Applied Economic Perspectives and Policy (2020) volume 00, number 00, pp. 1–20.
doi:10.1002/aepp.13046

Featured Article

Local Foods Go Downstream: Exploring the Spatial Factors Driving U.S. Food Manufacturing

Sarah A. Low*, Martha Bass, Dawn Thilmany, and Marcelo Castillo

Sarah A. Low is an Associate Professor at the College of Agriculture, Food & Natural Resources at the University of Missouri. Martha Bass is a graduate student in the Division of Applied Social Sciences at the University of Missouri. Dawn Thilmany is a Professor at the College of Agricultural Sciences at Colorado State University. Marcelo Castillo is an Economist at USDA Economic Research Service.
Editor: Craig Gunderson
*Correspondence may be sent to: be sent to: E-mail: lowsa@missouri.edu

Submitted 25 August 2019; editorial decision 10 February 2020.

Abstract *Manufacturing, specifically food and beverage production, is a key employer in rural areas and has linkages to the agricultural sector. Using data drawn from the National Establishment Time-Series for 2013–15, we explore what entrepreneurship, farm marketing channel innovations, and more traditional spatial factors influence the location decisions of food and beverage manufacturing establishment start-ups in the U.S. We find that traditional spatial decision factors still matter but, in addition, proxies for farm adoption of downstream innovations are also related to start-ups. We conclude by discussing implications of our findings for food market dynamics and rural economic development policy.*

Key words: Food manufacturing, Local foods, Spatial location factors.

JEL codes: L66, Q13, O18.

Introduction

Food manufacturing is the largest industry within the rural manufacturing sector, which accounts for 20% of rural (nonmetro) earnings (Low and Brown 2017) and has historically been a key economic sector in rural areas. More recently, value-added activities and food processing are being adopted as a diversification strategy (push effect) and response to local consumer buying interest (pull effect) by farm and ranch operators. Indeed, according to the 2017 U.S. Census of Agriculture, 33,523 farms sold over $4 billion in value-added products, but those sales are only a small share of the $877 billion in 2016 sales reported by over 30,000 US food and beverage manufacturing

establishments (USDA ERS 2018).[1] In this evolving landscape, what remains unexplored is how interest in local food markets has expanded beyond farms to the surrounding entrepreneurial community, which is leveraging consumer interest in more than just raw agricultural products.

While overall food and beverage spending is stagnant, there has been a shift in consumer spending to smaller and specialty-good manufacturing. Consolidation in national food brands persists, but food retailers also seek to integrate popular local food producers and products into their stores based on perceived consumer preferences (Richards et al. 2017), resulting in a bimodal food manufacturing sector of national brands, complemented by regionally dispersed start-ups and artisan brands (Thilmany, Castillo, and Low 2019; O'Hara, Castillo, and Thilmany 2020).

In recent years, consumers have gained unprecedented access to, and ability to share information about food products *via* social media, creating an imperative for manufacturers to reset and reposition themselves to address these changing consumer needs (Conroy et al. 2015; Drummond, McGrath, and O'Toole 2018). The rising popularity of regional and place-based foods, value-laden food, and increasing demand for convenience (i.e. some level of food processing), raises the question: is food manufacturing, once again, a viable rural economic development strategy?

Still, Lusk (2017) argues that pivots in rural and small business development policy in response to food system advocates who posit there are societal gains to supporting localized business development must be well-informed and appropriately targeted. Little is known about whether local and regional foods address any market failure, or if the market is simply responding to consumer demand through new downstream, value-added food enterprises on farms, and more broadly, by nearby food manufacturers. To contribute to our understanding of this sector, we examine place-based factors' influence on food manufacturing start-ups. Is food manufacturing occurring near areas with aligned farm production and marketing activities? In short, are food start-ups a natural extension of the same dynamic driving local foods at the farmgate? Economic development potential does appear to exist, but it is less clear which locations are well-positioned to take advantage of the renaissance in value-based farm and food supply chains through catalyzing the rural entrepreneur community. While it is too early to test empirically long-term economic contributions, we begin by examining whether recent food manufacturing start-up location choice is influenced by complementary entrepreneurial drivers, defined both broadly and directly for the farm and rural economy.

This paper makes several contributions to the existing literature and the other featured articles in this issue. We investigate for the first time the relationship between food manufacturing start-ups and a set of variables to represent "the culture of food entrepreneurship" (e.g. local foods and organic sales), and do so across the rural–urban continuum as Jablonski et al. (2020) show metro influence matters for those targeting local markets. Also, we examine the relevance of the local entrepreneurial ecosystem more broadly on food manufacturing start-ups. Moreover, we use a national establishment-level database that is particularly helpful because it includes employer as well as nonemployer start-ups, the latter of which represent

[1]*Food and beverage manufacturing are the focus of the paper throughout, but we simplify to food manufacturing throughout for the sake of brevity.*

almost 10% of food manufacturing establishments. Both the employer and nonemployer categories are also considered by O'Hara, Castillo, and Thilmany (2020), indicating that employment strategies also matter.

Our results suggest that the culture of food entrepreneurship and farms with aligned alternative production and marketing activities (organic, direct sales) in a community's ecosystem are positively related to food manufacturing start-ups in counties across the continental U.S. Thus, understanding the spatial determinants guiding an increasing number of small and midsize food sector establishments might contribute to the discussion of policies to nurture economic development opportunities in the U.S.

We proceed with this paper by situating the trends in food manufacturing within the broader literature. First, within the historical context of food manufacturing and its relationship to economic development, and then, how changes in consumer preference are driving re-localization trends, and finally, through a summary of previous research on food manufacturing spatial determinants. This past research helps to frame our conceptual model and hypotheses. Next, establishment-level food and beverage manufacturing start-up data from the National Establishment Time-Series is described and integrated into a negative binomial regression model for food manufacturing location determinants on 2013–15 start-up locations. Discussion and policy implications of the results round-out the paper.

Background & Literature Review

Food Manufacturing and Economic Development

U.S. manufacturing, in general, is declining, but a nuanced look is important since manufacturing retains relatively greater economic importance in rural communities than in urban areas, in terms of employment and earnings (USDA ERS 2017). Food manufacturing is especially important, as the largest subsector in rural manufacturing and one that is particularly stable, but rural areas were historically thought to be at a comparative disadvantage (Goetz 1997; Lambert, McNamara, and Garrett 2006; Lambert and McNamara 2009). More recently, economic development strategies are shifting away from industrial recruitment and toward fostering local businesses and retention and expansion (Zhang and Warner 2017).

An increase in smaller, innovative food manufacturing firms may improve economic development outcomes, as small businesses have been found to generate the most job growth (Neumark, Wall, and Zhang 2011). Rupasingha (2017) found that the share of smaller local businesses may be positively associated with local economic performance, while Low and Brown (2017) found that smaller, independent manufacturers had the highest survival rates in rural areas, thereby bolstering resilience. Salnikova, Baglione, and Stanton (2019) found new product success rates are higher (>50%) among food manufacturers than previously understood, suggesting that food manufacturers in the U.S. may benefit from more innovative approaches.

While there does seem to be economic development potential, it is less clear which locations are well-positioned to take advantage of the renaissance in differentiated food supply chains. Historically, for food manufacturers, a range of place-based factors impact location decisions (Lambert, McNamara, and Garrett 2006; Lambert and McNamara 2009), but the relative draw varies across subindustries (Goetz 1997). Jablonski et al. (2020) find local food producers pay higher hourly wages, but there is less economic development

potential for rural areas than previously understood. Since worker experience is important to the growth and survival of the "pioneer" firms who are the first entrant in a region (Jara-Figueroa et al. 2018), metro and nonmetro areas with existing food manufacturing or entrepreneurial ecosystems bolster potential for start-ups.

Consumer-Driven Trends in Food Manufacturing

Changes in consumer buying habits are important to consider given the shift away from recruitment-based strategies toward locally based or hybrid food value chains (Bloom and Hinrichs 2011; Zhang and Warner 2017). Lusk and McCluskey (2018) highlight the erosion of linkages between a diminishing ratio of rural food producers to increasingly urban eaters who have lost trust in commodified agricultural and food production. At the same time, there remains a sizable budget-conscious consumer segment, which may lead to "increased bifurcation of the food supply chain" (p. 11). While food manufacturing continues to be dominated by national brands, reflecting the high levels of consolidation across the U.S. agri-food system (Constance et al. 2014), Thilmany, Castillo, and Low (2019) conceptually frame the factors driving an emergence of small, start-ups, and ultimately, more bimodal food market structure.

Demand for low-cost food products is not new to the U.S. food system, while interest in values-based foods only emerged in recent decades (Lusk and McCluskey 2018), following similar trends from Europe (Magnan 2011). Commonly, specific "values" are translated through well-formulated and managed labeling systems across the agri-food supply chain, including provenance (local, origin-specified), production practices (animal welfare, organic), and health and safety (traceability, free-from dietary restrictions) (Costanigro et al. 2011; Onozaka and Thilmany 2011). Since collaborative engagement with customers strengthens food product commercialization (Ashton 2019), start-up food entrepreneurs can also leverage customer interest through appeals to customers' community-based identities or other loyalties (Drummond, McGrath, and O'Toole 2018).

The early stage of the food movement focused on direct sales of unprocessed foods, including those farms and ranches explored in the Jablonski et al. (2020) piece in this series. Yet, as the buying power of values-based consumers grows, both established and new manufacturers will capitalize on or co-opt food claims (Guthman 2003; DeLind 2011) but will only be effective if such brands are perceived as authentic and linked to quality: for example, placing high value on locally baked bread from short supply chains that assure freshness (O'Hara, Castillo, and Thilmany 2020).

Location Determinants and Employment Dynamics

Lambert and McNamara (2009) found that rural counties may be at a disadvantage, but a strong mix of spatial characteristics (infrastructure, agglomeration, product and input markets, labor markets) do influence food manufacturing location decisions. In a study on food hubs even further downstream, Cleary et al. (2018) note the influence of direct sales, social capital (a proxy of community engagement), and complementary food industry establishments on lowering the population thresholds needed to support food hubs at the county level. As alluded to previously, rates of entrepreneurship vary spatially in relation to cultural identities

and historical industrial structure, (Audretsch et al. 2017; Jara-Figueroa et al. 2018), with churn (the sum of birth and death rates) having a positive impact as information generated by the success/failure of start-ups influences subsequent entrepreneurship and employment growth (Bunten et al. 2015).

An Analysis of Recent Food Establishment Location Decisions

Food manufacturing location decision-making is commonly framed as a two-stage process, consisting of a choice of initial region or state, followed by a more targeted county-level selection process (Goetz 1997; Lambert, McNamara, and Garrett 2006). However, establishment start-ups are expected to locate in the entrepreneur's preferred region (Yu and Artz 2019), with local, state, and industry-specific characteristics affecting their proclivity and ability to start up. Specifically, we are interested in the relationship between food start-ups and downstream innovation within a region's farm sector and ecosystem of food entrepreneurship; we term this "AgriCulture" per Lasley, Glenn, and Ogawa (2014).

Given research summarized above, food manufacturing start-up and location decisions will evolve alongside entrepreneurs developing strategic positions to leverage changing consumer food preferences. We assume there are both (i) segments of consumers who are particularly likely to buy local, but also seek other claims that may be aligned with their values (Onozaka and Thilmany 2011; Low et al. 2015), and (ii) food entrepreneurs who initiate a new enterprise or locate near such consumers strategically.

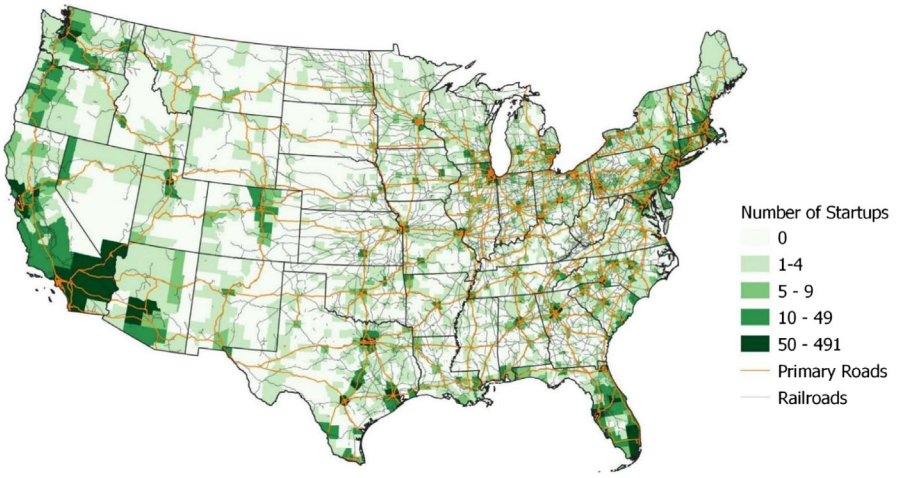
The rising popularity of regional, place-based, and value-laden foods raises the question – is a food manufacturing start-up location influenced by factors associated with farms that have already chosen downstream market strategies to leverage consumer demand for place-identified food brands? What about food entrepreneurial ecosystems, more generally? Does a place's rurality affect start-ups, and if so, is it due to push (few opportunities) or pull (perceived demand) factors? Answering such questions will move us closer to the larger question: is food manufacturing re-localization a viable rural development strategy?

Methods and Data

We use a negative binomial regression model to estimate the relationships between food and beverage manufacturing start-up counts and place-based determinants. Negative binomial regressions have been employed in previous food industry studies (Henderson and McNamara 2000; Weiss and Wittkopp 2005; Lambert and McNamara 2009; Bhattacharya and Innes 2016). This model is well-suited to account for the large number of places that have no start-ups, and the same process determines whether there are one, two, or more start-ups, making the negative binomial regression specification preferred over a zero-inflated negative binomial model.

For this study, our negative binomial models incorporate eight vectors of explanatory regressors that vary at the industry, state, and county levels (the unit of analysis is industry-county). Six of these sets of variables are drawn from previous literature (rurality, infrastructure, local economy, industry, policy, and region) and two are novel contributions of this paper (entrepreneurship and "AgriCulture"). Independent variables were lagged

Figure 1 Food and beverage manufacturing start-ups (dependent variable), 2013–15 [Color figure can be viewed at wileyonlinelibrary.com]



such that predictors for the earlier period were based on data from lagged periods to minimize endogeneity concerns.

Dependent Variables: Establishment Start-up Data

For the dependent variable, food and beverage manufacturing start-ups, we use National Establishment Time-Series (NETS) data on the number of start-ups in food and beverage industries from 2013–15, disaggregated to the five-digit or six-digit NAICS (North American Industry Classification System) level.[2] Using three years' data helps smooth some of the annual variability in the NETS and limits the number of observations with zero births, giving us greater ability to make generalized inferences about start-ups in rural counties (figure 1).

The NETS data are particularly rich for studies focused on new and small establishments since the sample includes nonemployer start-ups (Census Bureau data that include only start-ups for establishments with paid employees). Nonemployers represent approximately 10% of food manufacturing establishments. The dependent variable is the sum of start-ups across the most recently available three-year period by county and by NAICS code.

We use 19 food and beverage manufacturing industries (five- and six-digit NAICS codes) in our regressions, generating almost 60,000 observations across all U.S. counties.[3] Our data included 13,523 food and beverage manufacturing start-ups in the 2013–15 period. During the previous 10 years, food and beverage manufacturing establishments increased by 25% and

[2]*2004 to 2006 was also analyzed. Only the 2013–15 period results are presented given space limitations, but the earlier period served as a robustness check. In short, there were few differences across periods, and earlier results are available from the authors upon request. 2004–06 was selected as a robustness check because it was a complementary period to 2013–15 in the business cycle.*

[3]*Our selected industries are: 31121, 31122, 31131, 31141, 31142, 31151, 311611, 311612, 311613, 311615, 31171, 31181, 31182, 31183, 311911, 31211, 31212, 31213, 31214. We use data on food and beverage manufacturing plants in the selected industries that had positive employment in 2013–15 (recall, in NETS, positive employment can be only the proprietor, it does not necessarily indicate a wage and salary employee, like Census data do).*

125%, respectively. Thus, there are fewer start-ups now than in the previous business cycle, a fact underscored by generally declining total establishment birth rates throughout the U.S. since 1990.

Bread and bakery product manufacturing represents the largest slice of the food manufacturing sector with 36% of establishments and 67% of start-ups in 2015. This industry includes retail and cottage food bakeries, which have relatively low capital requirements and food safety requirements, making it attractive to entrants (O'Hara, Castillo, and Thilmany 2020). Wineries and Dairy Product (except frozen) manufacturing had the second and third largest share of start-ups nationwide (5.7% and 4.3%, respectively). In nonmetro counties, wineries were also second largest (8.1%) while animal slaughter and processing was the third largest sector (6.0%).

Independent variables were grouped by the categories of spatial determinants described in previous literature, in addition to variables framed as relevant in our earlier discussion, grouped into two new vectors, Entrepreneurial Ecosystem, and, AgriCulture (food entrepreneurship ecosystem). Variable descriptions and summary statistics are available in table 1.

Entrepreneurial Ecosystem

Entrepreneurship variables have not traditionally been included in location determinant analyses of food manufacturing, so this is a pilot exploration. Nascent entrepreneurs may be "pushed" into self-employment in the absence of wage and salary opportunities and "pulled" into self-employment by perceived market opportunities (Dawson and Henley 2012). Thus, we include proxies of entrepreneurial activity at the county level that capture both "push" (nonfarm self-employment rate) and "pull" (employer establishment start-ups, patents *per capita*) factors. In addition, proxies for financial capital availability (deposits *per capita*, the proportion of owner-occupied housing), grounded in the regional entrepreneurship literature, were included.

"AgriCulture"

One of the principal contributions of this paper is the addition of what we refer to as "AgriCulture" variables as a measure of the existence and relative strength of the food entrepreneurship ecosystem in a given county. Regions with a more substantial presence of consumer, downstream innovators and networks are expected to be more favorable locations given the resulting business resources and infrastructure.

Some of our "AgriCulture" variables have not been included in prior food manufacturing location studies, including direct sales of food, organic sales, and a continuum of commodity (wheat), specialty field (rye) and specialty produce (fruit and tree nut) crops as a representative portfolio of enterprise choices. All were normalized by total state acres. In addition, area of land in farms and agricultural land values were incorporated to account for the relative prevalence of agriculture in a county and as a proxy for competitive land uses in the county.[4]

Other Explanatory Variables

Explanatory variables routinely seen in the food manufacturing location decision literature (e.g. Goetz 1997; Henderson and McNamara 2000;

[4]*Some "AgriCulture" variables are at the state level, since limiting assessment of inputs to the county level for manufacturing are overly restrictive and potentially distorted due to the spatial "edge effect."*

Table 1 Variable Descriptions and Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
# start-ups, by county and NAICS, 2013–15	59,660	0.22667	2.74945	0	334
AgriCulture					
Direct sales of food to individuals for human consumption[1]/State acres[1]	58,525	0.899	1.294	0.006	9.822
Organic farm sales[1]/Total farm sales[1]	58,525	0.136	0.241	0.0004	1.487
Agricultural land value ($1,000)[1]	57,913	850	693	0	8,247
Land in farms[1]	57,912	297,624	386,966	12	5,815,557
Wheat sales[1]/Total state acres[1]	58,525	8.268	11.142	0.001	57.41
Rye acres harvested[1]/State acres[1] (1000)	58,525	0.194	0.33	0.00038	1.888
Fruit & tree nut ops[1]/State acres[1] (1000)	58,525	0.052	0.065	0.00015	0.782
Entrepreneurial ecosystem					
Self-employment rate[3]	58,240	0.217	0.085	0.017	0.70395
Patents per capita[3,4]	58,468	0.0001	0.00018	0	0.00269
Employer estab. birth rate[3]	56,260	0.00008	0.000072	0	0.0008
Owner-occupied housing[3]	59,553	0.74	0.07798	0	0.89868
Bank deposits per capita[3,13]	58,067	0.012	0.01431	0.00003	0.48026
Rurality					
Metropolitan county[5]	59,717	0.3465		0	1
Nonmetro and metro-adjacent[5]	59,717	0.33758		0	1
Drive time to 100k population city[3,7]	58,925	107.658	91.8032	0	516.086
Infrastructure					
Highway access[7,9]	59,717	0.52052		0	1
Broadband[8]	57,894	1.98256	1.5046	0	11.75
Railroad[3,7]	59,717	0.923		0	1
Local economy					
Employment rate[6]	59,641	0.92147	0.0277	0.7264997	0.98882
Income growth[2]	58,582	5532.77	7050.66	−21620.21	93153.2
Per Capita Personal Income[2]	58,677	37889.4	10883.2	17,270	194,277
Postsecondary institutions[10]	58,487	0.000019	0.00003	0	0.00032
Bachelor's rate[3]	58,487	0.16412	0.0762	0.0488291	0.60482
High school dropout rate[3]	58,487	0.22599	0.08727	0.030444	0.65298
Race: percent non-White[3]	59,663	0.14496	0.16206	0.0078278	0.95902

(Continues)

Table 1 Continued

	Obs	Mean	Std. Dev.	Min	Max
Ethnicity: percent Hispanic[3]	59,663	0.08666	0.13348	0.0019455	0.95629
Age: 18–64[3]	58,430	57201.9	188,089	44	6,032,249
Industry					
Herfindahl–Hirschman Index[3,14]	59,660	1202.75	1013.17	258.3	3755.1
Location Quotient for NAICS 311[3,15]	58,525	1.32387	0.69347	0.136219	3.85981
Location Quotient for NAICS 312[3,15]	58,525	1.1713	0.65571	0.115385	3.01526
Location Quotient for NAICS 72[3,16]	54,152	0.78483	0.68575	0.0111623	19.1446
Policy					
Local and state property tax revenue/General direct expenditures[3]	59,717	0.15702	0.04629	0.0734937	0.34233
Right-To-Work legislation[11]	59,717	0.59501		0	1
Region					
Index of county natural amenities[12]	57,970	0.05466	2.29463	−6.4	11.17
IA, IL, IN, KS, MI, MN, MO, NE, ND, OH, SD, WI	58,525	0.3422		0	1
CT, MA, ME, NJ, NY, NH, PA, RI, VT	58,525	0.07045		0	1
AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV	58,525	0.44444		0	1

Sources:
[1]*USDA Census of Agriculture, 2012 unless otherwise noted.*
[2]*Bureau of Economic Analysis, 2012 unless otherwise noted.*
[3]*Census Bureau, variable suffix of 12 equals 2012, otherwise 2010.*
[4]*U.S. Patent and Trademark Office, 1995–99.*
[5]*Office of Management and Budget, 2003.*
[6]*Bureau of Labor Statistics, 2012.*
[7]*GIS analysis.*
[8]*Federal Communications Commission, Form 477, December 2003.*
[9]*Esri Data & Maps, retrieved from: https://www.arcgis.com/home/item.html?id=77ee392dcabd42a8b0046b9f040d5f28.*
[10]*National Center for Education Statistics Integrated Postsecondary Education Data System, 2012.*
[11]*National Conference of State Legislatures, data for prior to 2013.*
[12]*USDA ERS Natural Amenities Scale (McGranahan 1999).*
[13]*FDIC Summary of Deposits, 2000.*
[14]*HHI is industry-specific, based on 50 largest firms.*
[15]*Ratio of state employment per establishment by the ratio of overall U.S. employment per establishment.*
[16]*Location quotient for accommodation and food services employment to population.*

Lambert and McNamara 2009) are included and described with summary statistics and sources, in table 1.[5]

Findings

County-based results are presented in table 2 for the whole sample, as well as across the rural–urban continuum in table 3, including, (i) metro counties, (ii) nonmetro counties, and (iii) only remote rural (nonmetro, nonadjacent to metro) counties.

"AgriCulture"

Overall, results suggest "AgriCulture" is positively related to the number of food manufacturing start-ups in counties across the rural–urban continuum. Direct and organic sales are positively related to food manufacturing start-ups, with coefficients that are large relative to the mean start-up levels. Organic sales as a share of total farms sales was significant and positively related to food manufacturing start-ups with one exception (nonmetro, nonadjacent counties, which had a positive but insignificant coefficient). In contrast, state direct sales per acre had a positive relationship with start-ups for regressions in only nonmetro counties.

The value of agricultural land was positively related to start-ups in nonmetro counties, but not start-ups in metro counties, suggesting asset values (a proxy for either wealth or competing uses) is unique to rural areas. In contrast, acres of farmland per county (a signal of agricultural dependency) was significant and negatively related to start-ups, but only in nonmetro, nonadjacent counties. Across the crop continuum, wheat sales were not significant, whereas rye acres (a specialty field crop) and fruit and tree nut farms (a perennial specialty crop) had significant and negative relationships with start-ups for all counties and metropolitan counties. It should be noted that these results may demonstrate data limitations at the county level (e.g. using acres harvested instead of sales due to publicly withheld data in the Census of Agriculture).

Entrepreneurial Ecosystem

Economic dynamism is likely driving food start-ups through consumer-driven strategies and a culture of innovation, particularly in urban areas. Overall, results suggest "pull" entrepreneurship factors are associated with food manufacturing start-ups in metro counties as the employer establishment birth rate had a significant positive relationship. Conversely, the nonfarm self-employment rate had a negative and significant coefficient in all regions, disproving the expectations that necessity-based entrepreneurship (i.e. a "push" due to a lack of wage and salary job opportunities) is driving food manufacturing start-ups.

The coefficient on patents *per capita* was not significant, perhaps signaling innovations in food are not closely aligned with more formal innovation processes. While traditional indicators of financial capital had no significant effect, the share of owner-occupied housing had a significant and negative

[5]*Our study focuses only on the lower 48 states; we drop Alaska, Hawaii, and DC from our sample due to data unavailability for some geographies in these states and our choice to focus on state-level variables. Finally, we lose some observations due to USDA NASS data being unavailable for some geographies, especially some Virginia cities.*

coefficient in most of the models, in contrast to the entrepreneurship literature (where housing is commonly inferred to serve as a significant source of equity to fund start-ups). It could be that home equity is appropriate to finance start-ups that are not capital intensive (e.g. professional services), but for more capital-intensive start-ups (e.g. food manufacturing), home equity may be insufficient, and moreover, limit credit capacity to secure additional loans.

Region, Rurality and Infrastructure

The level of urbanization was significantly related to food manufacturing start-up rates: metropolitan counties had significantly higher rates of start-ups, with remote, rural counties having significantly lower rates of start-ups than other nonmetro counties. Moreover, average drive time to a city with a population of at least 100,000 was significant and negatively related to start-up rates in all counties (table 2) and in metropolitan counties (table 3), but not in nonmetro counties. This runs counter to Artz, Kim, and Orazem's (2016) findings that food manufacturers' proximity to downstream marketing channels was especially relevant in rural areas. One might consider these place-based findings as an additional aspect of the "pull" factors discussed previously.

Regional dummies were significant, with the western U.S. tending toward lower rates of start-ups (table 2). Natural amenities were found to have a positive relationship with start-ups across regressions for all counties (table 2), a result that only holds for nonmetro when rurality is considered. When the rurality of counties is considered, all Northeast counties have higher start-up rates, while metro areas are more active in the South and rural counties are more active in the Midwest (table 3).

Highway access and broadband providers were both significant and positively related to the number of food manufacturing start-ups except such factors do not appear to benefit nonmetro, nonadjacent (remote rural) areas, reinforcing previous research (Goetz 1997; Lambert, McNamara, and Garrett 2006; Lambert and McNamara 2009; Schmit and Hall 2013; Tong et al. 2016). Railroad presence was also significant and positive for both types of nonmetro areas (adjacent and remote).

Local Economy, Industry Composition, and Policy

The county employment rate is insignificant in all regressions, suggesting start-ups are not necessarily related to employment opportunities. *Per capita* personal income and percent Hispanic population were significant and positively related to start-ups in metro counties. The population between ages 18 and 64 had a significant and positive relationship for all but the nonmetro, nonadjacent counties. It is interesting to note that the non-White population was significant and positively related to start-ups in all counties and metro counties, but negatively related to start-ups in nonmetro counties.

In terms of education, high school dropout rates had a significant and negative relationship with food manufacturing start-ups except for nonmetro, nonadjacent counties. In an interesting contrast, four-year degree attainment was significant and negative for the metro counties, but significant and positive for nonmetro counties. Postsecondary institutions *per capita* was significant and positive for all regions, perhaps indicating an increase in the relevance of nearby workforce development and technical assistance opportunities. The finding that lower educational attainment negatively impacts

Table 2 Results

	Coef. (SE)
"Agri-Culture"	
Direct sales of food to individuals for human consumption/State acres	0.045* (0.026)
Organic farm sales/Total farm sales	0.776*** (0.152)
Agricultural land value ($1,000)	0.048 (0.036)
Land in farms	0.004 (0.009)
Wheat sales/Total state acres	−0.001 (0.003)
Rye acres harvested/State acres (1,000)	−0.252*** (0.075)
Fruit & tree nut ops/State acres (1,000)	−1.189** (0.56)
Entrepreneurial ecosystem	
Self-employment rate (Entrepreneurial breadth)	−2.917*** (0.431)
Patents *per capita*	−84 (157.2)
Employer estab. birth rate	2690.8*** (514.6)
Owner-occupied housing	−2.157*** (0.548)
Bank deposits *per capita*	2.839 (2.368)
Rurality	
Metropolitan county	0.729*** (0.088)
Nonmetro and metro-adjacent	0.193** (0.085)
Drive time to 100k population city	−2.995*** (0.589)
Infrastructure	
Highway access	0.393*** (0.063)
Broadband	0.211*** (0.019)
Railroad	0.280* (0.163)
Local economy	
Employment rate	−1.66 (1.58)
Income growth	−2.100** (0.892)
Per Capita Personal Income	0.958 (0.585)
Postsecondary institutions	3476.2*** (1000.1)
Bachelor's rate	−0.551 (0.71)
High school dropout rate	−3.960*** (0.706)
Race: percent non-White	0.559** (0.258)
Ethnicity: percent Hispanic	1.822*** (0.291)
Age: 18–64	0.049*** (0.01)
Industry	
Herfindahl–Hirschman Index	−0.597*** (0.022)
Location Quotient for NAICS 311	−0.273*** (0.047)
Location Quotient for NAICS 312	−0.006 (0.047)
Location Quotient for NAICS 72	0.127 (0.115)
Policy	
Local and state property tax revenue/General direct expenditures	−3.024*** (0.639)
Right-To-Work legislation	0.062 (0.063)
Region	
Index of county natural amenities	0.318** (0.139)
IA, IL, IN, KS, MI, MN, MO, NE, ND, OH, SD, WI	0.461*** (0.137)
CT, MA, ME, NJ, NY, NH, PA, RI, VT	0.076*** (0.018)
AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV	0.532*** (0.152)
Constant	1.101 (−1.656)
N=	50,464
Pseudo R^2	0.15
Log Pseudolikelihood	−16,491

Note:
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

start-up rates fits with our expectations. The fact that postsecondary education was most relevant in nonmetro regions may suggest that micropolitan, metro and micro outlying, and rural areas that can attract and retain

Table 3 Results by Rurality

	METRO	NONMETRO	NONMETRO, NONADJ
	Coef. (SE)	**Coef. (SE)**	**Coef. (SE)**
"Agri-Culture"			
Direct sales of food to individuals for human consumption/State acres	0.021 (0.025)	0.169*** (0.056)	0.357* (0.193)
Organic farm sales/Total farm sales	0.662*** (0.201)	0.918*** (0.257)	0.146 (0.509)
Agricultural land value ($1,000)	0.014 (0.04)	0.229*** (0.081)	0.297* (0.166)
Land in farms	0.012 (0.01)	0.009 (0.015)	−0.035* (0.018)
Wheat sales/Total state acres	0.002 (0.004)	−0.004 (0.004)	−0.007 (0.006)
Rye acres harvested/State acres (1000)	−0.326*** (0.098)	−0.102 (0.113)	−0.184 (0.217)
Fruit & tree nut ops/State acres (1000)	−1.299* (0.701)	−0.685 (0.936)	−1.431 (2.499)
Entrepreneurial ecosystem			
Self-employment rate (Entrepreneurial breadth)	−2.762*** (0.548)	−3.546*** (0.637)	−4.606*** (1.265)
Patents *per capita*	−75.6 (156.4)	−259.4 (325.3)	54 (704.8)
Employer estab. birth rate	3212.2*** (681.1)	1,115 (722.9)	1150.6 (997.5)
Owner-occupied housing	−1.864*** (0.669)	−0.291 (0.79)	−2.576* (1.358)
Bank deposits *per capita*	−2.022 (7.227)	2.634 (2.262)	0.959 (3.715)
Rurality			
Metropolitan county	(omitted)	(omitted)	(omitted)
Nonmetro and metro-adjacent	(omitted)	0.257*** (0.087)	(omitted)
Drive time to 100 k population city	−4.981*** (0.809)	−1.091 (0.763)	1.004 (1.051)
Infrastructure			
Highway access	0.514*** (0.105)	0.302*** (0.076)	0.223 (0.136)
Broadband	0.174*** (0.02)	0.186*** (0.043)	0.121 (0.086)
Railroad	0.247 (0.293)	0.335* (0.173)	0.811** (0.366)
Local economy			
Employment rate	2.394 (2.275)	−2.185 (2.122)	0.254 (3.377)
Income growth	−3.540*** (1.17)	−0.407 (1.34)	−1.57 (2.11)
Per Capita Personal Income	1.700** (0.669)	−0.048 (1.04)	0.194 (1.54)
Postsecondary institutions	6826.3*** (1805)	2250.5* (1148.7)	3677.9** (1631.9)

(Continues)

Table 3 Continued

	METRO	NONMETRO	NONMETRO, NONADJ
	Coef. (SE)	**Coef. (SE)**	**Coef. (SE)**
Bachelor's rate	−2.267*** (0.86)	2.736** (1.074)	2.96 (1.874)
High school dropout rate	−4.568*** (1.009)	−1.911* (0.993)	−0.756 (1.588)
Race: percent non-White	1.561*** (0.337)	−0.648* (0.35)	−0.9 (0.6)
Ethnicity: percent Hispanic	2.806*** (0.385)	0.266 (0.397)	0.432 (0.638)
Age: 18–64	0.046*** (0.01)	0.059** (0.026)	0.075 (0.096)
Industry			
Herfindahl–Hirschman Index	−0.609*** (0.024)	−0.564*** (0.049)	−0.504*** (0.079)
Location Quotient for NAICS 311	−0.281*** (0.06)	−0.196*** (0.072)	−0.306** (0.121)
Location Quotient for NAICS 312	0.091 (0.058)	−0.089 (0.082)	−0.392** (0.196)
Location Quotient for NAICS 72	0.085 (0.145)	0.198* (0.103)	0.089 (0.156)
Policy			
Local and state property tax revenue/General direct expenditures	−2.646*** (0.792)	−3.161*** (1.082)	−3.153 (1.99)
Right-To-Work legislation	0.214*** (0.072)	−0.062 (0.097)	−0.076 (0.166)
Region			
Index of county natural amenities	−0.009 (0.179)	0.418** (0.206)	0.321 (0.33)
IA, IL, IN, KS, MI, MN, MO, NE, ND, OH, SD, WI	0.093 (0.161)	0.590*** (0.213)	0.790** (0.37)
CT, MA, ME, NJ, NY, NH, PA, RI, VT	0.074*** (0.024)	0.089*** (0.027)	0.090** (0.046)
AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV	0.472** (0.195)	0.273 (0.233)	−0.071 (0.63)
Constant	−2.006 (2.399)	−0.544 (2.179)	−1.275 (3.605)
N=	18,126	32,338	14,649
Pseudo R^2	0.104	0.066	0.068
Log Pseudolikelihood	−11,135	−5,267	−1837

Note:
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

well-educated residents may be well-positioned to catalyze entrepreneurship in food manufacturing.

Industry-specific concentration rates (HHI) were significantly related to start-up rates. Location quotients for food manufacturing (NAICS 311) were negative and significant while beverage manufacturing (NAICS 312) were only negatively significant for the nonmetro, nonadjacent counties. This inverse relationship suggests a strong concentration of production in the county deters new start-ups, a somewhat unexpected result. In contrast, prevalence of the tourism industry (location quotient for NAICS 72) was significant and positive for nonmetro start-up rates, indicating rural tourism may serve as a "pull" factor for food start-ups such as wineries, craft distilleries and microbreweries who see visitors as a potential market (Nesse, Green, and Ferguson 2019).

Right-to-work legislation was only significant in the metro only regressions, where such legislation was positively related to start-up rates. Property taxes as a share of general direct expenditures was negative and significant for all counties.

Discussion & Policy Implications

Exploring spatial and business environment determinants of food manufacturing establishment births in U.S. counties between 2013 and 2015, results suggest that a grouping of variables we characterize as "AgriCulture" positively affect start-up dynamics. While a convergence of downstream food market innovations (direct sales, organic) may spur start-ups, particularly where there is competitive pressure for land, more traditional measures of agricultural dependency (sales, acres, and land in agriculture) are not significant. Moreover, findings consistent with previous work on the importance of entrepreneurial culture suggest that it may be effective to target economic development strategies on downstream food supply chain opportunities. However, the dependency on a strong economy "pulling" entrepreneurs to create new offerings, suggest such start-ups would only complement and augment the broader agricultural sector, which is still a potential diversification approach when commodity markets struggle.

Beyond our findings related to the concept of AgriCulture as a driver of start-ups, our results reaffirm the importance of spatial determinants considered in the previous food manufacturing literature, including rurality (rural areas at a disadvantage), infrastructure (highways and railroads but also broadband internet), local economic conditions, industry structure, and region. That is, in the presence of an emerging bimodal food manufacturing sector, both traditional location factors and consumer-driven downstream innovations, seem to affect food manufacturing dynamics.

There are a few important differences to note when comparing metro and nonmetro counties, suggesting effects vary across the rural–urban continuum. Food manufacturing start-ups appear to flourish in metro areas with larger proportions of non-White populations (i.e. postindustrial cities with increased suburbanization and histories of "White Flight," such as Detroit, St. Louis, and Baltimore) as compared to nonmetro areas with more non-White residents (including Native American tribal lands and the rural South and Mississippi Delta regions, which in many cases are designated persistent poverty counties by USDA ERS (2015)).

This research is especially relevant in rural and broader economic development policy contexts. Goetz, Partridge, and Stephens (2018) recommend that rural places emphasize their unique features in order to grow the diversity and quality of their business environments and human capital. Place itself might serve as one of those unique features, a concept underlying the state branding programs across states, so geographic interdependencies *between* places motivate the need for cooperative multicounty, state, and regional strategies (Thilmany et al. 2005; Clancy and Ruhf 2010). For example, Missouri's Lieutenant Governor commissioned a task force in 2019 to examine Food, Beverage, and Forest Product Manufacturing as a policy initiative for the State. One of the initiative's main thrusts is whether the State should sponsor food manufacturing incubators to drive start-ups. As another example, the National Institute of Standards and Technology's Manufacturing Extension Partnership, a federal-state-private partnership to assist U.S. manufacturers, hosted a Policy Academy in 2019 for state policymakers and practitioners who want to strengthen manufacturing in rural America with innovative policy solutions.

Given our findings show mixed, and often weak results for rural areas, care in framing such initiatives is key. Since farm-level local foods may not be the rural economic development panacea many have promulgated (Low et al. 2015; O'Hara and Low 2016; Jablonski et al. 2020), the dynamics that are spatially correlated to the consumer demand in high-income metro and metro-adjacent areas may be leveraged by rural areas in the region (even if not nearby), if rural economic development is the aim. And, while food manufacturing is also not necessarily a panacea for rural economic development (Goetz 1997; Henderson and McNamara 2000), it does align with other consumer-driven innovations (organic, direct sales) and can be leveraged or better integrated into the grant and business development programs that are in place to support farmgate food systems. For example, there were a portfolio of grants just integrated into the Local Agriculture Market Program in the 2018 Farm Bill, some of which do allow for food enterprise development beyond the farmgate, and these findings justify the implementation of such programs.

Beyond providing a more diverse economic base to balance commodity-dependent areas during times of weak markets (a "push" factor), food manufacturing start-ups are likely "pulled" by the proliferation and acquisition of niche brands as national conglomerates identify start-ups with piloted concepts to integrate into their portfolios (Salnikova, Baglione, and Stanton 2019). For example, Hormel Foods, which diversified its portfolio with Skippy peanut butter in 2013, went on to acquire New Jersey's natural food focused Applegate Meats in 2015, then purchased Justin's Nut Butters, a natural food start-up out of Boulder, Colorado, in 2016. Still, these examples illustrate that such innovations may fare best in metro rather than rural areas.

Conclusions and Future Research Needs

Our findings provide additional evidence that, to support nascent dynamism in the food manufacturing industry, stakeholders throughout the supply chain must be cognizant of key drivers. If ongoing and future policies to leverage food innovations and opportunities are continued, they should be intentionally targeted. For example, our results suggest that regions or states with more organic and local/regional food production have more start-ups.

This paper makes several contributions to the existing literature. We investigate the relationship between food manufacturing start-ups across the rural–urban continuum and the "AgriCulture" ecosystem and the broader entrepreneurial ecosystem—two vectors that are novel in this vein of literature. Second, we use a national establishment-level database to understand start-ups dynamics in food manufacturing, as related to location. This dataset is particularly helpful because it includes nonemployer start-ups, representing 10% of food manufacturing establishments.

Yet, this analysis is limited by the fact it uses some imperfect proxies to allow for county-level analysis (which limits data availability). Also, the model tracks a narrow time frame (although results are robust when compared to an earlier period). Future research that matches establishment identifiers, as did Jablonski et al. (2020), could track the survival and/or growth of start-ups across time to extend this work. If we can help to define the "locational secret sauce" for food manufacturing start-ups, then the resources should focus start-ups in those locations, conserving resources put toward start-ups in less-optimal locations. Additional work that examines the influence of AgriCulture and Entrepreneurial Ecosystem variables on start-ups by detailed food manufacturing sector (e.g. bread and bakery manufacturing or dairy products), as did Goetz (1997), would also be beneficial to policymakers and practitioners as they wrestle with resource allocation decisions.

Acknowledgments

The authors appreciate helpful comments received from seminar attendees at the U.S. Department of Agriculture (USDA) Economic Research Service and the 2018 North American Regional Science Council annual meeting. This research was supported in part by the U.S. Department of Agriculture's Economic Research Service. The authors appreciate funding received from ERS cooperative agreement 58-6000-6-D071, Rural Employment Sustainability and Establishment Dynamics, and also, the Colorado and Missouri Ag. Experiment Stations and Extension Services. The findings and conclusions in this publication are those of the authors and should not be construed to represent any official USDA or U.S. government determination policy.

References

Artz, G.M., Y. Kim, and P.F. Orazem. 2016. Does Agglomeration Matter Everywhere?: New Firm Location Decisions in Rural and Urban Markets. *Journal of Regional Science* 56(1): 72–95. https://doi.org/10.1111/jors.12202.

Ashton, B. 2019. Nature of Innovation in Food Processing in Manitoba, Canada. *The Journal of Rural and Community Development* 14(1): 35–53.

Audretsch, D.B., M. Obschonka, S.D. Gosling, and J. Potter. 2017. A New Perspective on Entrepreneurial Regions: Linking Cultural Identity with Latent and Manifest Entrepreneurship. *Small Business Economics* 48(3): 681–697. https://doi.org/10.1007/s11187-016-9787-9.

Bhattacharya, H., and R. Innes. 2016. Concentration, Product Variety, and Entry-for-Merger: Evidence from New Product Introductions in the U.S. Food Industry. *American Journal of Agricultural Economics* 98(5): 1360–1376. https://doi.org/10.1093/ajae/aaw070.

Bloom, D.J., and C.C. Hinrichs. 2011. Informal and Formal Mechanisms of Coordination in Hybrid Food Value Chains. *Journal of Agriculture, Food Systems, and Community Development* : 143–156. https://doi.org/10.5304/jafscd.2011.014.016.

Bunten, D., S. Weiler, E. Thompson, and S. Zahran. 2015. Entrepreneurship, Information, and Growth. *Journal of Regional Science* 55(4): 560–584. https://doi.org/10.1111/jors.12157.

Clancy, K., and K. Ruhf. 2010. Is Local Enough? Some Arguments for Regional Food Systems. *Choices: The Magazine of Food, Farm & Resource Issues* 25(1): 36.

Cleary, R., A. Bonanno, L. Chenarides, and J.S. Goetz. 2018. Store Profitability and Public Policies to Improve Food Access in Non-metro U.S. Counties. *Food Policy* 75: 158–170. https://doi.org/10.1016/j.foodpol.2017.12.004.

Conroy, P., K. Porter, R. Nanda, B. Renner, and A. Narula. 2015. Consumer Product Trends: Navigating 2020. https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/consumer-business/deloitte-uk-cpg-trends-2016.pdf.

Constance, D.H., M. Hendrickson, P.H. Howard, and W.D. Heffernan. 2014. Economic Concentration in the Agrifood System. In *Rural America in a Globalizing World: Problems and Prospects for the 2010s*, First ed.) ed., ed. E. Ransom, L. Jensen, and C. Bailey, 16–35. Morgantown, WV: West Virginia University Press.

Costanigro, M., D. McFadden, S. Kroll, and G. Nurse. 2011. An in-Store Valuation of Local and Organic Apples: The Role of Social Desirability. *Agribusiness: An International Journal* 27: 465–477.

Dawson, C., and A. Henley. 2012. "Push" Versus "Pull" Entrepreneurship. *International Journal of Entrepreneurial Behaviour & Research* 18(6): 697–719.

DeLind, L.B. 2011. Are Local Food and the Local Food Movement Taking us where we Want to Go? Or Are we Hitching our Wagons to the Wrong Stars? *Agriculture and Human Values* 28(2): 273–283. https://doi.org/10.1007/s10460-010-9263-0.

Drummond, C., H. McGrath, and T. O'Toole. 2018. The Impact of Social Media on Resource Mobilisation in Entrepreneurial Firms. *Industrial Marketing Management* 70: 68–89.

Goetz, S.J. 1997. State- and County-Level Determinants of Food Manufacturing Establishment Growth: 1987-93. *American Journal of Agricultural Economics* 79(1997): 838–850.

Goetz, Stephan J., Mark D. Partridge, and Heather M. Stephens. 2018. The Economic Status of Rural America in the President Trump Era and Beyond. *Applied Economic Perspectives and Policy* 40(1): 97–118. https://doi.org/10.1093/aepp/ppx061.

Guthman, Julie. 2003. Fast Food/Organic Food: Reflexive Tastes and the Making of 'yuppie chow'. *Social & Cultural Geography* 4(1): 45–58. https://doi.org/10.1080/1464936032000049306.

Henderson, Jason R., and Kevin T. McNamara. 2000. The Location of Food Manufacturing Plant Investments in Corn Belt Counties. *Journal of Agricultural and Resource Economics* 25(2): 680–697.

Jablonski, B.B.R., Allison B., and D. Thilmany. 2020. Exploring the Role of Human Capital in Farms and Ranches that Sell through Local Food Markets. (Under review, AEPP).

Jara-Figueroa, C., B. Jun, E.L. Glaeser, and C.A. Hidalgo. 2018. The Role of Industry-Specific, Occupation-Specific, and Location-Specific Knowledge in the Growth and Survival of New Firms. *Proceedings of the National Academy of Sciences of the United States of America* 115(50): 12646–12653. https://doi.org/10.1073/pnas.1800475115.

Lambert, D.M., K.T. McNamara, and M.I. Garrett. 2006. Food Industry Investment Flows: Implications for Rural Development. *The Review of Regional Studies* 36(2): 140–162.

Lambert, D.M., and K.T. McNamara. 2009. Location Determinants of Food Manufacturers in the United States, 2000-2004: Are Nonmetropolitan Counties Competitive? *Agricultural Economics* 40(6): 617–630. https://doi.org/10.1111/j.1574-0862.2009.00403.x.

Lasley, P., J. Glenn, and T. Ogawa 2014. Agriculture vs. Agri CULTURE. What You Should Have Learned in Soc 325. https://www.slideserve.com/clarke-soto/what-you-should-have-learned-in-soc-325-if-you-had-been-paying-attention

Low, S. A., A. Adalja, E. Beaulieu, N. Key, S. Martinez, A. Melton, A. Perez, et al. 2015. Trends in U.S. Local and Regional Food Systems: A Report to Congress. Washington DC: U.S. Department of Agriculture, Economic Research Report No. AP-068, pg. 92. https://www.ers.usda.gov/publications/pub-details/?pubid=42807

Low, S.A., and J.P. Brown. 2017. Manufacturing Plant Survival in a Period of Decline. *Growth and Change* 48(3): 297–312.

Lusk, J.L. 2017. Evaluating the Policy Proposals of the Food Movement. *Applied Economic Perspectives and Policy* 39: 387–406.

Lusk, J.L., and J. McCluskey. 2018. Understanding the Impacts of Food Consumer Choice and Food Policy Outcomes. *Applied Economic Perspectives and Policy* 40(1): 5–21. https://doi.org/10.1093/aepp/ppx054.

Magnan, A. 2011. Bread in the Economy of Qualities: The Creative Reconstitution of the Canada-UK Commodity Chain for Wheat. *Rural Sociology* 76(2): 197–228. https://doi.org/10.1111/j.1549-0831.2010.00038.x.

McGranahan, D. A. 1999. Natural Amenities Drive Rural Population Change. Washington DC: U.S. Department of Agriculture, Agricultural Economic Report No. 781. https://ageconsearch.umn.edu/record/33955/

Nesse, K., T. Green, and B. Ferguson. 2019. Quality of Life in Potential Expansion Locations Is Important to Craft Brewers. *Journal of Regional Analysis & Policy* 49(1): 65–77.

Neumark, D., B. Wall, and J. Zhang. 2011. Do Small Businesses Create More Jobs? New Evidence for the United States from the National Establishment Time Series. *Review of Economics and Statistics* 93(1): 16–29. https://doi.org/10.1162/REST_a_00060.

O'Hara, J.K., and S.A. Low. 2016. The influence of metropolitan statistical areas on direct-to-consumer agricultural sales of local food in the Northeast. *Agricultural and Resource Economics Review* 45(3): 539–562.

O'Hara, J., M. Castillo, and D. Thilmany. 2020 Under Review. Do Cottage Food Laws Reduce Barriers to Entry for Food Manufacturers? *Applied Economic Perspectives and Policy*.

Onozaka, Y., and D.M. Thilmany. 2011. Does Local Labeling Complement or Compete with Other Sustainable Labels? A Conjoint Analysis of Direct and Joint Values for Fresh Produce Claims. *American Journal of Agricultural Economics* 93(3): 689–702.

Richards, T.J., S.F. Hamilton, M. Gomez, and E. Rabinovich. 2017. Retail Intermediation and Local Foods. *American Journal of Agricultural Economics* 99(3): 637–659. https://doi.org/10.1093/ajae/aaw115.

Rupasingha, A. 2017. Local Business Ownership and Local Economic Performance: Evidence from U.S. Counties. *Regional Studies* 51(5): 659–673. https://doi.org/10.1080/00343404.2015.1119264.

Salnikova, E., S. Baglione, and J. Stanton. 2019. To Launch or Not to Launch: An Empirical Estimate of New Food Product Success Rate. *Journal of Food Products Marketing*. https://doi.org/10.1080/10454446.2019.1661930.

Schmit, Todd M., and Jeffrey S. Hall. 2013. Implications of Agglomeration Economies and Market Access for Firm Growth in Food Manufacturing. *Agribusiness* 29(3): 306–324. https://doi.org/10.1002/agr.21336.

Thilmany, Dawn, M. Castillo and S. Low. 2019. The Tale of Two Food Supply Chains: Exploring the Emerging Bimodal Structure of U.S. Food and Beverage Manufacturing. CSU Regional Economic Development Institute Report. December. Available at: https://redi.colostate.edu/wp-content/uploads/sites/50/2019/12/REDI-report-food-manufacturing.pdf.

Thilmany, D., N. McKenney, D. Mushinski, and S. Weiler. 2005. Beggar-Thy-Neighbor Economic Development: A Note on the Effect of Geographic Interdependencies in Rural Retail Markets. *Annals of Regional Science* 39(3): 593–605. https://doi.org/10.1007/s00168-005-0229-x.

Tong, T., T.E. Yu, K. Jensen, D. De La Torre Ugarte, and S.-H. Cho. 2016. Impact of Public Infrastructure on Output of U.S. Food Manufacturing Industries: A Heterogeneous Dynamic Panel Approach. *Agribusiness* 32(4): 439–453. https://doi.org/10.1002/agr.21455.

U.S. Department of Agriculture Economic Research Service. 2015. County Economic Types, 2015 Edition. https://www.ers.usda.gov/data-products/county-typology-codes/descriptions-and-maps/#ppov

——. 2017. Rural Manufacturing at a Glance, 2017 Edition. Washington DC: U.S. Department of Agriculture, Economic Information Bulletin 177. https://www.ers.usda.gov/webdocs/publications/84758/eib-177.pdf

——. 2018. Manufacturing. https://www.ers.usda.gov/topics/food-markets-prices/processing-marketing/manufacturing/

Weiss, C.R., and A. Wittkopp. 2005. Retailer Concentration and Product Innovation in Food Manufacturing. *European Review of Agricultural Economics* 32(2): 219–244. https://doi.org/10.1093/eurrag/jbi022.

Yu, L., and G. Artz. 2019. Does Rural Entrepreneurship Pay? *Small Business Economics* 53: 647–668.

Zhang, X., and M.E. Warner. 2017. Business Retention and Expansion and Business Clusters–A Comprehensive Approach to Community Development. *Community Development* 48(2): 170–186. https://doi.org/10.1080/15575330.2017.1285332.