOTSPOTS COMPARE TO THOSE FROM GENERAL AGRICULTURAL HOTSPOTS?

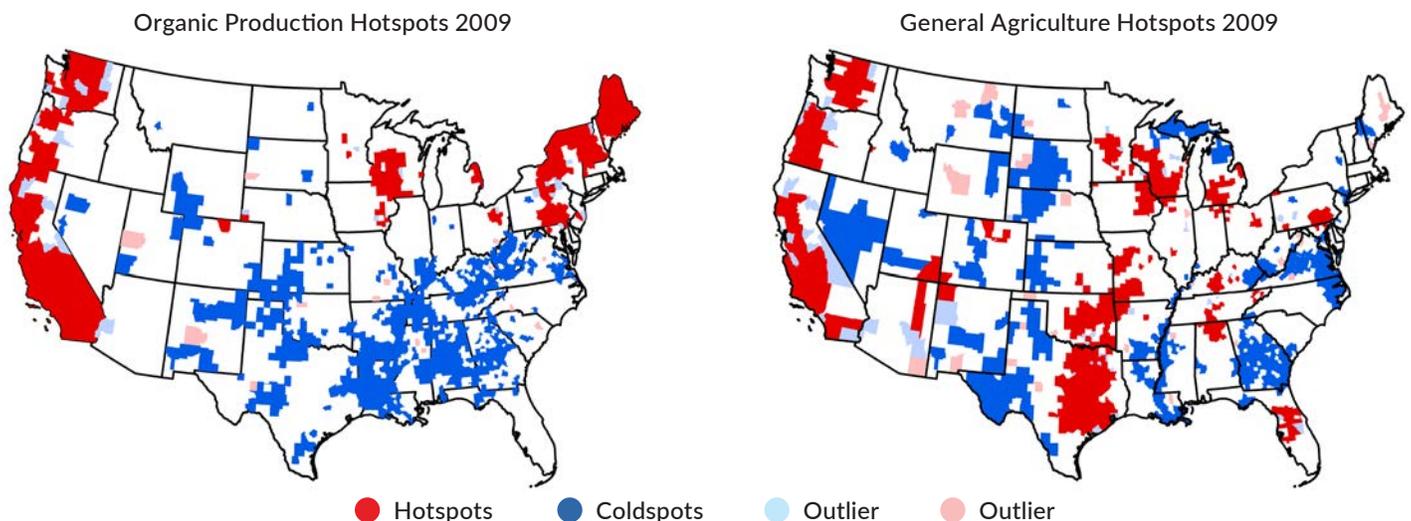
But are the beneficial impacts attributed to organic hotspots due to the nature of agriculture in general, instead of the specific characteristics and outcomes associated with organic agriculture? To investigate this question, we compare organic hotspots to general agricultural hotspots. We also investigate “coldspots,” which are groups of counties with low levels of organic activity and low-level neighbors.

Figure 3 compares organic hotspots, using crop and livestock operations but not handlers, with hotspots based on all farms. We find that general agricultural hotspots based on numbers of all types of farms do not strongly overlap with organic hotspots.

To compare the impacts from organic agricultural hotspots and general agricultural hotspots, we reproduce the treatment effects model using general agricultural hotspots as the central focus. This extra analysis allows us to investigate the organic agricultural sector separately as a special case of agriculture.

Results: After isolating the economic impact of a county being part of a general agricultural hotspot, we find that a county’s poverty rate drops by only 0.17 percentage points and the median household income increases by only \$75 when the county is in a general agricultural hotspot. Figure 4 juxtaposes these results with the comparable results for organic production hotspots (next page).

Figure 3: Organic Production Hotspots vs. General Agriculture Hotspots, 2009

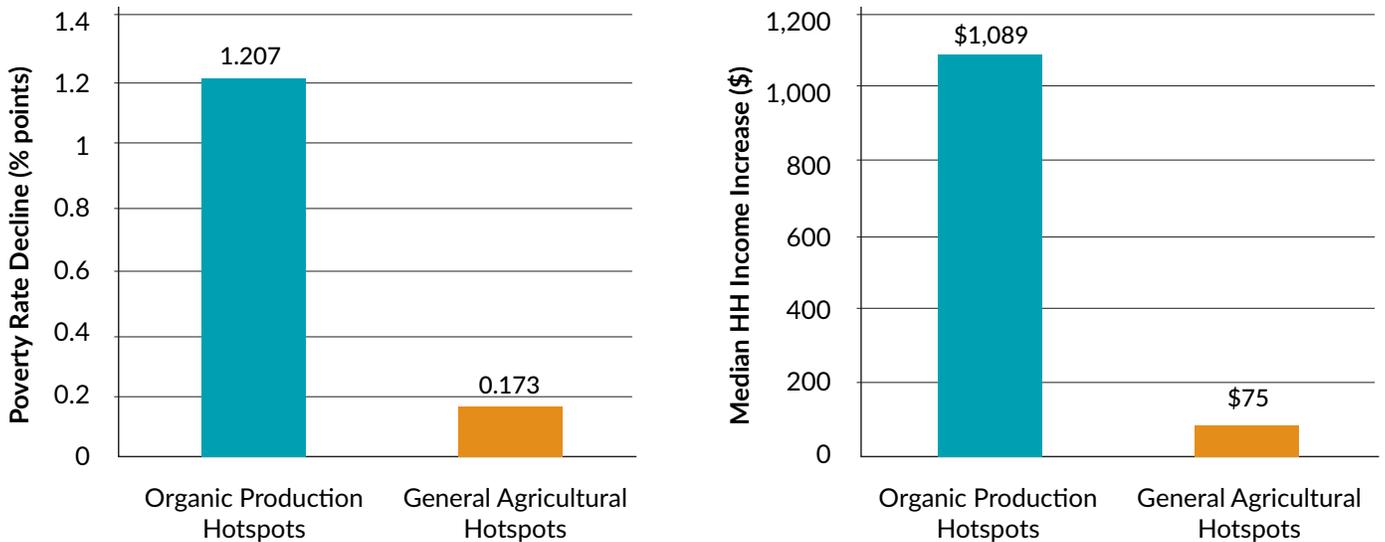


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Agricultural hotspots in general do not create the economic benefits that organic hotspots do.

Figure 4: Organic Hotspot Impacts vs. General Agricultural Impact on Poverty Rates and Household Income



Some Additional Checks: Impacts to other County-level Economic Indicators

A. County-level unemployment rate:

Membership in an organic hotspot of any type lowers the unemployment rate by 0.22 percentage points. Membership in an organic production hotspot lowers the unemployment rate by 0.84 percentage points. On the other hand, membership in a general agricultural hotspot, unemployment actually rises by 0.06 percentage points.

B. County-level per capita income:

Membership in an organic hotspot of any type increases per capita income by \$899. Membership in an organic production hotspot increases per capita income only by modest \$37. On the other hand, membership in a general agricultural hotspot lowers per capita income \$1,076.

Thus, our main findings are generally robust to other county-level economic indicators.

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5. WHAT DRIVES HOTSPOT FORMATION?

Organic hotspots do not necessarily match regions of strong agricultural productivity. This suggests that factors different from growing conditions or other agriculture-related factors are partly responsible for the formation and location of organic hotspots.

To investigate all these factors, we estimate the likelihood of a county being in an organic hotspot as a function of a host of variables.

Result 1: Increased outreach services lead to organic hotspot formation

The prevalence of outreach services by organic certifiers is found to play one of the strongest roles in organic hotspot formation. When at least 50% of organic operations in a county are certified by certifiers that provide outreach, the odds of that county being in an organic hotspot increase by 12.8%.

Result 2: Government-sponsored organic certifiers are associated with organic hotspots

A public sector home, such as a state department of agriculture, for organic certifiers is another factor that strongly encourages organic hotspots. When at least 50% of organic operations in a county are certified by certifiers with a public sector home such as a state agency, the odds of that county being in an organic hotspot increase by 6.6%.

Results for other factors, such as farm income, land values, population density and others, are presented and discussed in the appendix available online at www.OTA.com/hotspots.

Why these results are solid

- State-of-the art spatial statistical methods were used to quantify hotspots.
- Non-randomness in hotspot (treatment) membership was corrected for.
- Variables with considerable time lags were used to avoid measuring “reverse causality.”
- Counties neighboring hotspots were eliminated to prevent the possibility of measuring a hotspot county’s economic benefit that may have come at the expense of a non-hotspot neighbor.
- Organic hotspots were compared with general agricultural hotspots to make sure our measured impact is due specifically to organic agriculture.
- Two additional economic indicators were used to make sure our results for county-level poverty rates and median household income levels are not flukes.

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6. WHAT ARE THE IMPLICATIONS FOR POLICY MAKERS?

The answer to this White Paper’s overarching research question of whether organic agriculture could be used as an economic development tool: YES. Organic hotspots lower a county’s poverty rate and raise its median household income. Policy makers at all levels--local, state and national - now have a proven economic reason for promoting organic agriculture.

At the national level, the USDA offers an emerging suite of programs to encourage the development of organic. Increased funding for existing programs, development of new programs, and organic emphasis within programs can expand the economic opportunities of organic including:

- Rural Development- loan and grant programs, entrepreneur assistance, and community development.
- Programs that support organic transition- ‘Organic Transitions’, market development through certification, conservation programs.

Five Policy Recommendations:

1. Promote organic agriculture at the federal, state, and local level.
2. Focus on rural development, organic transition, capital structures and barriers to investment.
3. Expand outreach efforts and facilitate network effects
4. Target specific geographic areas for development.
5. Build broader coalitions.

Deepened engagement at the state and local level are central to the next generation of effective economic stimulating policy programs.

Policy programs that integrate organic as an economic development tool with capital structures like banking, loan, and finance programs could catalyze further hotspot formation. Additionally, removing barriers to private investment could foster hotspots.

A second important finding in this White Paper is the instrumental role that outreach services play in the formation of organic hotspots. The prevalence of entities and organizations with outreach and educational efforts is a strong positive factor in building hotspots. Promoting increased outreach efforts can create more organic hotspots, which in turn benefits the local economy. A focus on technical assistance, and facilitating a network of knowledge and information providers is essential to creating organic hotspots.

A third finding relates to the geographic location of hotspots. With county-level economic development as a goal, counties neighboring existing hotspots, or counties with high organic activity but without ‘neighbors’ with high activity are likely targets of local policies to promote organic agriculture. Likewise, the large regions that comprise organic coldspots might also be the focus of national policies aimed at reversing this status.

Lastly, advocates for organic can develop broader coalition partners as a result of these beneficial economic findings: reinforcing bipartisan support for organic and building allies in anti-hunger and poverty communities.

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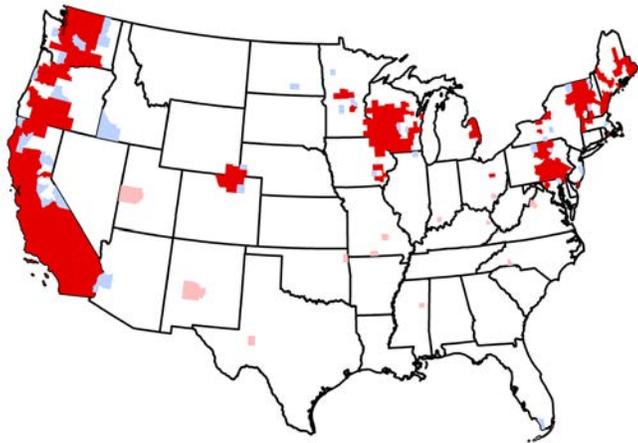
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APPENDIX

The following maps show how organic hotspots vary by type of operation (as of 2009). Organic crop hotspots and handling hotspots to some degree mimic the location of organic hotspots based on all operations combined. However, organic hotspots based on livestock farms are much smaller and fewer.

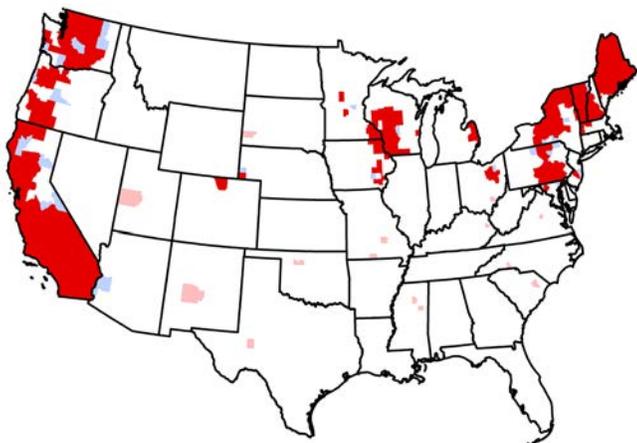
Organic Crop Hotspots, 2009



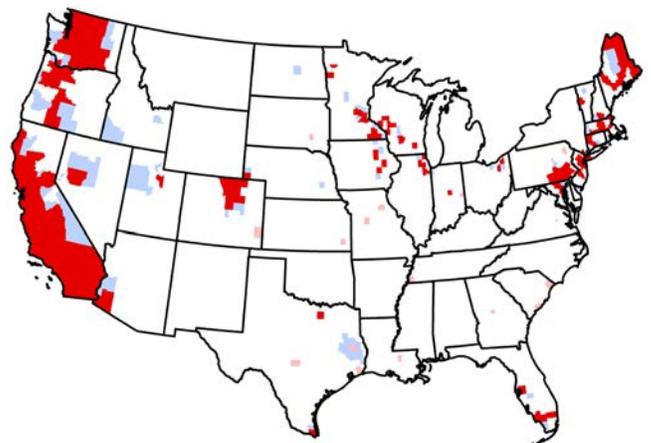
Organic Livestock Hotspots, 2009



Organic Production Hotspots, 2009



Organic Handling Hotspots, 2009



● Hotspots ● Coldspots ● Outlier ● Outlier

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Technical Details for Hotspot Formation and Impact Estimation

Hotspot Formation Estimation: To investigate factors that influence hotspot formation, we model our hotspot variable, which takes the value of 0 or 1, as a logistic function of various factors, including organic certifier characteristics. In the following table, we estimate five “logit models”, each representing five different definitions for the hotspot variable: (i) All types of organic operations, (ii) organic production – crop and livestock – operations, (iii) organic handling operations, (iv) organic crop operations, and (v) organic livestock operations.

The best way to interpret the results, presented in Table A-1, is to look at the “marginal effects” column. After

converting the marginal effects number to percent, this number is interpreted as the percentage increase in the likelihood of hotspot formation as the result of a one-unit increase in the factor. Thus, a marginal effect of 0.128 for Cert_priv_outreach_50pct means that if a county were to switch from not having 50 percent of organic operations certified by certifiers with outreach to having 50 percent certified by those with outreach (i.e., a switch of Cert_priv_outreach_50pct from a 0 to a 1), then the likelihood of the county being in a hotspot increases by 12.8%. The marginal effect from certifier outreach is shaded in light green, and the marginal effect from certifiers housed in a state agency is shaded in light blue.

Table A-1: Results from Hotspot Formation Estimation, Including Marginal Effects

Factors	(I) ALL ORGANIC HOTSPOTS		(II) ORGANIC PRODUCTION HOTSPOTS		(III) ORGANIC HANDLING HOTSPOTS		(IV) ORGANIC CROPS HOTSPOTS		(V) ORGANIC LIVESTOCK HOTSPOTS	
	Coefficient Estimate	Marginal Effects	Coefficient Estimate	Marginal Effects	Coefficient Estimate	Marginal Effects	Coefficient Estimate	Marginal Effects	Coefficient Estimate	Marginal Effects
Cert_priv_outreach_50pct	2.448***	0.128***	2.557***	0.132***	1.648***	0.064***	1.126***	0.058***	0.628*	0.021*
Cert_govt_50pct	1.253***	0.066***	1.251***	0.065***	.882***	0.034***	2.331***	0.119***	1.617***	0.055***
Avg_farm_income	0.00002***	9.59e-07***	0.00001**	6.92e-07**	0.00002***	6.95e-07***	0.00002***	8.32e-07***	-0.00001	-4.78e-07
Indus_entropy_index	0.136	0.007	0.216	0.011	-0.499**	-0.019**	0.074	0.004	1.298***	0.0442***
Distance_to_interstate	-0.012*	-0.0006*	-0.191***	-0.001***	-0.015*	-0.0006*	-0.014**	-0.0007**	-0.034***	-0.001***
Pop_density	-0.0005*	-0.00002*	0.0008**	-0.00004**	0.0002	8.10e-06	-0.0008***	-0.00004***	-0.001**	-0.00004**
Natural_amenities_scale	0.085**	0.004**	0.081**	0.004**	0.151***	0.006***	0.087***	0.004***	-0.045	-1.51e-03
Land_values	0.00006***	3.09e-06***	0.00006**	3.28e-06**	0.0001***	4.11e-06***	0.00008***	4.18e-06***	1.19e-06	4.02e-08
Property_tax_per_cap	-0.00014	-7.48e-06	-0.0002	-8.69e-06	-0.0002	-8.09e-06	-0.0004	-0.00002	0.00066***	0.00002***
Green_party_votes	0.394***	0.021***	.436***	0.023***	0.333***	0.013***	0.362***	0.018***	0.317***	0.011***
Urban_influence_code	-0.085**	-0.004**	-0.045	-0.002	-0.167***	-0.007***	-0.055	-0.003	0.044	0.001
Constant	-5.241***		-5.630***		-3.257***		-4.848***		-8.465***	

Notes: *, **, and *** denote statistical significance at the 90%, 95%, and 99% levels. This table is drawn from portions of a similar table in Marasteanu and Jaenicke (2015)

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Our main results, discussed in the body of this White Paper, focus on the roles that certifier outreach and government-housed certifiers, play in hotspot formation.

In addition to these results, increased average farm income, land values, natural resource amenities, and green party voting are all associated with stronger odds of a county being in an organic hotspot. On the other hand, distance to the interstate, population density, property taxes, and urban influence codes are all associated with lower odds of a county being in an organic hotspot.

Hotspot Impacts Estimation

To estimate the impacts of hotspot membership on county-level economic indicators, we estimate a treatment effects model.

Three problems make our treatment effects model and estimation much more complicated than a randomized medical trial where the treatment is a new drug dosage or therapy. First, other economic factors besides hotspot membership affect a county's economic outcomes. Second, the assignment to the treated or control group, which in our case is being in a hotspot or not, is not random. The first problem is easily addressed if we control for these other factors by including them in our estimated model. Thus, we estimate the ATET due to organic hotspots conditional on all these other factors being held constant, a technique that allows us to use an "all else equal" argument.

The second problem, non-randomness of hotspot membership is more difficult but not impossible to overcome.

Economists and statisticians use a technique where, in the treatment effects model estimation, hotspot membership for each county is replaced with its prediction from a separate model. The predicted hotspot membership provides a type of randomness that is analogous to the randomized assignment of treated versus control groups. Fortunately, the previous research step that investigates hotspot formation provides just such a prediction, and this extra step solves the non-randomness problem.

One last major problem one last problem remains, however: We need to guard against "reverse causality" affecting our measurement of ATET. Reverse causality exists if strong economic health at the county level actually helps create organic hotspots. We take a number of steps, discussed in the sidebar, to ensure that we, in fact measure the opposite, namely the causal ATET that organic hotspot membership has on economic activity.

For all these reasons, we estimate a treatment effects model with an "endogenous binary regressor." This last phrase means that the hotspot indicator itself must be modeled as a function of other variables.

Table A-2 presents the results for the treatment effects estimation when a county's poverty rate is used as the economic indicator, and Table A-3 presents a similar table when a county's median household income is used as the economic indicators.

The key result from these tables is the ATET estimate in the bottom row. These results, as well as the coefficient estimate on the hotspot prediction, are shaded in green.

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Table A-2: Instrumental Variable Treatment Effects: County Poverty Rate

	TYPE OF HOTSPOT			
Impacts Equation:	Organic Production	Organic Handling	All Organic	General Agriculture
TotalPhysicians09	-0.00005	-0.00029**	-0.00010	-0.00014
Urban_influence_code_03	0.33082***	0.33705***	0.33373***	0.56621***
NoHealthIns_18to64_07	-0.12625***	-0.10523***	-0.11891***	-0.04701
Highschool09	-0.511883***	-0.50373***	-0.49487***	-0.47405***
NumViolentCrime08	0.00010	.00023**	0.00013	0.00015
Indus_entropy_indx_00	0.41575*	0.89793***	0.53974**	1.13442***
Distance_to_interstate_07	0.00962	0.00924	0.00962*	0.01080*
Pop_density_07	0.00191***	0.00143***	0.00178***	0.00186***
Land_values_07	-0.00033***	-0.00035***	-0.00032***	-0.00035***
Avg_farm_income_07	-0.00003***	-0.00003***	-0.00003***	7.97E-06
Hotspot variable_09	5.20255***	5.50363***	5.07278***	6.64592***
Constant	57.40398***	55.34116***	55.53454***	48.55798***
Selection Equation:	Organic Production	Organic Handling	All Organic	General Agriculture
Cert_govt_30pct_09	0.28059***	0.19280**	0.32738***	
Cert_outreach_30pct_09	0.81274***	0.70289***	0.76737***	
Avg_farm_income_07	8.308e-06***	9.514e-06***	9.823e-06***	-0.00001***
Urban_influence_code_03	-0.04348***	-0.05787***	-0.04490***	-0.10881***
Indus_entropy_indx_00	0.08316	-0.29223***	0.04331	-0.16173**
Distance_to_interstate_07	-0.00517*	-0.00693**	-0.00425*	-0.00214
Pop_density_07	-0.00070***	-0.00007	-0.00053***	-0.00015
Natural_amenities_scale	0.01342	0.05980***	0.01971	0.04186***
Land_values_07	0.00004**	0.00007***	0.00005***	-3.83E-06
Property_tax_per_cap_02	-0.00024***	-0.00033***	-0.00023***	-0.00056***
Politics_green_00	0.25253***	0.21581***	0.22607***	0.11170***
Constant	-2.33301***	-1.47189***	-2.22913***	0.664964***
TREATMENT EFFECTS - POVERTY2012				
	Organic Production Hotspots	Organic Handling Hotspots	All Organic Hotspots	General Agriculture Hotspots
ATET	-1.207*	-1.076	-1.349**	-0.172

Notes: *, **, and *** denote statistical significance at the 90%, 95%, and 99% levels. This table is drawn from portions of a similar table in Marasteanu and Jaenicke (2016b).

U.S. Organic Hotspots and their Benefit to Local Economies



Table A-3: Instrumental Variable Treatment Effects: County Median Household Income

	TYPE OF HOTSPOT			
Impacts Equation:	Organic Production	Organic Handling	All Organic	General Agriculture
TotalPhysicians09	2.10300***	2.36926***	2.04526***	1.77361***
Urban_influence_code_03	-929.6104***	-935.6623***	-923.8170***	-1132.662***
NoHealthIns_18to64_07	-05.74273	31.26102	23.56278	-30.68007
Highschool09	751.6469***	745.1008***	739.3599***	734.7886***
NumViolentCrime08	-1.22736***	-1.41617***	-1.22562***	-1.00193***
Indus_entropy_indx_00	-566.7075	-703.6554**	-647.2055*	-897.4777**
Distance_to_interstate_07	-19.07221**	-20.26643**	-20.32079**	-23.82559***
Pop_density_07	-0.20291	0.14969	0.11420	-0.96693
Land_values_07	0.43118***	0.37689***	0.43604***	0.70698***
Avg_farm_income_07	0.08592***	0.07261***	0.07869***	0.06231***
Hotspot variable_09	-328.525	2184.860	1203.295	-6022.158***
Constant	-11934.41***	-10883.92***	-11314.98***	-7460.844**
Selection Equation:	Organic Production	Organic Handling	All Organic	General Agriculture
Cert_govt_30pct_09	0.37295***	0.37310***	0.47429***	
Cert_outreach_30pct_09	1.17704***	0.89525***	1.15478***	
Avg_farm_income_07	7.023e-06**	9.053e-06**	8.833e-06***	-0.00001***
Urban_influence_code_03	-0.01862	-0.08602***	-0.03953**	-0.12389***
Indus_entropy_indx_00	0.14036	-0.34400***	0.06181	-0.18633**
Distance_to_interstate_07	-0.01036**	-0.007567*	-0.00806**	-0.00221
Pop_density_07	-0.00057***	8.82E-07	-0.00040***	-0.00023
Natural_amenities_scale	0.04669**	0.08251***	0.05149**	0.05255***
Land_values_07	0.00003*	0.00006***	0.00003**	-0.00002
Property_tax_per_cap_02	-0.00013	-0.00005	-0.00002	-0.00058***
Politics_green_00	0.29081***	0.20966***	.25614***	0.06637***
Constant	-3.02572***	-1.65501***	-2.80183***	0.93358***
TREATMENT EFFECTS - MEDIAN HOUSEHOLD INCOME - 2012				
	Organic Production Hotspots	Organic Handling Hotspots	All Organic Hotspots	General Agriculture Hotspots
ATET	1088.70***	2587.86***	2094.44***	75.403

Notes: *, **, and *** denote statistical significance at the 90%, 95%, and 99% levels. This table is drawn from portions of a similar table in Marasteanu and Jaenicke (2016b).

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