ANALYSIS OF HEALTHY FOOD INCENTIVE PROGRAMS' IMPACT ON FARMERS MARKET VENDORS IN MICHIGAN

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Contents

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Context for this Study

The 2000s gave rise to numerous motivations and initiatives for increasing food assistance beneficiaries' access to healthy food options. While conversion to an electronic benefits transfer (EBT) system nationwide was a step forward in increasing overall use of Supplemental Nutrition Assistance Program benefits (SNAP, formerly known as food stamps), this shift presented a technological barrier to the use of benefits at farmers markets (Wasserman et al., 2010). As policy interventions responded to this challenge and markets become equipped to accept EBT, the use of SNAP at farmers markets for fruits and vegetables was further incentivized through introduction of one-to-one Double Up Food Bucks coupons matching SNAP benefits. In addition to their impacts on consumers, these interventions stand to benefit farmers, farmers markets, and the rural and urban communities that conduct local food commerce.

While promoting markets for local food is often viewed as an economic development strategy (Hughes, Brown, Miller, and McConnell, 2008; Hughes and Isengildina-Massa, 2015; Jablonski, Schmit, and Kay, 2016), there are many challenges to evaluating economic impacts. For example, concerning efforts to increase SNAP redemptions at farmers markets, it is difficult to distinguish between the relative impacts of other interventions/programs with similar goals. Many interventions with similar goals may occur simultaneously or within a short period of each other, making it challenging to isolate their individual impacts (for example, an electronic benefit transfer machine that allows the market to accept SNAP benefits and an incentive program could be implemented at the same time at a market). Another consideration is that incentive programs encourage shoppers to substitute the incentives for other expenditures. Understanding these and other challenges in terms of determining impacts from efforts to increase SNAP redemptions is important in the design and implementation of policies for these purposes.

The broader project provides several important contributions and insights to the local foods literature:

- We distinguish between the effects of SNAP and Double Up Food Bucks (Double Up; DUFB), and we provide preliminary estimates of Double Up impacts on county-level direct-to-consumer sales. At the regional level of analysis we provide additional support that incentive program participants are an important market segment for farmers markets. Previous efforts to model incentive programs have not separated the impacts from specific programs and/or limited analysis to a single or small number of farmers markets (Bertmann, Ohri-Vachaspati, Buman, and Wharton, 2012; Freedman, Mattison-Faye, Alia, Guest, and Hebert, 2014; Oberholtzer, Dimitri, and Schumacher, 2012; Sadler, 2016; Young, Karpyn, Uy, Wich, and Glyn, 2011).
- We analyze and are able to isolate how selected vendor characteristics influence the vendors' perceptions of the impacts of the Double Up program.
- We found that prices at farmers markets were not perceived by SNAP recipients to be higher, which contrasts with studies that reported that prices at farmers markets are perceived to be higher relative to those of traditional grocery outlets (Hood, Martinez-Donate, and Meinen, 2012). Thus, our finding is consistent with a broader consensus in the literature that there are not systematic price differences between products at traditional retail outlets and local food markets (Valpiani, Wilde, Rogers, and Stewart, 2015). We also found that shoppers perceived the market offered them higher quality and better selection than did other venues.

A Note about Data

The study utilized data collected by Fair Food Network on SNAP and Double Up transactions occurring at participating farmers markets between 2010 and 2015, as well as data provided by the USDA Food and Nutrition Service. We also used information collected from Fair Food Network's annual surveys of vendors and consumers; see Appendix I for more information on survey methods. In the absence of available data on total sales at the individual farmer or market level, we used data from the most recent (2014) Census of Agriculture on direct-to-consumer (DTC) sales at the county level to model effects of the two programs. Our rationale and the limitations of these data are discussed in more detail in Mann et al. (in press).

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INTRODUCTION

Healthy food incentive programs like Double Up Food Bucks are intended to accomplish three key types of impacts: 1) help lower-income people buy and consume healthier food; 2) assist farmers with accessing new markets and increasing sales; and 3) increase dollars circulating in the local economy. Because evidence of these effects is not well known, this study primarily focused on exploring the influences of Supplemental Nutrition Assistance Program (SNAP) incentives like Double Up on local food market activity from the producer perspective, though this report makes some references to consumer implications. The contribution of this document is to examine how the DUFB program in Michigan has impacted Michigan farmers and vendors. In particular, this study explores the following research questions:

- How have farmers market incentive programs impacted local food market activity?
- How do results vary based on community, farmer, and/or consumer characteristics?
- What conclusions can we draw from the project to better understand local food's impact on the local economy literacy and support organizations in their capacity to track indicators of market activity?

To do this, we a) undertake a county-level analysis of direct sales in Michigan, b) use factor analysis and principle component analysis to analyze an index that reflects vendor perceptions of Double Up, and review survey responses of vendors at participating farmers markets. We provide two appendices that describe in more detail 1) the history of the Double Up program and data used in the analysis and 2) a model of vendors' perceptions of the Double Up program in farmers markets. We also provide a brief discussion of results from separate analysis of the economic impacts of Double Up on vendors' sales (Mann et al., in press).[1] Our results suggest that Double Up provides an important component of Michigan's local food economy, although more data is needed to understand the precise mechanisms of how these incentives are influencing the marketing and operational practices of local farmers and vendors.

Key Findings

We found that while the capability of farmers markets to accept SNAP benefits provided a boost to sales, offering Double Up provided an even greater boost. Thus, we can conclude that offering Double Up does not substitute for, or "crowd out," expenditures that would otherwise occur. We also found that while Double Up is accepted by more-experienced farmers at a greater percentage than is the case for beginning farmers, the beginning farmers perceive that Double Up is relatively more important. Thus, greater outreach and effort to beginning farmers to accept Double Up could be particularly critical. While our conclusions are relevant to the entire state of Michigan, we found that vendors in rural counties that are adjacent to metropolitan counties perceived the greatest value in Double Up relative to vendors in other counties. The remainder of the document provides details about how we arrived at our conclusions.

1 For more information about this upcoming journal article or to request a copy, please contact corresponding author John Mann at mannjoh3@anr.msu.edu

ANALYSIS OF FINDINGS

How have farmers market incentive programs impacted local food market activity?

Absent precise data on total vendor or market sales, we employed multiple methods to estimate the potential effects of farmers market incentive programs. Our primary model analyzed the impacts of Double Up on county-level direct-to-consumer (DTC) sales. We also considered both vendor and consumer perspectives.

There are several important findings from the results reported in Mann et al. (in press),[2] which 1) distinguish between the impacts of Double Up and SNAP on DTC sales (our proxy for farmers markets sales) and 2) provide a preliminary per-dollar estimate of the impact of Double Up on DTC sales.

Double Up and SNAP provide distinct, positive influences on direct sales.

When modeling the effects of Double Up + SNAP and SNAP alone in a county versus counties in which no farmers markets accepted SNAP in 2012, we found that each program positively influences direct sales. Further, the magnitude of the impacts on DTC sales from counties with farmers markets participating in the Double Up program are at least 1.5 times the size of counties with farmers markets that participate only in the SNAP program. Thus, these impacts imply that offering Double Up provides an additional increase in sales and does not merely substitute for SNAP spending that would otherwise have occurred.

Farmers market incentives like Double Up appear to increase market sales by more than the total of the matched transactions.

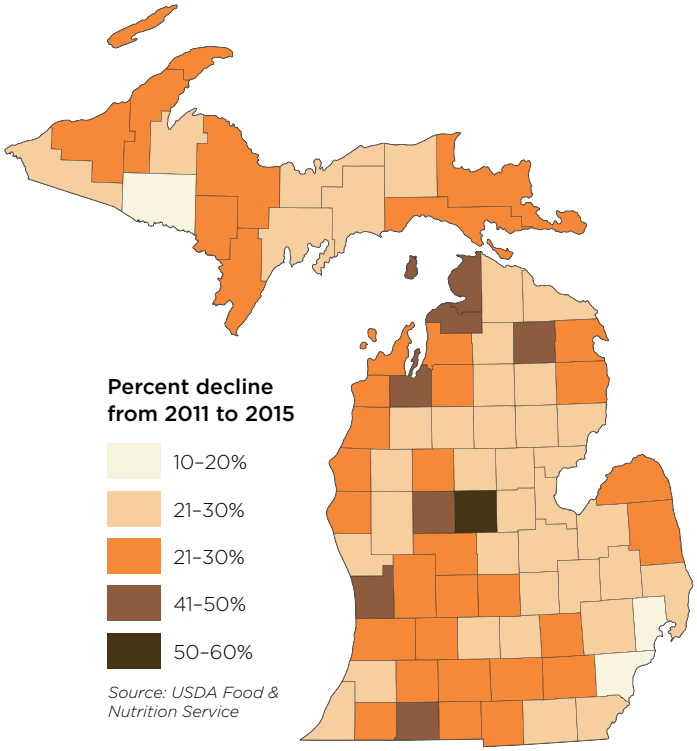
We found preliminary evidence that SNAP/Double Up customers are making purchases at farmers markets that exceed the size of their Double Up benefit. While further analysis is needed to identify the specific reasons for this behavior, this phenomenon suggests that participants in the Double Up program may be spending money from other sources (e.g., additional SNAP, cash, other incentive programs) to purchase local foods.

Food assistance beneficiaries—SNAP shoppers—represent a new customer base for farmers markets, and those shoppers impact participating farmers' bottom line.

With the recovery from the Great Recession, SNAP enrollment and spending in Michigan has declined, but the percentage of SNAP dollars spent at farmers markets has increased. Between 2011 and 2015, Michigan farmers markets that accepted both SNAP and Double Up increased their respective share of SNAP redemptions by 64.4 percent. According to Fair Food Network transaction data, this translated to an approximately $240,000 increase in farmers market sales through SNAP and Double Up redemptions at farmers markets statewide, from $1.11 million in 2011 to $1.35 million in 2015. See Figure 1 and "A Closer Look: Trends in SNAP" for additional context on this finding.

2 Additional detail on methods and interpretation of results can be found in our forthcoming journal article. For more information or to request a copy, please contact corresponding author John Mann at mannjoh3@anr.msu.edu

Figure 1. Percent Decline in SNAP Dollars Issued in Michigan between 2011 and 2015



A CLOSER LOOK: TRENDS IN SNAP

At the national level, the SNAP program issuances have recently declined after a nearly three-fold increase between 2004 and 2011 (Food and Nutrition Service [FNS], 2016). While the biggest year-to-year jump was from 2009 to 2010 (due in part to the 2009 American Recovery and Reinvestment Act), total SNAP expenditures in the U.S. declined from $79.9 billion in FY 2013 to $70.1 billion in FY 2016 (Dean and Rosenbaum, 2013; FNS, 2016). This is also reflected in Michigan, where SNAP redemptions declined about 24 percent between 2011 and 2015, which is a statewide reduction of about $700 million. Figure 1 shows the county-level changes from 2011 to 2015, which range in reductions from about 10 percent to just over 50 percent.

Despite the decline, in 2016, SNAP benefits totaling $20.2 million were redeemed at farmers markets nationally, with 6,996 farmers markets and direct marketing farmers authorized as SNAP retailers (FNS, 2016). Michigan accounts for about 5 percent of these authorized farmers markets/ direct marketing farmers, and ranks third in the total number of farmers markets accepting SNAP.

How do results vary based on farmer, community, and/or consumer characteristics?

What do we know about farmers surveyed?

Responses to selected questions for the 2015 vendor survey are provided in Tables 1, 2 and 3, where we distinguish between several operational characteristics, including whether the vendor meets the USDA definition for a beginning farmer (farming less than 10 years).[3] Operational characteristics break down similarly for both beginning and more seasoned farmers with a few exceptions:

- As one would expect, respondents who have been farming less than 10 years are much newer to the farmers markets surveyed. While fewer than one-third had been operating as a vendor at the particular farmers market for 5 or more years, over three-quarters of respondents farming 10 or more years had been operating as a vendor at the same locations. Thus, respondents farming for 10 or more years are much more familiar with the farmers market scene, and this may be reflected in participation in other activities such as benefit programs.
- There are some differences between newer and more seasoned vendors/farmers in the context of primary goods sold. While more experienced vendors are more likely to sell fruits and vegetables, newer vendors are more likely to sell prepared foods and other goods.
- More seasoned vendors/farmers appear to participate more often in different benefits programs, with SNAP at the highest rate, followed by Double Up Food Bucks.
- Less seasoned vendors/farmers have a higher percentage of sales coming from farmers markets.

Table 1. Selected Vendor Characteristics, 2015 Survey

SURVEY ITEM	PERCENT	
	< 10 YRS. (*N* = 90)	10+ YRS. (*N* = 262)
Years at farmers market		
First Year	20.0%	5.3%
1–2 years	24.4%	5.3%
2–3 years	27.8%	11.8%
5 or more years	27.8%	77.5%
Primary sell		
Fruits and vegetables	54.7%	62.5%
Meats	2.8%	4.7%
Dairy	2.8%	0.9%
Grains, flour, seeds, nuts	1.9%	1.5%
Prepared foods	7.5%	2.9%
Non-food products	5.7%	4.7%
Jam, relish, honey	7.5%	11.3%
Other	17.0%	11.6%
Program participation		
SNAP/EBT/Bridge Card	80.0%	87.7%
Double Up Food Bucks	70.0%	80.9%
WIC Project Fresh	55.6%	73.7%
Market Fresh (for seniors)	57.8%	77.5%

SURVEY ITEM	PERCENT	
	< 10 YRS. (*N* = 90)	10+ YRS. (*N* = 262)
Percentage of sales at farmers market		
Less than 25%	12.7%	14.5%
25–50%	13.9%	27.1%
51–75%	17.7%	16.3%
More than 75%	55.7%	42.1%
Race/Ethnicity		
White	90.8%	95.7%
Hispanic, Latino/a, or Spanish origin	0.6%	1.3%
Black or African American	3.4%	0.4%
Asian	0.0%	0.8%
American Indian or Alaska Native	2.3%	1.6%
Other Pacific Islander	0.0%	0.0%
Native Hawaiian	0.0%	0.0%
Other	3.4%	1.6%

3 Note that not all respondents to the vendor survey provided an answer to the question about length of time in farming. For simplicity, the roughly 110 additional vendors that did not answer that question are excluded from the summary here.

What do farmer responses suggest about economic influences of Double Up?

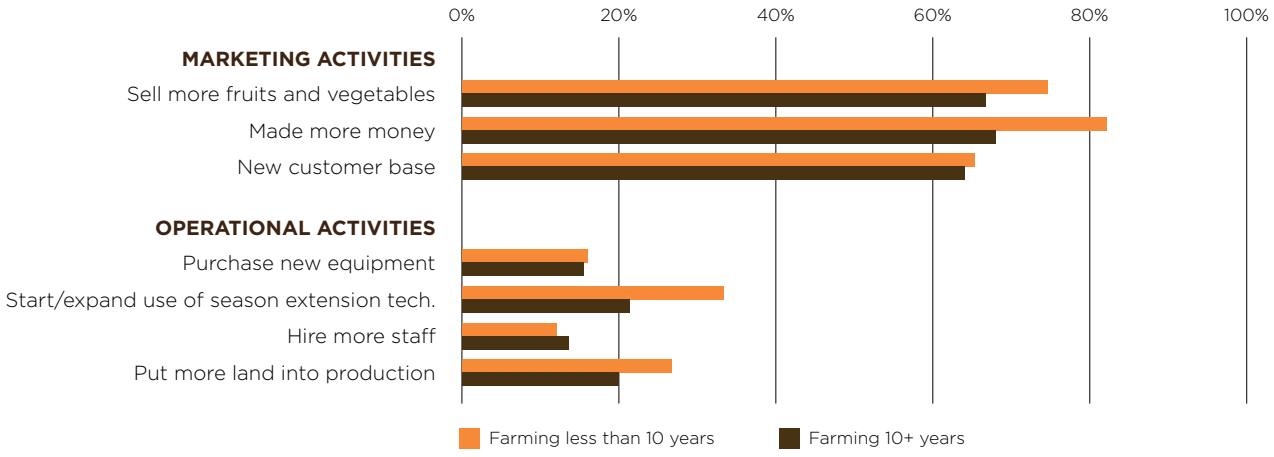
Farmers market vendors perceive economic benefits from Double Up participation. As noted earlier, we are limited in our access to precise, objective information on vendor sales. However, we can analyze how vendors' perception of participation in Double Up may have influenced their business practices, as summarized in Table 2 and Figure 2. For these, the percentages displayed in the table reflect those who selected "agree" or "strongly agree" (positive response) to the questions.

Table 2. Marketing and Operation Activities, 2015 Vendor Survey

SURVEY ITEM	PERCENT < 10 YRS.		PERCENT 10+ YRS.	
	DUFB=NO (*N* = 27)	DUFB=YES (*N* = 63)	DUFB=NO (*N* = 50)	DUFB=YES (*N* = 212)
Marketing Activities				
Sell more fruits and vegetables	8.0%	73.0%	7.4%	65.1%
Made more money	14.0%	82.5%	14.8%	66.5%
New customer base	20.0%	65.1%	29.6%	64.6%
Operational Activities				
Purchase new equipment	8.0%	15.9%	7.4%	15.1%
Start/expand use of season extension	8.0%	33.3%	3.7%	21.2%
Hire more staff	4.0%	11.1%	0.0%	13.7%
Put more land into production	10.0%	28.6%	7.4%	20.3%

"DUFB=No" indicates that respondent did not participate in the DUFB program.
"DUFB=Yes" indicates that respondent participated in the DUFB program;

Figure 2. 2015 Vendor Perceptions of Double Up Influence on Activities



Overall, a majority of participating farmers credited the program with increased income, a new customer base, and increased fruit and vegetable sales. Others thought they were likely to hire more staff and/or put more land into production as a result of participation. We found that beginning vendors—vendors newer to farmers markets relative to more seasoned vendors at the farmers markets—appear to have the perception that they made more money in 2015 due to the Double Up program (82.5 percent for newer vendors compared to 66.5 percent for more seasoned vendors) and are more likely to (or already had) expand(ed) seasonal production or put more land into production relative to seasoned vendors (33.3 percent for newer vendors compared to 21.2 percent for more seasoned vendors), while more seasoned vendors/farmers indicate they are more likely to (or already had) hire(d) more staff as a result of Double Up (13.7 percent for more seasoned vendors compared to 11.1 percent for newer vendors).

The 2014 vendor survey also yielded our best available information regarding annual farm sales and estimated farmers market earnings, though these cannot be separated by the definition of beginning farmers and seasoned farmers. About two-thirds of respondents in 2014 reported that they expected to make less than $50,000 in farm sales and less than $28,000 at farmers markets (Table 3). One interesting finding of the 2014 survey not shown in the tables is the inverse relationship between vendors/farmers sales and the percentages of sales received at farmers markets. In other words, smaller producers (based on annual expected farm sales) reported receiving a higher share of their total farm sales at farmers markets than did larger producers.

Double Up is impacting small and beginning farm businesses. The vast majority of farms participating in Double Up are small; about two-thirds reported less than $50,000 in total annual sales and of those, just over half reported annual sales of less than $25,000. And beginning farmers, who report generating the vast majority of their sales from farmers markets, tended to have higher perceptions that Double Up had increased their ability to make more money.

We incorporated vendors' survey responses as well as additional data on vendor, market, and regional characteristics into a model we call the Vendor Double Up Impact Index. The technical details of how we compiled this index, including the table of results, appear in Appendix 2. In short, the index is an aggregated metric (using statistical tools—factor analysis and principle component analysis) of the related elements of multiple responses to similar questions—for example, the influence of DUFB on a range of marketing and operational activities—expressed as a single value. This metric, then, can be used as a gauge and statistically tested in terms of vendor and other relevant characteristics that may influence the broader perception of DUFB on these activities. From this model, we found that 1) respondents farming less than 10 years (compared to those farming 10 or more years) and 2) earning 75 percent or more of sales from farmers markets (compared to those earning less than 75 percent of sales from farmers markets) have more positive perceptions of the Double Up program, perceiving greater benefits to their marketing activities and operational decisions based on the Double Up program than do seasoned vendors/farmers and larger producers.

Market characteristics influence vendors' perceptions of Double Up. Our Vendor Double Up Impact Index results also suggest that incremental increases in Double Up redeemed at a farmers market, on average, also increase vendor perceptions of the program. Broadly speaking, the amount of Double Up benefits issued appears to positively influence the perception that vendors/farmers have of the program in terms of impacts on their marketing

Table 3. Selected Vendor Characteristics, 2014 Survey

SURVEY ITEM	PERCENT (*N* = 576)
Estimated annual farm sales	
Less than $25,000	37.8%
$25,000–$49,999	26.8%
$50,000–$99,999	20.4%
$100,000 or More	13.3%
Estimated annual farmers market earnings	
Less than $14,000	37.8%
$14,000–$27,999	28.6%
$28,000–$35,999	20.4%
$36,000 or more	13.3%

activities and operational decisions. Additionally, our analysis of the Vendor Double Up Impact Index revealed that vendors in rural counties that are adjacent to metro areas perceive the highest benefit from the Double Up program, compared both to vendors in remote rural counties and those in metro counties. See Table 5 in Appendix II for statistical information that informed these comments.

What about consumer perceptions?

Though impacts on farmers and markets are of most interest for this study, it is still useful to consider some information about consumer perceptions, as doing so helps to reinforce earlier assumptions and observations.

Table 4 summarizes selected responses to the 2015 survey of benefit program recipients. The surveys were administered by market managers at the point of sale (i.e., where Double Up was issued) to 435 SNAP shoppers at 45 farmers markets during August and September of that year. Key points to note include the following:

- About two-thirds of respondents reported that the prices at the farmers markets were less than or about the same as what they paid at other markets, such as conventional grocers. At the same time, the majority reported that the quality and selection of produce was much better than what they found at other markets.
- The majority of respondents (two-thirds) reported driving their own car to the farmers market, and nearly 90 percent drove 20 minutes or less to get there. This implies that at least some, if not many, of the benefits program recipients are likely shopping at farmers markets within their respective counties.

Table 4. Selected Benefits Program Recipients' Perceptions, 2015 Customer Survey

DUFB consumer price perception	
Much less expensive	14.7%
Slightly less expensive	20.2%
About the same	31.2%
Slightly more expensive	18.8%
Much more expensive	4.6%
Not sure	3.7%
Consumer method of transportation	
I drove my own car	66.3%
I rode with a friend or family member	13.8%
I took the bus	4.1%
I took the taxi	0.2%
I walked or rode a bicycle	14.0%
Other	0.5%
Consumer travel time	
Less than 10 minutes	52.5%
10–20 minutes	34.9%
21–30 minutes	7.6%
More than 30 minutes	3.4%

Selection relative to where usually purchased	
Much worse	0.0%
Slightly worse	2.5%
About the same	15.6"
Slightly better	12.6%
Much better	60.8%
Not sure	2.5%
Quality relative to where usually purchased	
Much worse	0.0%
Slightly worse	0.9%
About the same	10.3%
Slightly better	9.9%
Much better	70.0%
Not sure	1.8%

N=435

CONCLUSIONS AND RECOMMENDATIONS

What conclusions can we draw from the project about the influences of healthy food incentives on farmers markets and their vendors? In addition, how do learnings support organizations in their capacity to track economic and other indicators of market activity?

This research is an initial step in evaluating the impacts of these programs on farmers and markets, and our findings point to important considerations and future research opportunities.

Implications of Results

This study breaks new ground in measuring the estimated potential economic influences of SNAP incentives on farmers and markets. It is the first to use USDA Census of Agriculture county-level direct-to-consumer (DTC) sales data as a proxy for market sales to isolate the effects of SNAP authorization and the presence of SNAP incentive programs on farmer sales. And while other studies have evaluated overall economic implications of the SNAP program, including those for the agricultural industry overall, our focus on farmers market spending of SNAP incentives helps to quantify the programs' influences on local and regional food systems.

Evidence indicates that farmers markets would be negatively impacted if SNAP incentives ceased to exist, but additional research is needed to evaluate shopping patterns of SNAP/incentive recipients at farmers markets. Building on the basic evidence that SNAP and Double Up are being utilized at farmers markets, our model finds that accepting Double Up yields an economic benefit to markets that is distinct from simply accepting SNAP, and that at least some Double Up shoppers are spending above and beyond their matched SNAP benefits. The latter is worth testing both with a larger sample and with further investigation into the source of those dollars. A broader question to consider is this: Now that SNAP customers have begun patronizing farmers markets, how would their shopping behavior change if the incentives go away?

SNAP incentives may be relatively more important to beginning farmers. Prior research by the USDA Economic Research Service (Low et al., 2015) found that beginning farmers with DTC sales were more likely to continue farming over time, and more than half of beginning farmers surveyed by Fair Food Network in 2015 reported generating at least 75 percent of their sales from farmers markets. While beginning farmers were less likely than those farming 10 years or more to accept incentive programs, those that did participate in Double Up had high positive perceptions that the program had increased their ability to make more money. Targeted outreach to beginning farmers about the potential economic implications of accepting SNAP incentives may prove to be a win-win for connecting these new producers and new markets.

Replicating this approach with 2017 Census of Agriculture data should yield additional conclusions. While there are limitations in the use of DTC sales as a proxy, one advantage is the public availability of such data. In 2012, 27 Michigan counties had a farmers market that accepted Double Up, but by 2016, that number—and, thus, the sample size—nearly doubled. Accounting for significant changes in SNAP funding since 2013 will also be possible.

Many of the components of farmers markets sales remain unmeasured. For instance, an increase in farmers market activity from Double Up could be attributable to numerous factors, some of which occur simultaneously and therefore do not lend themselves to being individually isolated. For example, consumers could be making additional payments beyond available Double Up incentive benefits when they go to the market. This could perhaps explain the discrepancy that occurred when

our empirical model suggested that there was a high association between higher incentive levels and market performance, but the importance of Double Up to vendors in the vendor-level survey was, to a degree, attenuated (positive perception on making more money ranged from 66.5 percent among more seasoned farmers to 82.5 percent among less seasoned farmers). Conceivably, farmers participating in the Double Up program may also perceive fewer year-to-year increases in benefits the longer they participate, as annual increases in benefits would be marginal after the first few years of participation. This may explain the difference in perception between more seasoned and less seasoned farmers. It is also possible that farmers are using the benefits to invest and increase market activity. Thus, there are many unexplored dynamics that will pose interesting and important future research questions.

Engaging market managers and vendors in data collection efforts is a priority. Without context and outreach, data collection imposed on farmers market managers and vendors can seem to them a distraction from undertaking more important activities. More collaborative efforts are needed with managers and vendors so that they can see how greater data collection efforts benefit the performance of the sector. Along those lines, new resources employed by the Michigan Farmers Market Association, the U.S. Department of Agriculture's Agricultural Marketing Service (AMS), and others can ensure that there is clear purpose and consensus among stakeholders in undertaking data collection efforts before such activity commences.

More on Data Collection

USDA's AMS toolkit titled *The Economics of Local Food Systems*[4] includes a module on primary data collection for economic impact assessments, which is an excellent overview or refresher for general audiences. We underscore its recommendation for practitioners to consult with an economist or similar analyst early in the design of research and evaluation strategies for incentive programs.
These initial conversations should lay out questions the parties are hoping to answer, explore the realities faced by those generating or providing the necessary data, and consider the most appropriate collection methods and instruments. While precise data on farmer or market sales may still prove difficult to capture, the use of more narrow sales ranges as response options or the institution of other changes in question formats could yield data that enables rigorous economic analysis of interventions. Additionally, early consultation with an analyst can help minimize the use of leading questions that unintentionally influence responses and thus discount the weight of resulting conclusions. At the same time, significant thought should also be given to the use of consistent metrics wherever possible to elucidate time series data.

As part of our outreach about this study, we partnered with the Michigan Farmers Market Association and the Michigan Good Food Charter Shared Measurement Project in hosting a webinar on farmers market data collection. This webinar, held on September 11, 2017, drew a national audience and highlighted efforts to change the culture around farmers market data collection in Michigan. Key topics of discussion for the webinar, and going forward, include:

- National and/or state resources available concerning data collection metrics, format, and tools, such as those developed by the Michigan Farmers Market Association (mifma.org/reports) and the Farmers Market Coalition (farmersmarketcoalition.org/programs/farmers-market-metrics).
- Strategies to motivate farmers and vendors to report sales, including incentives and strategic communication about data. For example, SNAP sales at farmers markets are a small percentage of total SNAP redemptions, but describing their impacts on low-income shoppers and small businesses still resonates with government leaders.
- Funding for data collection and opportunities to leverage what others have developed.

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APPENDICES

Appendix I: More on Double Up Food Bucks and Data

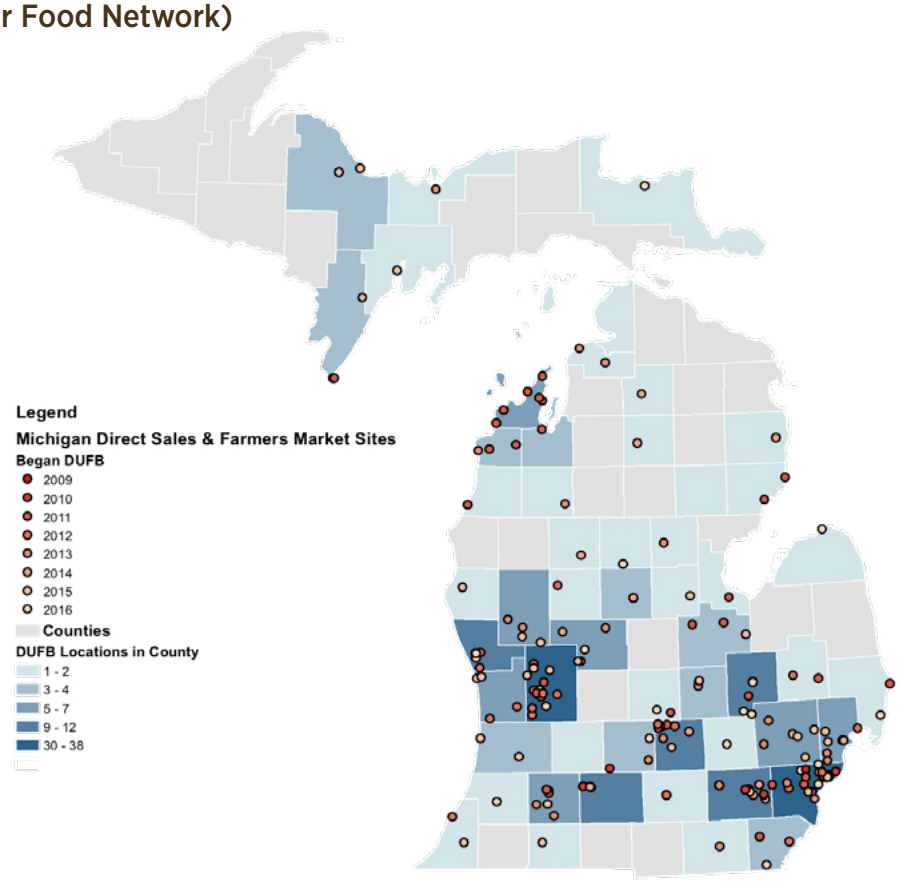
History of Double Up Food Bucks

Double Up Food Bucks is a healthy food access incentive program coordinated by Fair Food Network (FFN), a national nonprofit organization based in Ann Arbor, Michigan. In Michigan, Double Up matches the value of federal SNAP benefits spent at farmers markets and at grocery stores for Michigan-grown fresh fruits and vegetables on a 1:1 basis up to $20 per day. The incentive program previously had operated seasonally from June through October, but began piloting extended and year-round programs in markets in 2015.

In 2007, before Double Up began, less than $16,000 worth of SNAP benefits were redeemed at Michigan farmers markets. In 2016, combined SNAP and Double Up distribution at Michigan markets exceeded $1.6 million, and Double Up was used by customers to purchase fruits and vegetables more than 600,000 times between 2010 and 2016. Today, 90 percent of Michigan residents live in a county with a Double Up site (see Figure 3). The program is now operating in 200 outlets statewide in Michigan in diverse retail outlets including 150+ farmers markets, farm stands, and 50+ full-service retail grocery stores, and it works in all types of communities—rural and urban, large and small. It has also expanded to 20 additional states.

Double Up Food Bucks started as a small pilot in Detroit and is now a national model for healthy food incentives, helping people bring home more

Figure 3. Michigan Direct Sales and Farmers Market Double Up Sites as of 2016 (Source: Fair Food Network)



healthy fruits and vegetables while supporting local farmers. Double Up helped inspire and secure bipartisan support for $100 million in incentives grants in the 2014 Farm Bill when USDA initiated the Food Insecurity Nutrition Incentive Grant Program.

Survey Data

This report includes discussion of Fair Food Network's survey data. Vendor surveys were collected for 2011, 2012, 2014, and 2015. However, the questionnaires varied from year to year in terms of the types of questions asked and in the way categories were aggregated. To minimize the influence of changes in the survey instruments, we restricted our analysis to the two most recent survey years (2014 and 2015) and focused on the questions (variables) that were consistent in these two years. The following provides more technical information about the 2014 and 2015 Michigan Farmers Markets vendor surveys and 2015 Michigan Farmers Markets consumer survey. Michigan Farmers Markets Double Up transaction data are discussed in Mann et al. (in press). All details are provided by Fair Food Network (FFN).

2014 Vendor Survey

Self-reported paper-and-pencil surveys were administered by market managers or staff/volunteers both to Double Up eligible and non–Double Up eligible vendors during market hours of operation. Market managers disseminated the paper survey both to Double Up eligible and non–Double Up eligible vendors in the marketplace during market hours of operation. A small number of vendors completed an online version of the same survey. Sixty-six markets returned a total of 576 completed surveys directly to FFN for data cleaning and analysis.

2015 Vendor and Consumer Surveys

FFN distributed the vendor survey to market managers through the Michigan Farmers Market Association (MIFMA) leadership. Market managers administered the paper-and-pencil surveys on-site at their markets during market hours of operation. Survey administration took place in August to September of 2015. The vendor survey was available to all vendors, whether or not they participated in Double Up. For the consumer surveys, market managers administered the survey in paper-and-pencil format to consumers at the point of sale to customers using their SNAP benefits to shop at participating Double Up markets in August to September of 2015. Completed vendor and consumer surveys were returned to the MIFMA office in postage-prepaid envelopes, and were sent to the Gretchen Swanson Center for Nutrition in bulk in December 2015. In total, 465 vendor surveys were collected from 52 farmers markets, and 435 consumer surveys were collected from 45 farmers markets.[5]

Appendix II: Modeling Double Up Impacts

Vendor Index

Analysis of selected survey questions regarding vendor perceptions of Double Up impacts on their marketing efforts and operational decisions is developed here. We used factor analysis (FA) and principle component analysis (PCA) to construct a Vendor Double Up Impact Index. The index is an aggregated measure of the seven Likert scale questions regarding marketing activities and operational decisions and is based on perceptions of Double Up program impacts on these activities. The index provides an aggregate metric of vendor perception encompassing multiple factors, including the amount of Double Up Bucks issued, selected vendor characteristics, and regional controls.

The motivation for constructing an index is to develop a single metric of vendor perceptions across multiple dimensions while also controlling for multicollinearity. Additionally, focusing on a single metric simplifies the analysis of the perception questions. The intuition of the index is as follows. Each of the seven Likert scale questions relates vendor perception of the Double Up program to vendors' marketing activities or operational decision. We used both FA and PCA procedures to extract the related parts of each question into a series of factors or dimensions (for examples of FA and PCA methods used to construct indices see Mann and Shideler [2015]). This resulted in two similar indices, one constructed using the

5 Contact Fair Food Network for a copy of the survey tools used (info@fairfoodnetwork.org).

FA method and one constructed using the PCA method. The resulting output from each procedure (which can be transformed into weight vectors) can be reduced to a single column of values by selecting the relevant dimension of interest. For example, there are seven questions of interest, and each of the questions can be categorized either as a marketing activity or an operational decision. However, within each category the perceived impact of the Double Up program is reflected by the survey respondent. When the FA and PCA procedures are applied to the number of questions (seven), the output results in a single dimension that reflects the overall perception of the Double Up program.

In the second step of this analysis, the Vendor Double Up Impact Index is used as the dependent variable in a regression model, and the amount of Double Up Food Bucks issued as well as selected vendor characteristics and regional controls are included as independent variables. The resulting model is as follows:

$$Ii,k,t=Xi,k,t\beta+\varepsilon i,k,t$$

where Ii,k,t is the Vendor Double Up Impact Index value of vendor k in county i for time t, Xi,k,t is a vector of explanatory variables, β are vectors of the respective parameters to be estimated, and $\varepsilon i,k,t \sim N[0,1]$ is the error term. The primary hypothesis tested here is whether the amount of Double Up Bucks issued had a positive impact on the Vendor Double Up Impact Index; i.e., vendor perceptions of program impacts on their marketing activities and operational decisions.

Regression results of the Vendor Double Up Impact Index model are presented in Table 5. While the amount of variation captured by each aggregation technique is greater than 45 percent, model pre-testing (results not presented here) demonstrated that the indices performed better as dependent variables in the regression models rather than by adding the seven individual variables independently in the equation. With the exception of the intercept and indicator for a farmers market in a rural remote county, all other model parameter estimates are positive and statistically significant, and the results can be interpreted as follows. The index scores scale is 0 to 100, with 100 being the highest and 0 being the lowest. The Double Up (scaled per $1,000) value and per capita personal income are continuous variables. All other variables are included as indicator variables.

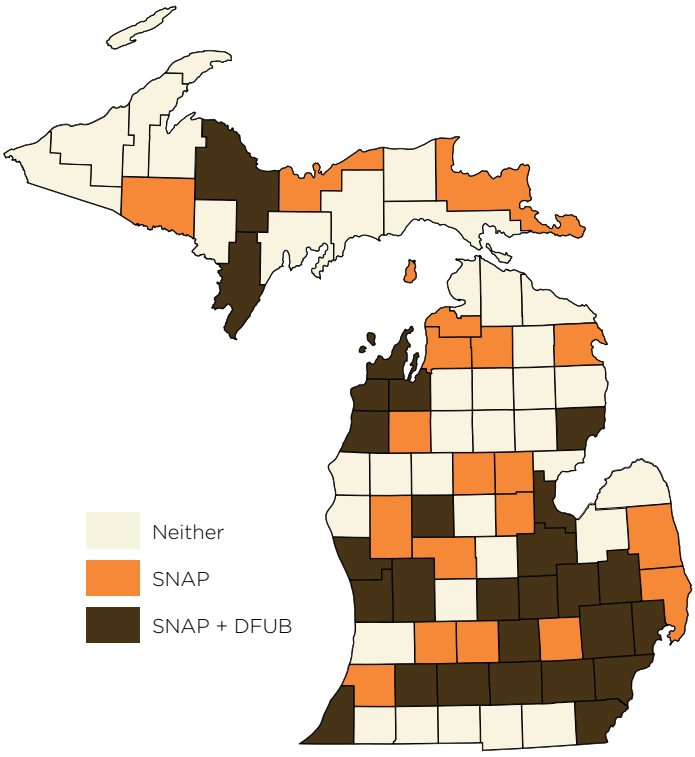
Table 5. Vendor DUFB Impact Index Model

VARIABLE	FA INDEX		PCA INDEX	
	ESTIMATE	P-VALUE	ESTIMATE	P-VALUE
Intercept	6.7799	0.2277	5.9571	0.2944
Farming less than 10 yrs.	8.3909	0.0152	8.2188	0.0160
Percent sales 75% or more	7.1374	0.0001	6.8020	0.0001
DUFB issued ($1,000)	0.2305	0.0001	0.2233	0.0001
Indicator for 2015	5.2030	0.0048	4.2415	0.0210
Rural adj. to metro county	7.3876	0.0266	7.1481	0.0273
Rural remote county	1.5692	0.445	2.0108	0.3264
Per capita personal income	0.0002	0.0737	0.0002	0.0619
Number observations	995		995	
R-squared	0.073		0.066	
AIC	9330		9331	

Transaction Data

In Mann et al. (in press), we examined the impact of Double Up on vendor sales at Michigan farmers markets. Based on data constraints, we focused on the year 2014 and combined direct-to-consumer sales (DTC) data from the USDA Census of Agriculture with the FFN SNAP and Double Up transaction data as well as a few other secondary data sets. Our primary model separated Michigan counties into one of three categories (see Figure 4), and our research questions considered the separate impacts of counties with: 1) at least one farmers market participating in the Double Up program; 2) at least one farmers market participating in SNAP only; and 3) counties with farmers markets with neither program.

Figure 4. Michigan County Participation in SNAP and Double Up Programs, 2012



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