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Differential expenditure patterns of local food system participants

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Abstract

Since 2009 the US Department of Agriculture (USDA) has funded over 2600 local food initiatives. However, the economic impacts of these policies remain unclear largely due to data deficiencies that preclude the understanding of differential expenditure patterns of farms participating in these local market channels (both in terms of what inputs they require, and where the inputs are purchased—local or not). This paper utilizes two unique data sets from samples of producers in New York State (NYS) to build expenditure profiles for local food system participants. We employ USDA Agricultural Resource Management Survey data as a robustness check on our results. The primary contribution of this paper is to provide preliminary evidence that local food system participants in NYS have different expenditure patterns than farmers who do not sell through local food markets. We show that farmers with local food sales have higher reliance on local labor and other variable expenses as primary inputs than farms without local food sales, and that local food producers spend a higher percentage of total expenditure in the local economy. Based on our results, we recommend that future economic impact assessments utilize revised expenditure profiles that more accurately reflect inter-industry linkages of the local food sector.

Key words: economic impact assessment, expenditure pattern, production function, farm inputs, ARMS, local food, New York

Introduction

Between 2009 and 2012, the US Department of Agriculture (USDA) funded over 2600 local food projects; a major motivator of these policies is enhanced opportunity for community economic development (USDA, 2013). Specifically, local food projects are purported to increase the amount of money circulated in a local economy, thereby bolstering sales of other local businesses and creating jobs. Despite the proliferation of funding, however, the resulting local economic benefits remain unclear, largely due to data deficiencies precluding comprehensive analysis.

To conduct economic impact assessments, one must have information about inter-industry linkages both within and among sectors of an economy; i.e., as a business or industrial sector buys from and sells goods and services to other sectors of the economy and to final users, the firm stimulates additional economic activity by other businesses and within other industrial sectors. This information is generally available only on an aggregate commodity sector scale, particularly for agriculture (e.g., IMPLAN data and software provided by IMPLAN LLC), which limits the extent of tractable analyses of local food system activities. To this point, most current research quantifying the impact of local food systems utilize expenditure patterns for aggregated agricultural commodity sectors (Otto and Varner, 2005; Cantrell et al., 2006, 2008; Hughes et al., 2008; Henneberry et al., 2009; Swenson, 2010, 2011). These studies thereby assume that the purchasing and sales patterns of local food producers are identical to those in aggregated commodity sectors, and thus that an increase in demand for these products has the same economic impact (both in terms of total output and distribution).

In early 2013, a group of agricultural economists met to identify data needs and best practice methodologies to assess the economic impact of local food system activity. One of the gaps identified was a need to better understand the input expenditure patterns of farms that sell into local food markets and, in particular, what inputs farms require and where the inputs are purchased (O'Hara and Pirog, 2013). This is not to suggest that the 2013 meeting was the first time that researchers called for this type of information. Krinke (2002), for example, states that little is known about the labor and material requirements for farms that participate in alternative farming systems.

And Hughes et al. (2008) specifically called for more research on expenditure patterns of local food participants.

As a step toward better understanding production profiles of local food system participants, this paper utilizes two unique data sets from samples of producers in New York State (NYS). Both data sets were collected by the researchers: one set includes small and mid-scale producers that utilize direct-to-consumer (D2C) markets in the 11-county Capital District (CD) region of NYS, the second set comprises farms of all scales that have sales through a food hub in NYS. Additionally, we utilize the 2008–2011 USDA Agricultural Resource Management Survey (ARMS) data, the only nationally representative sample of farms that estimates the costs of production, segmenting the farms that report local food sales and those that do not. Within the ARMS data, we follow the USDA Economic Research Service (ERS) by defining 'local food' based on a set of marketing channels: D2C (i.e., farm sales at roadside stands, farmers' markets, onfarm stores and community-supported agriculture arrangements); and, intermediated marketing channels (i.e., farm sales to local retail, restaurant and regional distribution outlets) (Low and Vogel, 2011). We use the non-local farm data from the ARMS as a benchmark. Finally, as the ARMS data do not provide information on location of expenditure, we use the IMPLAN agricultural sector data to understand expected location of expenditures for non-local food system participants.

The primary contribution of this paper is to provide preliminary empirical evidence that local food system participants in NYS have different expenditure patterns than farmers who do not sell through local food markets. We show that farms with local food sales have higher reliance on local labor and 'other variable expenses' as primary inputs than farms without local food sales. Additionally, when field crop, fruit and vegetable producers with local food sales are viewed alone, they have lower expenditures on fertilizer and chemicals—the largest expenditure item per unit of output for farms without local food sales. Based on our results, we recommend that future impact assessments utilize revised production functions that more accurately reflect inter-industry linkages of the local food sector.

We begin the rest of this paper by reviewing the literature on farm input expenditure patterns and their relationship to economic development. This is followed by a description of the data collected in the two case studies and utilized from the ARMS. Finally, the empirical results are discussed, along with their implications and directions for future research.

Literature Summary

The importance of the relationship between farm input expenditures and economic development is well documented. For rural areas with strong agricultural and less diversified economies, there is evidence that the mix of inputs purchased and the location of the purchases has key local impacts (Aldrich and Kusmin, 1997; Shaffer et al., 2004; Lambert et al., 2009). As the structure of farming in many rural economies continues to shift—in large part due to improvements in transport and telecommunication technologies—much of the literature focuses on the negative impacts resulting from these changes (Tacoli, 1998; Krinke, 2002; Stabler and Olfert, 2009; McManus et al., 2012). McManus et al. (2012) refer to this phenomenon as the 'uncoupling' of farm enterprises and rural service centers. They conclude that as farms are freed from reliance on 'the local', small rural towns are likely to experience decline unless they have other attributes that will support local economies (e.g., amenity tourism).

Related literature emphasizes the impact of farm attributes (especially scale and farming practices) on input purchase decisions, though none looks specifically at the relationship between market channel and input purchases. Goldschmidt's seminal study of two California communities generated the hypothesis that large-scale farming has detrimental community impacts while small-scale operations enhance community well-being—in part because these smaller-scale operations were more likely to support local businesses (Goldschmidt, 1947). Marousek (1979) surveyed small and large farmers in two towns in Idaho and found that small farms spend a higher percentage of their total expenditures locally. Chism and Levins (1994) conducted a study of 30 crop and livestock farmers in Minnesota, finding that larger farms purchased a smaller percentage of their inputs from the local economy. Lawrence et al. (1997) reported from their survey of pork producers in Iowa that large-scale producers spend less money on inputs in the nearest community than small-scale producers. Tacoli (1998) writes that the multiplier effects of 'prosperous' agriculture often bypasses local small towns. Krinke (2002) cites an interviewee in Green Isle, MN as stating that 'When dairy gets so big, they don't deal with you; they buy direct and bypass the local economy'.

Additional research suggests that farming practices also play an important role in determining the location of input purchases. Brodt et al. (2006) and Milestad et al. (2010) claim that 'sustainable' farming practices tend to involve more locally produced inputs, and to replace agrochemicals obtained in distant markets. However, Brodt et al. (2006) caution that preliminary evidence suggests that increased local input purchases only result where local economies are prepared to meet the needs of alternative agricultural producers. Lockeretz (1989) compared five previously published studies examining the economics of high-input conventional cropping systems with low-input alternatives to assess the community economic impact. He reports that though lower-input systems contribute less money per acre to the local economy (as they purchase less inputs), a greater portion of the value of expenditure is spent locally.

Community economic impacts resulting from the declining employment opportunities in agriculture on small rural towns are well understood (Heady and Sonka, 1974; Marousek, 1979). Significant technological advances and increases in productivity have resulted in farm employment and labor expenditures per dollar of gross output declining precipitously throughout the USA; accordingly, many rural communities are unable to support businesses that supply farm inputs and household items. As a result, many remaining farms and households can no longer purchase products in the nearest town, but travel to more densely populated locations (Aldrich and Kusmin, 1997; Shaffer et al., 2004; Lambert et al., 2009).

There are four studies that provide preliminary evidence that farms that participate in local food markets have higher labor expenditures as a percentage of total expenditure than non-local food system participants. Biermacher et al. (2007) conducted a 2-year study of growing and selling products for a farmers' market in rural Oklahoma. They calculated that 55% of the total variable production expenses were associated with hired labor. LeRoux et al. (2010) and Hardesty and Leff (2010) conducted research on market channel selection for local food system producers. Both studies demonstrate the high labor demands per unit of output associated with certain D2C sales outlets. Similarly, King et al. (2010) found that producers receive a greater share of retail prices in local food supply chains than mainstream supply chains—partially due to the fact that producers assume additional supply chain functions such as processing, distribution and marketing.

Methods

While some data exist on the value of D2C and intermediated sales within local food systems (Martinez et al., 2010; Low and Vogel, 2011), there is widespread recognition that official tracking has not kept pace with the sector's growing importance (Tropp, 2008). Most available data 'does not describe how local food systems operate or how their operations and economics vary from place to place' (Hendrickson et al., 2013). To analyze the differential expenditure patterns of local food system producers we use interview data from two sample groups of farmers participating in local food markets during the summers of 2011 and 2012 in NYS. We also utilize USDA ARMS data for farms in NYS with and without local food sales to broaden our scope of analysis and assess the robustness of our farmer interview results. Finally we utilize IMPLAN agricultural sector data to assess percentage of expenditure that is local.

Farmer interview data

The first set of farmer interview data was collected during the summer of 2011 from a random sample of farms with local food sales within the CD region of NYS, including Albany, Columbia, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren and Washington Counties (henceforth referred to as the 'CD study'). In this study, we endeavored to better understand the purchasing patterns of small and mid-scale farms that included D2C sales as part of their marketing portfolio (i.e., all farms in this sample have some component of D2C sales, but do not necessarily sell exclusively through D2C channels). A team of Cornell Cooperative Extension educators identified farms in each county that marketed at least a portion of their farm products through D2C market outlets. The team identified 752 farms in total, a number remarkably consistent with data from the 2007 Census of Agriculture, which reported that there were 797 farms in the region with D2C sales in 2007 (USDA ERS, 2007). In total, 130 farmers were randomly selected for interviews based on the county-level distribution of all farms in the region (USDA, 2007).

A total of 97 interviews (75% response rate) contained complete information, 82 of which were small or mid-scale operations (under US$500,000 in annual gross sales). The interview protocol was designed based on our knowledge of how farms report expenditures in an income (or profit and loss) statement for their business. Farmers were asked to provide their 2010 annual farm expenditures by item category and the proportion of each expenditure purchased locally (i.e., purchased within the 11-county region), as well as outside of the region but within NYS, and outside of NYS. Based on the farm's commodity with the largest sales (numerous farms produced products in multiple categories), the distribution of farms by category was 15% fruit, 27% vegetables, 6% dairy, 23% meat and livestock, 12% greenhouse and nursery, and 17% other crops.

Interviews for the second NYS study were conducted during the summer of 2012 with farmers who supplied produce to Regional Access (RA), a food hub (i.e., a local food aggregation and distribution business) located in Trumansburg, NY (henceforth the 'food hub study'). The purpose of this case study was to understand the economic impact of food hubs, particularly on participating farmer vendors. We chose RA as our case study food hub because of their commitment to working directly with farmers (they currently source produce from 96 farmers, as well as 65 specialty processors), their length of time in operation (they were established in 1989), the diversity of their customer base (they sell produce to over 600 customers, including individual households, restaurants, institutions, distributors, buying clubs, retailers, manufacturers and bakeries) and size of their operation (they are a mid-scale operation with over US$6 million in annual sales).

We conducted 30 interviews with RA's farmer vendors out of a population of 86 located in NYS (35% response rate). Farmers were asked to provide their 2011 annual

farm expenditures by item category and the proportion of each expenditure purchased locally (i.e., purchased within NYS). Unlike the CD study, the expenditure categories defined were designed to correspond to the sector categorization within the IMPLAN software. In addition, for the CD study we only included small and mid-scale local food system participants, while the food hub study utilized information from farms of all scales working with RA. In this study, 37% of farms were classified as 'small' (US$1000–US$249,999 in total gross sales), 43% of farms were classified as 'large' (US$250,000–US $999,999 in total gross sales), and 20% were classified as 'very large' (US$1 million or more in total gross sales). Farmers were also asked to identify their primary commodity category; accordingly the distribution of farms by primary category was 37% meat and livestock, 30% fruit and vegetable, and 33% value-added products (including cheese, butter, yogurt, honey, maple syrup, wine and juice).

ARMS data

Starting in 2008, the ARMS added specific questions about sales to local food outlets. However, Low and Vogel (2011), the first researchers to publish local food data from ARMS, caution 'the design and structure of the questions create[s] obstacles'. The ARMS utilizes a stratified sampling technique, which targets certain commodities (depending on the year), large farms and farms in 15 core agricultural states (of which NYS is not one). Given that local food system participants are overwhelmingly small- and mid-scale farms (65% of local food farms in NYS report under US$500,000 in gross annual sales), they have a small overall sample size in ARMS, and larger associated weights.

Following protocol developed by the USDA ERS and USDA National Agricultural Statistics Service (NASS) staff, we utilized custom-built software with a jackknife re-sampling process. As the ARMS sample is not a simple random sample, each observation has a different weight to reflect its probability of selection, and therefore, what part of the total population it represents. We used the jackknife re-sampling process with 30 additional weights from NASS for each sample to estimate the variances for each data item (Dubman, 2000; USDA ERS, 2012). Due to the small sample size of farms reporting local food sales in NYS, these data were aggregated over the available four years with local food questions (2008–2011). Following Low and Vogel (2011), we excluded cut Christmas trees, short-rotation woody crops, nursery, greenhouse and floriculture from our definition of 'local foods', as well as point farms (those with under US$1000 in total gross annual sales). We included any farm that reported a non-zero number for D2C or intermediated sales as a 'local food' producer. In total, ARMS reports 64 unique respondents with local food sales in NYS over the 4 years, representing 5536 farms. Of the 64 respondents, 22% define their primary commodity as field crops, 27% as vegetables, fruit and nuts, 43% as livestock and 8% as dairy. Average farm sales for farms reporting local food sales is US$45,431 (141 acres), compared to US $125,874 (239 acres) for those without. Due to the small size of the sample we are unable to present expenditure patterns for the NYS ARMS respondents with local food sales by scale; this remains a key area for future research.

Non-local food system participant data

In order to analyze the differential expenditure patterns of producers in NYS with and without local food sales, we segmented the ARMS data into those farms with and without local food sales. There are 429 farms that do not report local food sales in the ARMS for NYS from 2008 to 2011 (representing 27,575 farms). According to the respondents, 27% define their primary commodity as field crops, 4% as vegetables, fruit and nuts, and 69% as livestock and dairy.

Additionally, we used the 2011 NYS agricultural sector data from IMPLAN to understand non-local food system participants' location of expenditure. We created an 'agricultural production sector' that includes the IMPLAN agricultural commodity sectors corresponding to the CD and food hub studies. Accordingly, our agricultural production sector in IMPLAN includes oilseed farming, grain farming, vegetable and melon farming, fruit farming, greenhouse, nursery and floriculture farming, all other crop farming, cattle ranching and farming, dairy cattle and milk production, poultry and egg production and all other animal production. Though the agricultural IMPLAN data include both farms with and without local food sales, the farms without local food sales dominate the data due to their larger volume of total expenditure (Schmit et al., 2013).

Results

Utilizing the farmer interview and ARMS data, expenditure profiles for local food system producers in NYS were calculated from each source. The results demonstrate some key points of convergence between the three local food producer data sets, as well as substantial differences with NYS ARMS respondents without local food sales and the IMPLAN agricultural data.

Expenditure patterns

Due to the varying designs of the interview protocols and the way that IMPLAN divides its sectors, we can only compare certain aggregated expenditure items from the food hub study and the IMPLAN agricultural data to

Table 1. Expenditures by item, as percentage of total expenses.

	CD region (2011)	NYS USDA ARMS (2008–2011, average)			
		Local food sales, all outlets		No local food sales	
Expenditure item	D2C small- and mid-scale farms (%)	All farms (%)	Field crop, vegetables, fruit and nut farms (%)	All farms (%)	Field crop, vegetables, fruit and nut farms (%)
All livestock-related	6	18	1	29	2
Seeds and plants	10	3	5	4	9
Fertilizer and chemicals	8	7	10	8	21
Labor	22	18	29	14	14
Fuel and oil	9	7	9	7	10
Repair and maintenance	8	11	11	9	10
Custom work	2	2*	2*	4	3
Utilities	6	4	3	3	3
Other variable expense	16	16**	18**	10	10
Taxes, land and property	7	9**	2**	6	10
Insurance premium	5	3	4	3	5
Rent and lease payments	2	1	2	2	3

Source: 2011 primary data collection by the authors and 2008–2011 USDA ARMS.
Asterisk (*) denotes statistically significant difference of the means at the 0.01 level and (**) at the 0.05 level, between farms with local food sales and those without.

the CD study and ARMS data. Table 1 compares total expenditures for the small- and mid-scale farms with D2C sales in the CD study with the weighted average ARMS data for NYS broken into four groups—those with local food sales and those without, and divided by primary commodity (all and field crop, vegetable, fruit and nut producers). Note that the case study and ARMS data presented only include variable expense items (i.e., we did not ask about capital expenditure items in the case studies, or utilize non-variable expenditures available from the ARMS).

For all local food system participants, 'labor' and 'other variable expense' are the largest areas of expenditure. Note that labor costs reported here do not include imputed wages to operators; labor expenditures are defined solely as payments to employees. The ARMS defines 'other variable expense' as V32B (hand tools, supplies, farm shop power equipment expense) + V36 (general business expense excluding insurance) – V35A (utilities). The CD farms spend on average 22% of total expenditure on labor, and 16% on other variable expenses. ARMS data show local food participants—those participating in D2C and/or intermediated markets—spend 18% of total expenditure on labor and 16% on other variable expenses. Closer analysis of ARMS data divided by primary commodity reveals that field crop, vegetables, fruit and nut producers spend 29% of total expenditure on labor. As 71% of CD respondents report fruit, vegetables, greenhouse, nursery or other crop as their primary production category, comparison with the ARMS producers reporting field crop, vegetable, fruit and nut as their primary production category is perhaps a more accurate comparison than utilizing the entire ARMS local food sample (with 41% of farms reporting livestock or livestock-related as their primary commodity). The data from the food hub study support this finding; on average, food hub farms spend 26% of total expenditure on labor (see Table 2). Unfortunately, given the design of the food hub study interview protocol and the composition of the IMPLAN sectors, we are unable to break out an equivalent 'other variable expense' item for the food hub study or IMPLAN agricultural data.

For NYS ARMS respondents without local food sales, livestock-related expenditure represents the highest portion of total expenditure (24%), followed by labor (14%) and other variable expense (10%). Though we cannot break out livestock-related expenditure or other variable expense within the IMPLAN agricultural data, we see the similar average expenditure on labor (15%). ARMS respondents, both with and without local food sales, show much higher portions of total expenditure on livestock-related expenses than the CD respondents

Table 2. Regional food hub case study, expenses and distribution across all farms.

Item	% of total expenditure[1] (%)	% of expenditure local, by item[2] (%)	% of expenditure local, by total expenditure (%)
Ag commodities from other farms	16.3	89.4	14.6
Ag services	9.6	92.0	8.8
Utilities	4.4	100.0	4.4
Repair and maintenance of farm buildings	2.6	98.8	2.6
On-farm processing	9.4	40.6	3.8
Off-farm processing	1.5	74.9	1.1
Wholesalers	6.1	53.6	3.2
Tractor/machinery repair	3.0	93.3	2.8
Items purchased from retail stores	4.1	79.9	3.3
Transportation	4.3	78.5	3.4
Warehousing-rented	0.2	100.0	0.2
Information services	0.7	96.2	0.7
Insurance	1.6	100.0	1.6
Rented/leased land	1.3	100.0	1.3
Rented equipment	0.3	100.0	0.3
Professional services	0.4	97.8	0.4
Veterinary services	0.3	100.0	0.3
Waste disposal	0.2	100.0	0.2
Education/training programs	0.2	86.8	0.2
Taxes	5.9	100.0	5.9
Labor (not contracted)	26.3	100.0	26.3
Other	1.3	66.0	0.8
Total local expenditure			86.3

Source: 2012 primary data collection by the authors.
[1] The sum of this column totals 100% and provides information on total average input expenditure by item.
[2] This column shows the percentage of each row expenditure item made in the local economy.

(14% for ARMS respondents without local food sales, 24% for ARMS respondents with local food sales, compared to 4% in the CD study); CD study respondents report a larger share of total purchases of seeds and plants (10%) compared with 3% for ARMS respondents without local food sales and 4% for ARMS respondents with local food sales. However, these differences may reflect the survey samples—the CD respondents having the smallest representation of livestock producers (23%).

ARMS field crop, vegetables, fruit and nut respondents without local food sales spend the largest proportion of expenditure on fertilizer and chemicals (21%). This stands in stark contrast to expenditures by our local food samples. ARMS field crop, vegetables, fruit and nut respondents with local food sales spend 10% of total expenditure on fertilizer and chemicals and CD farmers spend 8%. Unfortunately, we are unable to break out fertilizer and chemical expenses for the food hub study.

Pairwise means difference tests were conducted to compare variance in expenditure proportions between the farms with local food sales and farms without local food sales in the ARMS data, where the null hypothesis is H_0: $\beta_1 = \beta_2$ (β_1 = no local food sales, β_2 = local food sales). Table 1 shows which of the categories are statistically different at significance levels of 1 and 5%. Though only three of the input expenditure items have statistically significant differences (custom work, other variable expense, and tax, land and property), this may be influenced by the small sample size where the jackknife estimator can be problematic (Dubman, 2000).

Location of input expenditure

In both the CD and food hub studies, surveyed farmers reported spending higher percentages of their total input expenditures 'locally' than is reported in the IMPLAN agricultural data for the corresponding regions (11-county CD region and NYS, respectively). Table 2 shows that the RA food hub farms spent 86.3% of their total expenditures in NYS. By comparison, the IMPLAN agricultural data, which includes all corresponding agricultural sectors, show 54% of expenditures taking place in NYS. The interview data from the CD study show farms spending 64% of their total expenditures in the 11-county CD region, compared with 52% in the IMPLAN agricultural data. If the definition for 'local' expenditure is extended to include all of NYS,

the CD study farms spent 82% of their total input expenditure locally. Thus results from both case studies are very similar in terms of location of expenditure by local food participants when 'local' is defined as NYS. The information on local expenditures is limited in the ARMS survey (i.e., miles travel to four input expenditure items are asked—farm machinery and implements; fuel; fertilizer; and chemicals). As the ARMS does not ask about expenditure items of key importance to local food producers, the usefulness of the ARMS data in terms of expenditure location is limited.

Discussion

The input expenditure pattern results from the farm interviews, the ARMS, and IMPLAN agricultural data provide preliminary empirical evidence that local food system participants in NYS have different expenditure patterns than farms that do not sell through local food markets. Across the available data for local food system producers, we find that expenditures are greatest on labor and other variable expense. Field crop, vegetable, fruit and nut farms without local food sales report greater reliance on fertilizer and chemicals as a share of total expenditure than the same primary commodity farms selling through local food sales channels.

Consistent with King et al. (2010), we expect that the greater reliance on labor and other variable expenses is likely due in part to the additional supply chain functions assumed by local food system participants. Though our case studies and ARMS data do not enable us to know exactly what is included in other variable expenses, items such as marketing and packaging materials are not accounted for in other categories. LeRoux et al. (2010) and Hardesty and Leff's (2010) research on marketing costs associated with D2C market channel requirements supports the fact that local food producers have substantially higher labor input requirements. Thus, as local food system participants are more likely to market and distribute their own items, the differences in the production budgets may be a reflection of these supply chain characteristics.

Our farm interviews also provide evidence that in comparison to the IMPLAN agriculture data, local food participants purchase more of their inputs locally than do farms without local sales. Given policymakers' motivation for incentivizing local and regional food systems, capturing this additional local expenditure in impact assessments may be important in understanding true impacts.

Conclusion and Future Research

This paper highlights the differential input expenditure patterns for local food producers in NYS compared with ARMS respondents without local food sales and IMPLAN agriculture data. Our results provide preliminary evidence that local food system participants have different expenditure patterns, thereby warranting additional data collection in other states and regions. In aggregate, additional case studies will provide empirical evidence of how local food system participants interact within a local economy, so that policies promoting local food system activity can be more accurately evaluated.

Our case studies show additional local expenditure by local food system participants, as well as higher reliance on labor and other variable expense. The extent to which the differential expenditure patterns impacts farm profitability is a key area for future research, and will have important implications for the direction of future policy.

This study ignores the scale effects that may impact the results (given the most farms using local food sales channels are small and mid-scale) (Low and Vogel, 2011). However, due to sample size issues this was not an area of inquiry we could pursue. We recommend that future research evaluate whether or not differential spending patterns are due to market channel selection or scale.

More research is needed to determine best practice methodologies in order to better understand the impact of local food system activity. Determining expenditure profiles for local food system participants is only one of the requisite steps to conducting economic impact analyses. Taking the next step to incorporate differential expenditure patterns into modeling efforts that assess the impact of policies support local food system initiatives remains a key area for future research. As we show local food producers spend a larger percentage of total expenditure in the local economy, this inherently has a direct economic impact, by increasing total local demand. However, the multiplier impacts from inter-industry linkages remain unclear. Understanding how these differential expenditure profiles reverberate throughout the economy remains the key next step in understanding the economic impacts that result from policies supporting strengthened local food systems.

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References

Aldrich, L. and Kusmin, L. 1997. Rural Economic Development: What Makes Rural Communities Grow? Agricultural Information Bulletin No. 737. U.S. Department of Agriculture, Economic Research Service, Washington, DC.

Biermacher, J., Upson, S., Miller, D., and Pittman, D. 2007. Economic challenges of small-scale vegetable production and retailing in rural communities: An example from rural Oklahoma. Journal of Food Distribution Research 38:1–13.

Brodt, S., Feenstra, G., Kozloff, R., Klonsky, K., and Tourte, L. 2006. Farmer-community connections and the future of ecological agriculture in California. Agriculture and Human Values 23:75–88.

Cantrell, P., Conner, D., Erickcek, G., and Hamm, M. 2006. Eat Fresh and Grow Jobs: Michigan. Michigan Land Use Institute and The C.S. Mott Group, East Lansing, MI.

Chism, J.W. and Levins, R.A. 1994. Farm Spending and Local Selling: How Do They Match Up? Minnesota Agricultural Economist 676. Minnesota Extension Service, St. Paul, MN.

Conner, D., Knudson, W., Hamm, M., and Peterson, H.C. 2008. The food system as an economic driver: Strategies and applications for Michigan. Journal of Hunger and Environmental Nutrition 3:371–383.

Dubman, R.W. 2000. Variance Estimation with USDA's Farm Costs and Returns Surveys and Agricultural Resource Management Study Surveys. ERS Staff Paper AGES 00-01. U.S. Department of Agriculture, Economic Research Service, Washington, DC.

Goldschmidt, W. 1947. As You Sow. 1st ed. Free Press, Glencoe, IL.

Hardesty, S.D. and Leff, P. 2010. Determining marketing costs and returns in alternative marketing channels. Renewable Agriculture and Food Systems 25:24–34.

Heady, E.O. and Sonka, S.T. 1974. Farm size, rural community income, and consumer welfare. American Journal of Agricultural Economics 56:534–542.

Hendrickson, M., Johnson, T.G., and Cantrell, R. 2013. Input/Output Interviews. Local Food Linkages Project. Available at Web site http://localfoodlinkages.wordpress.com/iointerviews (verified September 5, 2014).

Henneberry, S.R., Whitacre, B., and Agustini, H.N. 2009. An evaluation of the economic impacts of Oklahoma farmers markets. Journal of Food Distribution Research 40:64–78.

Hughes, D.W., Brown, C., Miller, S., and McConnell, T. 2008. Evaluating the economic impact of farmers' markets using an opportunity cost framework. Journal of Agricultural and Applied Economics 40:253–265.

King, R., Hand, M.S., DiGiacomo, G., Clancy, K., Gomez, M.I., Hardesty, S.D., Lev, L., and McLaughlin, E.W. 2010. Comparing the Structure, Size, and Performance of Local and Mainstream Food Supply Chains. ERS-99. U.S. Department of Agriculture, Economic Research Service, Washington, DC.

Krinke, M. 2002. Comparative Regional Economic Impacts from Agriculture: A Literature Review. Land Stewardship Project. Available at Web site http://landstewardshipproject.org/repository/1/273/litrevieweconimpacts.pdf (verified September 5, 2014).

Lambert, D.M., Wojan, T.R., and Sullivan, P. 2009. Farm business and household expenditure patterns and local communities: Evidence from a national farm survey. Review of Agricultural Economics 31:604–626.

Lawrence, J.D., Otto, S., and Meyer, S. 1997. Purchasing patterns of hog producers: Implications for rural agribusiness. Journal of Agribusiness 15:1–17.

LeRoux, M.N., Schmit, T.M., Roth, M., and Streeter, D.H. 2010. Evaluating marketing channel options for small-scale fruit and vegetable producers. Renewable Agriculture and Food Systems 25:16–23.

Lockeretz, W. 1989. Comparative local economic benefits of conventional and alternative cropping systems. American Journal of Alternative Agriculture 4:75–83.

Low, S.A. and Vogel, S. 2011. Direct and Intermediated Marketing of Local Foods in the United States. ERR-128. United States Department of Agriculture, Economic Research Service, Washington, DC.

Marousek, G. 1979. Farm size and rural communities: Some economic relationships. Southern Journal of Agricultural Economics 11:57–62.

Martinez, S., Hand, M., Da Pra, M., Pollack, S., Ralston, K., Smith, T., Vogel, S., Clark, S., Lohr, L., Low, S.A., and Newman, C. 2010. Local Food Systems: Concepts, Impacts, and Issues. ERR-97. U.S. Department of Agriculture, Economic Research Service, Washington, DC.

McManus, P., Walmsley, J., Argent, N., Baum, S., Bourke, L., Martin, J., Pritchard, B., and Sorensen, T. 2012. Rural community and rural resilience: What is important to farmers in keeping their country towns alive? Journal of Rural Studies 28:20–29.

Milestad, R., Ahnstrom, J., and Bjorklund, J. 2010. Essential multiple functions of farms in rural communities and landscapes. Renewable Agriculture and Food Systems 25:1–12.

O'Hara, J. and Pirog, R. 2013. Economic impacts of local food systems: Future research priorities. Journal of Agriculture, Food Systems, and Community Development 3:35–42.

Otto, D. and Varner, T. 2005. Consumers, Vendors, and the Economic Importance of Iowa Farmers' Markets: An Economic Impact Survey Analysis. Iowa State University, Ames, IA.

Schmit, T.M., Jablonski, B.B.R., and Mansury, Y. 2013. Impacts of local food system activities by small direct-to-consumer producers in a regional economy: A case study from upstate NY. Working Paper 13–16, Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY.

Shaffer, R., Deller, S., and Marcouiller, D. 2004. Community Economics: Linking Theory and Practice. 2nd ed. Blackwell Publishers, Ames, Iowa.

Stabler, J.C. and Olfert, R. 2009. One hundred years of evolution in the rural economy. In J.M. Porter and C. Avery (eds). Perspectives of Saskatchewan. University of Manitoba Press, Winnipeg, Canada. p. 125–147.

Swenson, D. 2010. The Economic Impact of Fruit and Vegetable Production in Southwest Iowa Considering Local and Nearby Metropolitan Markets. Leopold Center for Sustainable Agriculture, Iowa State University, Ames, IA.

Swenson, D. 2011. Measuring the Economic Impacts of Increasing Fresh Fruit and Vegetable Production in Iowa

Considering Metropolitan Demand. Leopold Center for Sustainable Agriculture, Iowa State University, Ames, IA.

Tacoli, C. 1998. Rural-urban interactions: A guide to the literature. Environment and Urbanization 10:147–166.

Tropp, D. 2008. The growing role of local food markets: Discussion. American Journal of Agricultural Economics 90:1310–1311.

U.S. Department of Agriculture (USDA). 2007. State and county profiles—New York. 2007 Census Publications. Available at Web site http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/New_York/index.asp (verified September 5, 2014).

U.S. Department of Agriculture (USDA). 2013. Factsheet: Strengthening New Market Opportunities in Local and Regional Food Systems. Newsroom. Available at Web site http://www.usda.gov/wps/portal/usda/usdahome?contentid=2013/11/0219.xml&contentidonly=true (verified September 5, 2014).

U.S. Department of Agriculture, Economic Research Service (USDA ERS). 2007. Food Environment Atlas, Data Access and Documentation Downloads. Available at Web site http://www.ers.usda.gov/data-products/food-environment-atlas/data-access-and-documentation-downloads.aspx#.VAoSZWP-Ics (verified September 5, 2014).

U.S. Department of Agriculture, Economic Research Service (USDA ERS). 2012. Documentation. ARMS Farm Financial and Crop Production Practices. Available at Web site http://www.ers.usda.gov/data-products/arms-farm-financial-and-crop-production-practices/documentation.aspx (verified September 5, 2014).