Assessing the Economic Impacts of Regional Food Hubs: the Case of Regional Access

Todd M. Schmit, Cornell University
Becca B.R. Jablonski, Cornell University
David Kay, Cornell University

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Author Contact: Todd M. Schmit, tms1@cornell.edu, 607-255-3015
USDA Contact: James Barham, james.barham@ams.usda.gov, 202-690-4077

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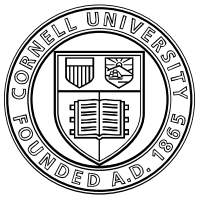

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In the past five years, there has been a proliferation in the number and recognition of 'food hubs' across the United States, as well as a substantial increase in foundation and public funding to support their development. In addition to generating economic value within a local economy, funders and policy makers are also acutely attentive to the impact of food hubs on local agricultural producers. While there is a substantial and growing literature that examines food hub activities, there have been few comprehensive, data-driven economic impact assessments completed to date. To adequately address this issue and to provide a replicable framework for similar studies, a best-practice methodology is needed to rigorously evaluate the economic contributions of food hubs on their local economies and the participating farms they support.

Furthermore, a better understanding of food hub activities is needed to evaluate the extent to which food hubs increase the overall demand for and consumption of local food products. Additionally, whether there is demand from customers to expand the availability of food hub products and services in light of opportunities to purchase products from traditional food distributors.

What Did the Study Find?
The study developed a replicable empirical framework to conduct impact assessments for food hub organizations. By collecting detailed expenditure and sales information from food hubs, an economic impact assessment was conducted to estimate the multiplier effects of a change in final demand for food hub products. By using data from the farms supplying products to the hub, we provide more accurate assessments than that available using secondary data.

Our particular application considered Regional Access (RA), a food hub operating in upstate New York that purchases and markets food products from farms and agribusinesses primarily in New York State (NYS). Importantly, we demonstrate that the farms selling to the food hub have differential production functions than those constructed using an aggregate NYS farm sector with available secondary data. From a comparative modeling exercise, we show that the estimated multiplier effects to the farm sector are nearly 8% lower when using the default data and, overall, result in a total output multiplier that is biased downward by 4%. To the extent that the goal of a stimulus to the food hub sector is to support rural economies, capturing more accurate inter-industry linkages of farms that work with food hubs is important.

Results from the model incorporating food hub-farm specific data show a gross output multiplier of 1.82, indicating that for every additional dollar of final demand for food hub products (and no opportunity cost), an additional $0.82 is generated in related industrial sectors. However, using customer data, we estimate that for every $1 increase in final demand for food hub products, a $0.11 net offset in purchases from other sectors occur. In other words, the purchase of the food hub's products resulted in decreased demand for other wholesale products. After applying the additive negative shock, the net output multiplier is 1.63, reducing the gross multiplier by over 10%. Future impact assessments on food hubs should importantly consider opportunity costs.

Food hubs support the expanded availability of local farm products. Information collected from farm vendors reveal that the case study food hub positively contributed to farm business expansion, particularly from the availability of freight and storage services, and access to new (largely urban) wholesale customers. Sales facilitation for medium-scale operations was particularly important. Finally, customer survey results provide evidence that there are opportunities for expansion within the food hub sector, primarily through improved logistics (e.g., lower minimum order sizes and increased frequency of deliveries) and expanded product offerings. Based on our findings, policies resulting in increased final demand for food hub products will have a positive community economic impact (even when opportunity costs are considered).

How Was the Study Conducted?

Using an input-output/social accounting matrix approach, we develop a data-driven empirical framework applicable to a variety of food hub structures. In particular, we model the food hub sector via how its revenues (resulting from an assumed change in final demand) are allocated to its component expenditures. Conceptually, the component expenditures represent the first round of indirect inter-industry purchases and payments to value added made by the food hub that trigger additional indirect and induced effects. The initial change in final demand modeled for food hub products represents the direct effect and combining this with the estimated indirect and induced effects determines the total effect.

Two alternative impact assessment models are constructed–one that incorporates additional data collected from farms selling to the food hub and one that does not. Through this approach, we are able to better understand the extent to which additional data collection from farms selling to food hubs is necessary to conduct an accurate evaluation.

Using survey data from food hub customers, we analyze the extent to which food hub purchases represent increased demand for local goods and services, or if they instead substitute purchases from one local source for another. We also collect information related to scenarios in which customers would purchase additional products from food hubs, thus providing information on the potential scalability of the food hub sector. The information collected from purchasers of food hub goods and services allows us to ascertain the direct value of food hub purchases, offsets in purchases from other sectors, and the potential for growing overall local food product demand.

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1.0 INTRODUCTION

In the past five years, there has been a proliferation in the number and recognition of 'food hubs' across the United States, as well as a substantial increase in foundation and public funding to support their development. Following the U.S. Department of Agriculture's (USDA) working definition, a food hub is a "business or organization that actively manages the aggregation, distribution, and marketing of source-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand" (Barham et al. 2012, 4). Though there is a substantial and growing literature that examines food hub activities, there have been no comprehensive, data-driven economic impact assessments completed to date (e.g., Barham 2011; Barham et al. 2011; Clancy & Ruhf 2010; Conner et al. 2011; Day-Farnsworth et al. 2009; Diamond & Barham 2011; Farm Credit Council and Farm Credit East 2013; Jablonski et al. 2011; Karp et al. 2010; Matson et al. 2011; Rozyne 2009; Schmidt & Kolodinsky 2011; Slama et al. 2010).

Food hubs generate economic activity through their purchases in a regional economy. But like any other business, they will only make purchases themselves if they are able to sell their products. Food hubs may sell some of their goods and services directly to local consumers. However, most often they sell to other businesses, like retailers or restaurants, which may be local or not. These businesses will only buy from the food hubs if they too have or anticipate demand for their products. Ultimately, then, food hubs depend on consumers and other end users to buy their products. This ultimate end user is known as 'final demand'. In general, an enormous amount of economic activity is associated with business-to-business sales. However, without final demand as the ultimate driver of economic activity, local businesses have no reason to incur transactions with each other.

Given, then, that final demand exists or can be anticipated for its products, a food hub will only be able to supply its customers if it spends revenues on the multiple goods and services it buys from farmers, truck drivers, utilities, insurers and many others. These purchases stimulate additional economic activity in these other businesses and industries, and they in turn stimulate the industries which are their suppliers. These purchase linkages comprise the primary mechanism through which food hubs, and all other businesses, transmit and stimulate economic activity in sectors of the economy aside from their own.

Economic impact assessments model and measure the economic activity associated with this kind of chain of effect of linked purchases. A final demand driven change for goods and services provided by food hubs results in changed production levels throughout the entire economy, an effect summarized quantitatively through a number called a multiplier. The multiplier of any industry is larger when linkages are greater within a local economy and there is less leakage (i.e., purchases made outside of the local economy, thereby 'leaking' dollars). In other words, the size of the multiplier is positively correlated with the degree to which additional purchases are local, or the extent to which local consumers and businesses trade with each other.

In addition to generating economic value within a local economy, funders and policy makers are acutely attentive to the impact of food hubs on local agricultural producers. Indeed, a primary focus of most food hubs is to increase the economic viability of their local farm suppliers, often with an emphasis on small and mid-scale farms for which access to wholesale and retail market channels is more limited (Barham et al. 2012).

The primary objective of this report is to promote the utilization of a best-practice methodology to evaluate the economic contributions of food hubs on their local economies and the participating farms they support. This is accomplished by developing a data-driven empirical framework applicable to a variety of food hub structures. Included in this framework is a discussion of the data requirements for such an approach and a recommended methodology for collecting such data. As the USDA distinguishes a food hub from other traditional food aggregators or distributors in part based on the fact that they purchase products "primarily from local and regional producers," the differential expenditure patterns can be modeled to determine the relative effects on the regional economy, including the impact on local agricultural sectors.

The framework developed is applied to a case study analysis of a food hub located in Upstate New York. Though there are limitations of generalizing the results of an individual case study to other food hubs, in contexts where food hubs exhibit similar purchasing patterns as in our case, one may be able to utilize the adjusted expenditure patterns in constructing a similar analysis. However, where food hubs are more dissimilar in terms of their activities and purchasing and sales patterns, following the complete data collection procedure proposed is advised.

The secondary objective of this report is to better understand the extent to which food hubs increase the overall demand for and consumption of local food products. And further, whether there is demand from customers to expand the availability of food hub products and services. Addressing this objective requires additional information from food hub customers. In particular, we collect additional information on the nature of customer purchases, and we analyze the extent to which these purchases represent increased demand for local goods and services, of if they instead substitute purchases from one local source for another (i.e., from wholesale distribution company to a food hub). We also collect information related to scenarios in which customers would purchase additional products from food hubs, thus providing information on the potential scalability of the food hub sector. The information collected from purchasers of food hub goods and services allows us to ascertain the direct value of food hub purchases, offsets in purchases from other sectors, and the potential for growing overall local food product demand.

The report continues with a general description of economic impact assessments to frame the report's objectives, along with a discussion of previous literature analyzing the impacts of local food system infrastructure. Next we provide an analytical framework for our analysis and a detailed empirical methodology, including two alternative modeling approaches. A discussion of the case study application follows, including the interpretation of and policy implications from the particular results and a set of recommendations for replicating the methodology in alternative settings. We conclude with priorities for future research.

2.0 ECONOMIC IMPACT ANALYSIS

To conduct an economic impact analysis, one must have information about the level of inter-industry transactions, or purchase and sales linkages. This information involves accounting relationships detailing the extent of purchases and sales of goods and services both within and among sectors of an economy. As a business buys from and sells goods and services to businesses in other sectors of the economy and to final users, the firm stimulates additional economic activity by the other businesses and within other economic sectors. Input-Output (IO) analysis is a technique widely used by economists to measure and understand the distributional impacts or inter-industry linkages across an economy. An IO model offers a snapshot of the economy, providing information about the existing relationships involving the sales and purchase of goods and services between all sectors of the economy at a given point in time.

The IO methodology's analytical capacity lies in its ability to estimate the *indirect* and *induced* economic effects stemming from the *direct* expenditures associated with a change in final demand for the goods and services produced by an economy. These *indirect* and *induced* changes in economic activity result from what are now commonly known as 'multiplier' effects. An initial (*direct*) expenditure driven by a change in final demand sets in motion a cascading series of (*indirect*) impacts in the form of additional expenditures in other sectors by each business whose sales have increased. The cumulative impact across all of these affected industries determines the size of this initial type of multiplier, computed as the direct plus indirect effects divided by the direct effect.

These *direct* and *indirect* effects are also associated with increased income to labor as a result of increased economic activity. To the extent that this additional income is spent within the local economy, there are additional multiplier effects that are commonly referred to as *induced* impacts. A Social Accounting Matrix (SAM) model expands the core IO model of business linkages to include the accounting flows of money linking households, government, and other non-business sectors that are involved in receiving and spending money in the economy. The SAM model can be used to measure the distribution of income and related *induced* impacts in a comprehensive way. Thus, a SAM model enables one to calculate the *direct*, *indirect* and *induced* effects of changes in final demand based on a more comprehensive model of local inter-industry linkages. The resulting multiplier is then computed as the direct plus indirect plus induced effects divided by the direct effects (Miller & Blair, 2009).

Economic impact assessments commonly utilize IMPLAN (IMpact Analysis for PLANning) data and software from the IMPLAN Group LLC.[1] By default, the entire economy is represented by 440 sectors within IMPLAN. Each IMPLAN sector is represented by a single, static production function – a mathematical expression that relates the quantity of inputs required to produce that industry's resulting output (Lazarus et al., 2002; Liu and Warner, 2009).[2] The production function reflects how, on average, each industry sector's expenditures are distributed to: a) intermediate purchases (i.e., local purchases of intermediate inputs from other sectors), b) value added payments (i.e., employee compensation, proprietor income such as returns to business owners, other property type income such as payments to investors, and indirect business taxes

[1] IMPLAN Group, LLC is located in Huntersville, NC. For more information: http://implan.com/

[2] For an in-depth discussion of how production functions are constructed within IMPLAN, see Lazarus et al. (2002).

like sales taxes),[3] c) intermediate imports (i.e., intermediate inputs purchased from outside the local economy), and d) other sources (i.e., institutional outlays).

IMPLAN data comes predominantly from national sources, such as the U.S. Bureau of Economic Analysis' Regional Economic Accounts, the U.S. Census Bureau's County Business Patterns, National Household Personal Consumption Expenditures, the Annual Survey of Manufacturers, and the USDA's National Agricultural Statistics Service (IMPLAN Group, LLC 2013). Initiated from a national table of accounts, IMPLAN provides a comprehensive set of balanced SAMs for every county and state in the United States. These SAMs illustrate a complete picture of the economy, accounting for all inter-industry transactions, as well as transfers to and from institutional sectors. The widespread use of IMPLAN as an economic modeling tool stems in part from the simplicity by which economic multipliers can be generated for any county or multicounty geographic region, as well as by the fact that the models can be modified quite easily.

Impact analysis is used to assess changes that are expected to occur within the economy in the short run due to the actions of an exogenous 'impacting agent' (e.g., a change in government spending, or a natural disaster). Under a certain set of technical assumptions which are most likely to be met when changes in levels of economic activity are both typical and small relative to the level and technologies of existing production processes (i.e., constant returns to scale, excess capacity, and perfect complementarity), the SAM model can be converted into a multiplier model and used for impact analysis. Within the IMPLAN framework, the researcher provides the direct impact (positive or negative) on a defined geographical economy and IMPLAN calculates the total value of the shock (direct + indirect + induced impacts) based on the respective SAM.

2.1 Local Food Economic Impact Assessments

Most local food economic impact assessments can be grouped into two categories. The majority use impact assessment to measure changes in an economy due to import substitution; i.e., the economic impacts from decreasing reliance on foreign or domestic imports of intermediate production inputs through increases in production and utilization of locally grown or processed foods (e.g., Cantrell et al. 2006; Kane et al. 2010; Leung & Loke 2008; Conner et al. 2008; Swenson 2010; Swenson 2011b; Timmons 2006). In general, these studies assess economy-wide impacts from scenarios that consider increased consumption of locally-grown foods. The remaining studies measure the impacts of specific local food marketing channels, such as farmers' markets (e.g., Henneberry et al. 2009; Hughes et al. 2008; Myles & Hood 2010; Otto & Varner 2005; Sadler et al. 2013) or farm-to-school programs (Gunter & Thilmany 2012; Tuck et al. 2010), as well as key pieces of infrastructure such as meat processing facilities (Swenson 2011a).

Throughout most of these studies, there are two main challenges that reflect the difficulty in meeting the significant data requirements to conduct rigorous economic impact assessments. The

[3] Value added components together can be thought of conceptually and literally as representing the dollar value the business adds to the inputs of goods and services that it must purchase from other businesses in the process of producing its own output. As noted, value added is primarily distributed via the payments out of revenues that go to owners, workers, and government. Value added by a business is measured in practice as the difference between the total value in the market (revenues received for product sales) and the payments to other businesses for the inputs it must purchase from them.

first is what O'Hara and Pirog (2013) refer to as an 'interpretation' challenge. Specifically, "a critical issue for measuring net economic impacts entails stipulating how the 'opportunity cost,' which is what would have occurred in the absence of local food sales, is defined" (p.4). As they rightly point out, measuring opportunity cost is not straight-forward, and requires information about the extent to which increased consumer purchases of locally-grown food offsets other types of purchases, changes market prices and/or supply chain characteristics, or impacts land use. There are only a handful of local food economic impact assessments that explicitly acknowledge the need to consider opportunity cost (Conner et al. 2008; Hughes et al. 2008; Gunter & Thilmany 2012; Tuck et al. 2010; Swenson 2010). However, each of these studies makes assumptions about the sectors in which there are decreased purchases (or changes in land use) as a result of increases in local food consumption–in other words, none collects the data necessary to more fully understand the opportunity costs of increased local purchases.

The second challenge is that almost all of these studies reflect the implicit assumption that local food system participants have the same patterns of expenditure as the aggregate agricultural sector data available in IMPLAN. The production functions for each sector reflect average purchase and sales patterns across all firms in the sector, without the requisite information to be able to disaggregate them by any specific characteristic (i.e., scale of operation, or marketing channel). As IMPLAN sector data represents all inter-industry linkages, the expenditure and sales patterns are more reflective of those firms that contribute a higher proportion of total output in the sector (typically, the larger firms). Given that local food system participants tend to be smaller in scale, and represent a small overall portion of agricultural sector transactions (Low & Vogel 2011), the estimates of the impacts from increased local food sales based on existing IMPLAN data may be misleading if local food system participants have different patterns of input expenditures (e.g., different production functions) and/or they purchase a different proportion of their inputs from local sources.

There are a limited number of local food system impact assessment studies that disaggregate key sectors and augment the IMPLAN database with primary data collection on expenditure patterns. Gunter and Thilmany (2012) utilized a combination of survey data and National Agricultural Statistics Service data to create a customized farm-to-school farm sector within IMPLAN, reflecting differential production function of farm-to-school producer participants. Schmit et al. (2013) collected detailed expenditure and sales data from farms in Upstate New York and show that small- and mid-scale farms participating in direct-to-consumer (D2C) markets have different spending patterns than depicted in the default agricultural sector data in IMPLAN. They conclude that local food economic impact assessments utilizing default IMPLAN agricultural sectors to estimate economy-wide impacts will underestimate the true magnitude. Swenson's (2011a) study is the only of its kind to provide evidence that it is not just farms participating in local food market outlets that are not well represented by default IMPLAN sectors. His research on the small-scale meat processing sector in Iowa demonstrates differences in expenditure patterns based on the scale of operation, implying that utilizing default IMPLAN sector data to describe infrastructure required by local food systems (likely smaller in scale than what is reflected in default IMPLAN data), may not reflect true impacts.

3.0 EMPIRICAL FRAMEWORK

The first step in conducting economic impact assessments is to define the appropriate study area – i.e., defining what the local economy is. By definition, economic impact assessments measure the inter-industry linkages within a defined local economy. Intuitively, the larger and more diversified the regional economy, the more likely it is that the suppliers of goods and services for any one industry can and will be found within the same regional economy. Similarly, the larger the geographic area that is included in the definition of the local economy, the more likely it is that economic transactions will take place within the region, thereby minimizing 'leakage'. Determining what constitutes 'local' can therefore have a decisive impact on the results—the larger the definition of local, the more inter-industry linkages, and the larger the economic multiplier effect of a given change in the demand for regional goods and services.

Though there are many ways that one might want to define local (e.g., GrowNYC, the organization that oversees the largest farmers' market network in the U.S., defines local as 250 miles from New York City, economic developers may define a local region in terms of a commute-shed), within IMPLAN, data are available for zip codes, congressional districts, counties, and states. Thus, despite the fact that one may prefer to use other definitions of local, political boundaries are the level at which most data in the United States are collected, and therefore the most realistic way to define the boundaries of this analysis.

3.1 Defining food hub transactions

The second step in an impact assessment is to define the industry sector (or sectors) of interest and its (their) linkages with other industries. This is less straightforward in the case of food hub assessments as a separate *food hub sector* and its transactions with other industries do not exist within traditional data sources (including IMPLAN). The implication for an impact assessment is that additional information must be collected to develop a food hub sector or to describe the nature of all of its transactions.

Formally, we do not create a single aggregated food hub sector. Rather, we model the food hub sector via how its revenues (resulting from an assumed change in final demand) are allocated to its component expenditures, an analytically equivalent alternative known as 'analysis-by-parts'.[4] Conceptually, the component expenditures represent the first round of indirect inter-industry purchases and payments to value added made by the food hub that trigger additional indirect and induced effects. The initial change in final demand modeled for food hub products represents the direct effect and combining this with the estimated indirect and induced effects determines the total effect.

Defining the scope of a food hub within IMPLAN therefore requires detailed data on the food hub's annual outlays, including (*i*) purchases by the food hub from each industry sector, along with the proportions of those expenditures that are purchased within the defined local economy, (*ii*) payments to the value added components, and (*iii*) other institutional purchases (e.g., payments to households or government purchases). Total outlays should equal total outputs such that all sales by the food hub are distributed to these three components.

[4] See IMPLAN's 'Case Study: Analysis-By-Parts' for more information: http://implan.com/v4/index.php?option=com_multicategories&view=article&id=730:case-study-analysis-by-parts&Itemid=71

In addition, one should consider whether the default IMPLAN production functions associated with the sectors the food hub purchases from adequately represent the behavior of firms with whom the food hub interacts. If not, additional information will be required from firms representing these upstream sectors. This is perhaps most acute for the farm production sectors that supply food products to the food hub; i.e., are farms that sell to food hubs adequately represented using the default data contained within IMPLAN? In order to assess this question, we construct two alternative impact assessment models–one that incorporates additional data collected from farms selling to the food hub and one that does not. Through this approach, we will better understand the extent to which additional data collection from farms selling to food hubs is necessary to conduct an accurate evaluation. Data collection is expensive and time consuming. Promoting a replicable methodology partially involves ascertaining the minimum amount of data to collect while maintaining the methodological rigor, particularly given the fact that many of the organizations likely to undertake this effort are resource-constrained. Thus, through the construction of two models we can make recommendations about the amount and type of data recommended for collection in future studies.

Expenditure categories from the food hub data must mapped to applicable IMPLAN industry sectors, valued added, and institutional components. For industry sector mapping, utilizing the two-digit NAICS[5] aggregation scheme provided within IMPLAN consolidates the original 440 industrial sectors into 20 composite sectors and greatly simplifies model construction while making the mapping process more empirically tractable. However, sectors of particular interest or importance to food hubs should be left disaggregated, as well as any original IMPLAN sectors that can be uniquely identified with an expenditure category in the food hub data.

Primary expenditure categories for food hubs will include purchases of agricultural and food products from farmers and/or food processors for resale. Accordingly, we consider additional adjustments from the 2-digit NAICS aggregation scheme. First, with respect to farm product purchases, it is important to separate out the agricultural production sectors from the 2-digit NAICS sector from where they are contained, since the aggregate sector also includes individual sectors related to forestry, fishing, and hunting. Second, only those sectors from which the food hub purchases products should be considered. Third, since detailed expenditure data by primary commodity is unlikely to be available, an aggregated farm sector should be constructed to represent all of the agricultural commodity sectors from which the food hub purchases product. We call this agricultural production sector the ‘food sold-farm’ sector since output from this sector represents food products sold by the food hub that are purchased from the farm sector.. From our case study described below, this sector include 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 into this sector.

[5] The North American Industry Classification System (NAICS) is used by Federal agencies to classify business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. NAICS is a 2- though 6-digit hierarchical classification system, offering five levels of detail. Each digit in the code is part of a series of progressively narrower categories. The more digits in the code, the greater the classification detail. The first two digits designate the economic sector, the third digit designates the subsector, the fourth digit designates the industry group, the fifth digit designates the NAICS industry, and the sixth digit designates the national industry. For more information, see: http://www.census.gov/eos/www/naics/

A similar exercise is needed for food hubs that buy processed food and beverage products from nonfarm manufacturers for resale (as in our case study). As above, one separates out the food manufacturing sectors where the food hub purchases products from the aggregate 2-digit NAICS manufacturing sector and then consolidate them into a separate sector; in our case, named the food sold-nonfarm sector.[6]

3.2 Defining farms that sell to food hubs

Understanding how farms that sell product to food hubs (henceforth 'food hub farms') interact with other sectors of the economy is important in improving the precision of an impact assessment. While the same can be said of any input supplying sector, since purchases from farms generally represent a relatively large share of total food hub expenses, and we are particularly interested in how food hub farms are impacted by food hubs, it is important to consider the inter-industry linkages for farm suppliers.

Furthermore, for most of the businesses from which food hubs purchase inputs, it is sufficient to assume that the individual business' expenditure patterns reflect that of the entire industry sector. For example, a food hub is unlikely to purchase insurance (an input) from a specialty food hub insurance provider. Rather, the food hub's insurance agency more likely funds a range of businesses with a variety of products. As such, assuming that the food hub's insurance company has a similar production function to that of the 'insurance' sector within IMPLAN should be sufficient. By contrast there is growing evidence that farms participating in local food system outlets are oftentimes (but not exclusively) smaller in scale, and/or have different patterns of expenditures and labor requirements per unit of output than is reflected in IMPLAN's default agricultural sectors (Schmit et al. 2013).

Defining a separate food hub farm sector distinct from the total farm sector requires the same types of outlays data analogous to what is required from the food hub described above; i.e., the value and location of payments by the food hub farm to each industry sector and value added component.

3.3 Considering opportunity cost

Once our SAM model is customized to reflect food hub expenditure patterns according to the framework explained above, we can perform the impact analysis. In addition to a positive hypothetical shock assumed due to an increase in demand for food hub products, we need to consider resulting negative impacts due to decreased spending in other sectors. To assume that an increase in final demand for food hub products does not negatively impact final demand in other industry sectors is unrealistic.

Opportunity cost impacts reflect what would have occurred had the increased final demand for food hub products not have happened. In particular, we hypothesize that food hub purchases offset some local purchases from existing wholesale distributors; i.e., customers of the food hub buy less from other wholesale distributors given their purchases from the food hub. At the same

[6] The food sold-nonfarm sector does not include the wholesale trade sector (IMPLAN sector 319), even though this sector may contain some transactions that reflect food sold-nonfarm purchases (for example, produce auctions are included in this IMPLAN sector and may be a source for food products by food hubs). However, given the highly aggregated nature of the wholesale trade sector (including outputs of agriculture, mining, manufacturing, and certain information industries), we decided not to include it.

time, however, it is likely that consumers increase their overall purchases of local products due to the availability of food hub products and services. This is due to the fact that customers have access to a different basket of goods than perhaps they could from other types of distributors (i.e., they have more options to purchase local goods).

In order to test this hypothesis and more fully reflect the impact that increased demand for food hub products has on other sectors, we require the following information from food hub customers: (*i)* the percentage of food hub customers who would have purchased product from other sectors had the food hub outputs not been available; and (*ii*) of the customers who purchased less product from other sectors, the amount of reduced purchases as a result of purchases from food hubs.

3.4 Applying the Final Demand Shock

We consider a scenario in which an exogenous shock increases the final demand for food hub products and services and how this shock ripples through the economy to generate the indirect and induced impacts. Given the absence of a food hub sector, the increase in final demand is fully allocated according to the food hub's expenditure pattern. While the initial increase in final demand is the value of the direct effect, only a portion of expenditures to satisfy that increase occur locally or are included in typical impact analysis.

Specifically, only a portion of input sector expenditures are incurred with local firms, and it is only these local expenditures that are included in the impact analysis (i.e., as first-round indirect effects). The remaining nonlocal purchases represent leakages and are excluded. Next, generally, only some payments to value added generate impacts. Spending of employee compensation and other proprietor income generate induced impacts and are included. However, payments to other property type income and indirect business taxes are generally excluded (i.e., considered exogenous) for impact analyses. Similarly, any payments to government institutions (e.g., for municipal water) are excluded.

For example, consider a $100 increase in final demand for food hub products. To satisfy this increase in demand the food hub spends $60 to input sectors, $25 to employee compensation, $10 to proprietor's income and $5 on indirect business taxes. The $100 represents the direct output effect. One-half of the inputs ($30) are procured locally, the other $30 represent leakages. The $25 and $10 value added components are included in the analysis, but the $5 payment is not. Applying these values to our model will generate the entire cumulative impact from all inter-industry transactions.

4.0 CASE STUDY APPLICATION

Given the heterogeneous structure of food hub operations and the detailed data needs required for an impact assessment, we utilize a case study approach. The particular steps conducted in the analysis are described below, and are consistent with the empirical framework outlined above. The approach should be informative to the applicability of our results to other hubs and be useful to researchers conducting similar studies of food hub operations.

4.1 Case Study Food Hub

Regional Access, LLC (RA) was chosen for our case study due to their commitment to working directly with local farmers, their length of time in operation, the diversity of their customer base, and the size of their operation. RA was established in 1989. In 2011, it had over $6 million in sales, and employed 32 workers (inclusive of management, skilled, and unskilled labor). Utilizing 9 vehicles and a 25,000 square foot warehouse, RA aggregates and delivers products primarily throughout NYS. RA has over 3,400 product listings, including beverages, breads, cereals, flour, meats, produce, prepared foods, grains, and fruits and vegetables. RA purchases products from a variety of farm vendors and specialty processors and wholesalers (non-farm vendors). Considering total purchases of at least $100 in 2011, this includes 96 farm vendors (86 in NYS) and 65 non-farm vendors. RA has over 600 customers, including: individual households, restaurants, institutions, other distributors, fraternities and sororities, buying clubs, retailers, manufacturers, and bakeries. RA also provides freight services to a range of businesses, including farms.

RA plays an important role connecting farmers, customers, and the community-at-large around food and agricultural issues. RA fits within USDA's definition of a food hub given its commitment to building relationships with local farmers, managing the aggregation, distribution, and marketing of their products, and maintaining the farm's identity. A summary of RA's business functions is shown in Table 1.

Table 1: Regional Access' business functions

Vendor Services	Customer Services	Community Outreach
• Aggregation • Freight • Warehousing • Marketing	• Home delivery • Retail, wholesale, institutional delivery • Backhauling	• Food donations • Foundation – Great Local Foods Network • Community events, special projects

New York State (NYS) was chosen as our local region of analysis. This follows from the fact that RA works primarily with farms and customers across NYS. As such, the term 'local' will refer to NYS throughout the case study application.

4.2 Deriving Food Hub Expenditure Pattern

RA provided a detailed 2011 profit and loss statement, along with estimates of the percentages of expenditures in each category that were local (i.e., in NYS). Recall that RA performs a variety of services for a varied group of vendors, customers, and community members (Table 1). Each of these services necessitates a particular mix of inputs. The expenditure pattern estimated below reflects a composite of all of these activities. For example, fuel costs reflect not only those activities for marketing vendor products, but also for freight services to customers. Based on the data they provided and follow up discussions with the RA personnel, the hub's expenditure categories were mapped to IMPLAN sector, value added, and other components. For ease of exposition, the detailed sector aggregation and mapping scheme is included in Appendix 1; however, as outlined above some constructed model sectors warrant additional discussion.

RA purchases and resells a varied set of food products from farm vendors (i.e., agricultural producers). RA's farm product expenditure data are not disaggregated by commodity and thus

are mapped to an aggregated set of IMPLAN farm sectors corresponding to the range of products purchased from farm vendors (i.e., the food sold-farm sector). Similarly, RA purchases and re-sells a variety of food products from nonfarm vendors (i.e., food processors). Again, the RA expenditure data does not disaggregate these purchases by commodity and so these are mapped to an aggregate set of IMPLAN food processing sectors corresponding to the range of products purchased by RA from nonfarm vendors (i.e., the 'food sold-nonfarm' sector).

In addition to mapping input expenditure categories to IMPLAN industry sectors, additional outlays to value added components and direct payments to households are accounted for and require some additional modeling assumptions. First, we consider direct interest payments to individuals as a result of prior borrowings. These interest payments are classified as payments to households within the IO/SAM framework. The IMPLAN database divides all household accounts into nine household income groups, the highest of which is over $150,000. Since we have no information as to what household income groups the individual lenders are from, we assume that they are from the highest household income category. Given the relatively low amount of household borrowings, the decision on which household income group to use will have little effect on our final results.

Second, inherent in the IO/SAM framework is the assumption that total sales (output) equals expenses (inputs). In the case of RA, net returns, after accounting for payments to input sectors, value added, and direct payments to households, were allocated to 'proprietor income'. In addition, some items included in the profit and loss statement were excluded in this calculation; for example, depreciation and loan forgiveness. As IO analysis uses a static framework, these items should not be included.

After accounting for the value of all hub outlays, relative expenditures by category are computed and disaggregated by their local versus nonlocal components. RA's six largest expenditure items are shown in Figure 1. The two largest expenditure items are food sold-nonfarm (44%) and food sold-farm (18%). Together, food sold-nonfarm and food sold-farm expenditures represent what is commonly referred to as cost of goods sold (COGS). Interestingly, the COGS for RA is very similar to the average COGS reported by Fischer et al. (2013) from their national food hub survey (61%). The Farm Credit Council and Farm Credit East's Food Hub Benchmarking Study (2013) reported average COGS of 68%. By comparison, the Food Marketing Institute (2008) reports average COGS for food distributors at 71%.

The third largest expenditure item was employee compensation (16%). Similarly, the Farm Credit Council and Farm Credit East's (2013) Food Hub Benchmarking Study reported average labor costs as a percent of sales to be 17%. The Food Marketing Institute (2008) reports total payroll and employee benefits at 15% of total expenditures.

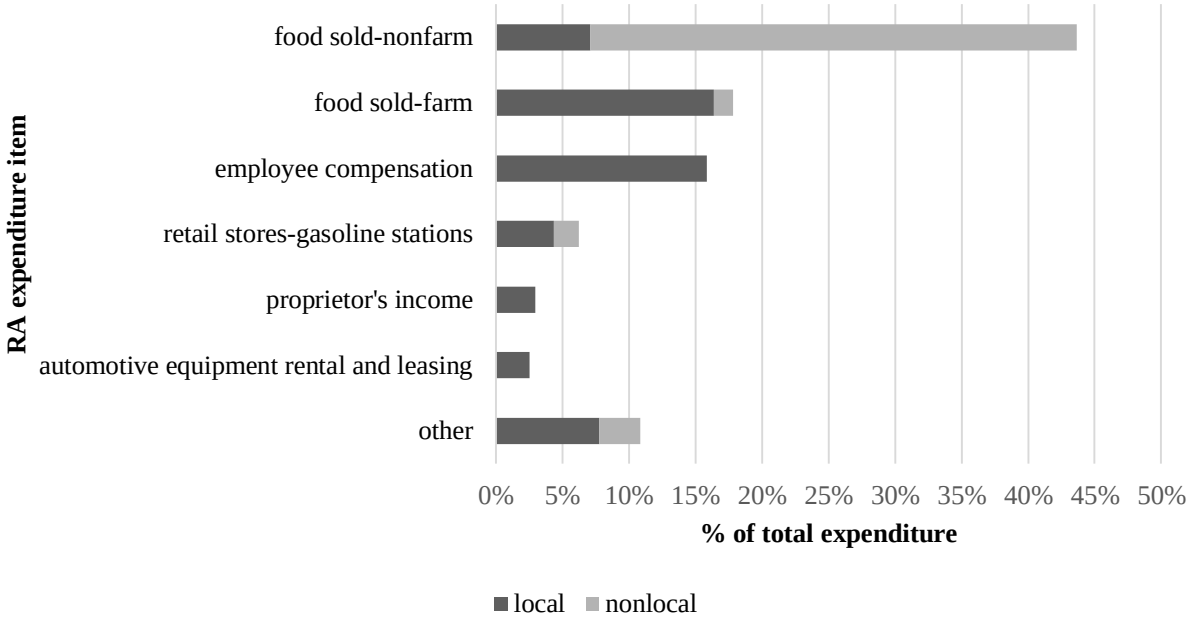

Figure 1: RA expenditures as percentage of total, local and nonlocal

Though the sector in which expenditures occur is important, more significant in terms of economic impact is the extent to which these items are purchased locally. In total, 57% of all RA's expenditures are local. Figure 1 depicts RA's expenditures by major category as a percentage of total expenditures and divided into their local and nonlocal components. The expenditure shares from top to bottom are food sold-nonfarm (representing 44% of total expenditures, 16% local), food sold-farm (representing 18% of total expenditures, 92% local), employee compensation (representing 16% of total expenditures, 100% local), retail stores-gasoline stations (representing 6% of total expenditures, 70% local), proprietor's income (representing 3% of RA's total expenditure, 100% local), automotive equipment rental and leasing (representing 3% of RA's total expenditure, 100% local), and other that includes an aggregate of all other expenditure items (totaling 11% of total expenditures, 71% local).

4.3 Food Hub Farms

To collect the necessary farm-level information for this analysis, RA's NYS farm vendors were requested to participate in in-person interviews. Thirty farmers agreed to participate, resulting in a 35% response rate.[7,8] The farms were located in every region of NYS except New York City and Long Island,[9] and 50% classified their operation scale as 'small' ($1,000-$249,999 in gross sales), 20% percent as 'medium' ($250,000-$500,000 in gross sales), and 30% as 'large' (over

[7] Data collection protocols received approval from Cornell's Institutional Review Board for Human Participants, protocol id number: 1206003110. All participants completed an informed consent form prior to participation.
[8] A template of the interview protocol is included in Appendix 2.
[9] Regional location of firms follows from Empire State Development's delineation of ten regions throughout the state, including Western New York, Finger Lakes, Southern Tier, Central New York, Mohawk Valley, North Country, Capital District, Mid-Hudson, New York City, and Long Island. For more information, see: http://esd.ny.gov/RegionalOverviews.html.

$500,000 in gross sales). When asked to classify their farms' primary production category, 37% percent identified meat and livestock, 30% fruit and vegetable, and 33% value-added.[10]

4.31 Deriving Food Hub Farms' Expenditure Pattern

Table 2 presents the average expenditure patterns of the food hub farms interviewed. The average total expenditure was $601,110 per farm, of which 86.7% was spent in the local economy ($521,314). The largest percentage of total expenditure is allocated to employee compensation (23.5%), followed by wholesale trade (15.4%), food sold-farm (15.6%), and support activities for agriculture and forestry (8.6%). Retaining the sector delineation from above, the food sold-farm and food sold-nonfarm sector values represent purchases by the food hub farms for the products from sectors producing farm and processed products, respectively.

[10] If a farm classified its primary production category as 'value added', it can be inferred that the farm grew/raised the raw commodity that it then processed. Examples of the value added products produced include cheese, butter, yogurt, honey, maple syrup, wine and juice.

Table 2: Food hub farm average expenditures by IMPLAN sector and % local

	Average Expenditure by Category		
Food hub farm expenditure by IMPLAN category	Local ($)	% Local	Total ($)
employee compensation	$ 141,644	100%	$ 141,644
wholesale trade	$ 47,067	51%	$ 92,326
food sold-farm	$ 77,855	89%	$ 87,478
support activities for agriculture and forestry	$ 47,377	92%	$ 51,496
proprietor income	$ 33,694	100%	$ 33,694
retail trade	$ 27,060	83%	$ 32,613
state/local/federal government and indirect business tax	$ 31,913	100%	$ 31,913
capital	$ 23,791	80%	$ 29,739
transport by truck	$ 15,665	76%	$ 20,599
maintenance and repair construction of nonresidential structures	$ 13,980	99%	$ 14,143
utilities	$ 10,901	100%	$ 10,901
insurance carriers	$ 8,648	100%	$ 8,648
real estate and rental	$ 8,604	100%	$ 8,604
food sold-nonfarm	$ 5,872	75%	$ 7,843
nondepository credit intermediation and related activities	$ 4,458	66%	$ 6,755
food hub [a]	$ 6,398	100%	$ 6,398
truck repairs and maintenance	$ 5,646	100%	$ 5,646
professional-scientific and technical services	$ 2,108	99%	$ 2,121
telecommunications	$ 1,793	96%	$ 1,864
professional expense-computer	$ 1,793	96%	$ 1,864
waste management and remediation services	$ 1,217	100%	$ 1,217
transportation and warehousing	$ 957	100%	$ 957
civic, social, professional, and similar organizations	$ 817	87%	$ 941
legal services	$ 556	98%	$ 568
accounting, tax preparation, bookkeeping, and payroll services	$ 556	98%	$ 568
management, scientific, and technical consulting services	$ 556	98%	$ 568
Total	$ 522,966	87%	$ 601,110

[a] We asked food hub farms how much they purchased from Regional Access as a percentage of total expenses. In general, these purchases from RA include freight service, other farm products (i.e., products for re-sale at a farm stand), and warehousing/storage. In this table we show these expenditures mapped to a food hub, even though a sector does not exist as such in our model. Accordingly, we allocate these purchases based on RA's expenditure pattern in our model. See section 4.41 for additional description.

4.4 IMPLAN Model Construction

Using 2011 IMPLAN data, two NYS models were constructed. Both of the models utilize data collected from RA about their sales and expenses. Model 1 assumes that food hub farms' production functions are similar to the default IMPLAN agricultural sector data (i.e., none of the food hub farm data is utilized in this model). Model 2 utilizes the food hub farm data to separate

the default IMPLAN agricultural sector data (i.e., the food sold-farm sector) into two distinct sectors: the 'food hub farm' sector and the 'other farm' sector (see below). Once the IMPLAN data for NYS is aggregated according to the scheme presented in Appendix 1, Model 1 is complete.

4.41 Creating a food hub farm sector

For Model 2, the food hub farm data were utilized to apportion transactions in the food sold-farm sector into two distinct sectors: the 'food hub farm' sector and the 'other farm' sector (i.e., everything other than the food hub farm sector).[11] The first step in separating the food hub farm sector from the food sold-farm sector is to determine the total size of the RA food hub farm sector in NYS—effectively calculating a new expenditure column and a new sales row to the SAM. Since the interview data provide estimates of average expenditures and sales per food hub farm, the average estimates were scaled up (multiplied) by the total number of RA farm vendors (96).

Food hub farm expenditure categories were then mapped to their corresponding IMPLAN sector. Due to a lack of detailed information, purchases by food hub farms from other agricultural production sectors were assumed to be divided evenly between food hub farms and other farms. Total local expenditures for the food hub farm sector, by IMPLAN category, were deducted from the corresponding SAM column expenditure within the default (food sold-farm) agricultural sector. All transactions remaining in the default agricultural sector were allotted to the other food sector (i.e., the food sold-farm sector no longer exists as its expenditures were reassigned to the two new sectors). Importantly, this procedure does not change the size of the overall economy, but reallocates total local expenditures into its two distinct sector components.

In addition to selling product to RA, food hub farmers also identified purchases of goods and services from RA (e.g., transportation, warehousing and wholesaling). RA has many different types of relationships with farms. In the majority of instances, RA purchases product from farms, which are then sold to RA's customers. However, farms can also act as customers of RA. For example, there are farms that purchase freight services. In these cases, the farms have an already identified customer to which they need to deliver product, and they hire RA to do the distribution. Farms also lease warehouse space from RA; this is particularly true of the wineries in the region, which may have relationships with RA as both vendors and customers. Finally, there are farms that purchase products wholesale from RA. Usually these farms have a farm stand or store at which they want to offer a variety of locally grown products. In other instances, the farm produces a value added product for which they need additional items that they do not grow themselves. Rather than allocate these food hub purchases based on the items that the farm purchases, we allocated them to the food hub sector via the food hub's component expenditures. As described above, we manually distributed the demand for food hub goods and services according to the patterns of food hub spending we have measured.

As previously explained, within a SAM framework, there is an accounting identity in which the value of total outlays in each sector must equal the value of total outputs. Our survey results

[11] The SAM IxI transactions matrix at this stage was exported from IMPLAN into Microsoft Excel 2010. Disaggregation of the default agricultural sector, along with all of the computations that follow, were conducted in Excel.

showed that whereas average sales per farm were $601,110, average input expenditures per farm were only $567,416. The difference ($33,693) should represent payments to owners (as value added contributions). Thus, we apportioned this amount as payments to proprietors (proprietor's income within IMPLAN).

Just as expenditures for the food hub farm sector were disaggregated from the food sold-farm sector (i.e., using SAM column transactions), output or sales must be similarly disaggregated (i.e., using SAM row transactions). Average sales per farm ($601,110) were initially scaled up by the size of the sector (96 farms). Then, sales designated as non-local were allocated to domestic trade (as exports). The balance of sales were divided between sales to other farms, sales to households (i.e., direct-to-consumer sales), intermediated sales not to RA, intermediated sales to RA, and commodity sales.

Our interview results on purchases and sales provided different estimates of intra-sector transactions within the food hub farm sector. Specifically, average purchases of farm commodities were reported as $87,478, but average sales of farm commodities to agricultural producers were $102,884. The IO/SAM framework requires these to be equal; accordingly, we utilized the farm expenditure information. As we did with the expenditures, due to a lack of information, sales by food hub farms from other agricultural production sectors were assumed to be divided evenly between food hub farms and other farms. In addition, we allocated the remainder between the sales and expenditures (i.e., $102,884-$87,479 * 96) to the other farm sector.

Average sales by market outlet for food hub farms are presented in Table 3. All food hub farm direct-to-consumer sales were assigned to households (an average of $144,173/farm). As the IMPLAN database contains nine household income groups, and we did not know the household income group into which food hub customers' belong, we apportioned the sales across household income groups based on the default IMPLAN data (i.e., the IMPLAN database contains information about the number of household in each of the income groups, and assigns a spending patterns for each). Intermediated sales separate from those to RA were assigned to the aggregated food sold-nonfarm sector (on average $279,701/farm).[12] Sales to RA were apportioned to the food hub sector based on RA's expenditure pattern (i.e., these sales were allocated across all of the sectors in which RA spends money; on average farms sold $37,200 to RA).[13] Food hub farms reported an average of $37,152 in sales to commodity markets/auction houses. These sales were allocated to IMPLAN's wholesale trade sector. Finally, non-local sales were allocated to exports (domestic trade).

[12] The problem with mapping the food hub farm sector non-RA intermediated sales to the 'food sold-nonfarm sector' is that sectors 324 (retail trade for food and beverages) and 413 (food services and drinking places) are not included. Recall that the aggregated food sold-nonfarm sector was created based on RA's expenditure pattern. However, we only asked food hub farms about their sales to other farms, retail outlets, wholesale outlets (RA or not RA), and commodity outlets, thus we lack the information to know sales to retail trade and food services (see farm survey in Appendix 2 for specific questions). We therefore made the decision to omit transactions between the food hub farm and sectors 324 and 413, although they likely exist.

[13] Two of the default food sold-farm sector transactions in IMPLAN had smaller amounts in the transactions matrix than the survey results showed. In these cases, we subtracted the corresponding amount from domestic trade and rebalanced the SAM.

Table 3: Food hub farm sales, average and percent local

Food Hub Farm Sales by Outlet	Sales average ($)	% local
Other farms	$102,884	93%
Direct-to-Consumer (households)	$144,173	100%
Food Hub (Regional Access)	$37,200	100%
Other Intermediated Sales	$279,701	84%
Commodity Sales	$37,152	100%
Total	$601,110	91%

Once we complete mapping of the food hub farms expenditures and sales to the relevant IMPLAN sectors, we see that our case study farms have very different patterns of expenditure than the default food sold-farm sector within IMPLAN (see Table 4). Most importantly in terms of local economic impact, per unit of output, food hub farms spend $0.77 in the local economy versus the $0.54 in the food sold-farm sector. Food hub farms spend $0.08 per unit of output on support activities for agriculture and forestry, compared to $0.02 in the default agriculture sector. And, food hub farms spend $0.14 per unit of output on purchases from other local farms (both food hub farms and other farms) compared to $0.06 in the default farm sector. Though we see distinct differences between the food hub farm and default food sold farm sector in terms of spending on employee compensation ($0.24 compared to $0.12) and proprietor's income ($0.06 compared to $0.16), the total income impact on a per unit of output basis is fairly consistent ($0.30 compared to $0.28). Given the absence of nationally available farm-level data on employment and earnings by commodity, and thus the challenges IMPLAN encounters in populating this information, it is best to focus on the total income allocation than on specific distribution of employee compensation and proprietor's income.[14]

[14]The U.S. Bureau of Economic Analysis' (BEA) Regional Economic Accounts program estimates county-level employment and income data, but these are farm totals, not differentiated by agricultural commodity. As a result, IMPLAN has developed procedures, using a combination of the USDA ERS farm count by commodity (as an indication of proprietors), employee compensation-to-output relationships from the BEA Benchmark I-O (to get a first estimate for wage and salary employment by commodity), and applying the resulting U.S. relationships to output to state outputs, to derive state employment numbers. For more information on the data challenges and IMPLAN's methodology, see:
http://implan.com/index.php?option=com_multicategories&view=article&id=638:638&Itemid=14

Table 4: Summary of expenditure patterns per dollar of output for the default agricultural sector (food sold farm) and the food hub farm sector

	Value of purchases per dollar of output	
Selected Industry Sector/Value Added Components	Food Sold- Farm (Default)	Food Hub Farm
food sold-farm (default) [a]	$0.06	NA
food hub farm [a]	NA	$0.07
other farm [a]	NA	$0.07
utilities	$0.02	$0.02
wholesale trade	$0.02	$0.08
retail trade	$0.00	$0.05
real estate and rental	$0.05	$0.01
monetary authorities and depository credit intermediation activities	$0.04	$0.00
support activities for agriculture and forestry	$0.02	$0.08
transport by truck	$0.01	$0.03
truck repairs and maintenance	$0.00	$0.01
other sector purchases	$0.06	$0.06
Total intermediate purchases	$0.26	$0.47
employee compensation	$0.12	$0.24
proprietor Income	$0.16	$0.06
Total payments to value added	$0.28	$0.29
Intermediate Imports	$0.46	$0.24

[a] *This table reports results from Model 1 and Model 2. The default agricultural sector exists as the food Sold-farm sector in Model 1, and the food hub farm sector and the other farm sector exist in Model 2; i.e., Model 2 splits the default agricultural sector into two distinct sub-sectors based on the survey data.*

4.5 Customer Surveys

RA's customers were surveyed using an online survey to better understand the extent to which purchases from RA increase the demand for locally-grown farm products and offset purchases from other sectors.[15,16] At the time of the survey, RA customers numbered 110 households and 547 businesses, of which 57 households and 186 businesses responded to the online survey. To improve the response rate for business customers, follow up phone interviews were attempted with those customers who did not respond online. An additional 62 surveys were completed, increasing the total number of responses received to 305 (46% response rate), with 80% from business customers and 20% from individual households.

RA's business customers are very diverse. They reported average annual gross sales of $5.7 million (median = $515,000, n=101), with a range from $3,000 to $414 million. On average, they have been in business 13 years (median = 8 years), although this ranged from new to over 130

[15] Data collection protocols received approval from Cornell's Institutional Review Board for Human Participants, protocol id number: 1206003110. All participants completed an informed consent form prior to participation.
[16] A template of the online customer survey is included in Appendix 3.

years in operation (n=151). The average number of fulltime employee equivalents was 15 (median = 4, n=145). Business customers were also asked to identify the function their business most often performs; accordingly, 2% identified themselves as distributors, 3% as grocery/meal delivery service providers, 9% as processors/manufacturers, 11% as wholesalers, 25% as restaurants, 34% as retailers, and 17% as other—including bakery, fraternity/sorority house, caterer, coffee shop, farmers' market vendor, and institutional cafeteria (n=245).

4.6 Impact Analysis

To understand the impact of an increase in final demand for RA food hub products and the extent of differential economy-wide impacts from the two models, we consider a scenario in which an exogenous shock increases final demand for food hub products and services by $1,000,000. The positive shock is allocated into the corresponding industry sectors, value added components, and institutional purchases based on RA's pattern of expenditures. The only difference between the allocation of the shock in Models 1 and 2 is that in Model 1 all local farm purchases by RA are allocated to the aggregate food sold-farm sector (which uses the default agricultural sector IMPLAN data), whereas in Model 2, RA farm purchases are allocated to the (now separately defined) food hub farm sector.

In addition to the positive shock, we consider a simultaneous negative shock to the wholesale trade sector in order to account for the opportunity cost. The customer survey results reveal that, on average, 49.39% of businesses decreased their purchases from other distributors due to their purchases from RA. Of those who reported decreasing purchases from other distributors, the average decrease was 23.09%. Accordingly, a negative shock of $114,042 was applied to the wholesale trade sector (i.e., .4939 * .2309 * $1,000,000 = $114,042), in addition to the positive expenditures to this sector made by the food hub. The wholesale trade sector was chosen as business customers reported decreasing purchases from other distributors, which are included in IMPLAN's wholesale trade sector.

5.0 RESULTS

Our results are divided into two sub-sections: quantitative and qualitative. The quantitative sub-section presents the impact results from Models 1 and 2, with and without opportunity costs considered. The qualitative sub-section reports additional results from the interviews with the food hub farms, as well as from the customer surveys.

5.1 Quantitative Results

This subsection presents the multiplier and distributional impact results. The results for Model 1 are described first (with and without consideration of opportunity costs), followed by a description of the results for Model 2 and a comparative analysis across models. The change in final demand is allocated according to RA's detailed expenditure pattern discussed above. In summary, the $1M is allocated as $0.41M for purchases of imported goods and services, $0.38M for purchases of local goods and services, $0.15M for employee compensation, $0.03 for proprietor income, and $0.03M for indirect business taxes and government purchases.

5.11 Model 1

The model results are shown in Table 5 illustrating the combined indirect and induced effects for the top affected industries,[17] the combined effects for the remaining industries, and the total effects across all industries. As seen for Model 1 without including opportunity costs, the combined multiplier effects are $747,715. When adding in the direct effect of $1M, this implies a total output effect of $1,747,715, or a gross output multiplier of 1.75.[18] In other words, for every dollar increase in final demand for food hub products, an additional $0.75 is generated in backward linked industries. While not shown, the total indirect multiplier effect is 0.51 and the total induced multiplier effect is 0.24 implying that most of the multiplier effect is due to the business-to-business transactions.

Table 5: Model 1 (default IMPLAN food sold-farm sector) impact results

Industry Sectors	Indirect and Induced Impacts	
	No Opportunity Cost	Opportunity Cost
food sold-farm	$ 181,262	$ 181,122
all other sectors	$ 178,019	$ 144,849
food sold-nonfarm	$ 78,779	$ 78,173
real estate and rental	$ 61,353	$ 50,941
retail stores-gasoline stations	$ 44,610	$ 44,459
health and socials services	$ 39,264	$ 32,378
insurance carriers	$ 29,766	$ 27,884
automotive equipment rental and leasing	$ 25,894	$ 25,766
monetary authorities and depository credit intermediation activities	$ 22,306	$ 19,611
finance and insurance	$ 22,620	$ 19,577
utilities	$ 19,028	$ 17,373
retail trade	$ 19,751	$ 16,296
support activities for agriculture and forestry	$ 3,282	$ 3,278
wholesale trade	$ 21,782	$ (96,023)
Total industry sectors	$ 747,715	$ 565,683

Alternatively, consider the results for Model 1 when incorporating opportunity costs. Here, the additional negative shock to the wholesale trade sector results in total indirect and induced effects of $565,683, implying a net output multiplier of 1.57. While still a relatively strong multiplier effect, this represents a 10.3% decrease in the total multiplier effect (1 – 1.57/1.75) from that when opportunity costs are ignored.

Figure 2 is a useful supplement to Table 5 by providing a visual representation of the industry effects, along with the component indirect and induced contributions. Since the relative

[17] Though not a top impacted industry sector in Model 1, we include support activities for agriculture and forestry for a point of comparison with Model 2.

[18] This result is similar to sectors that conduct activities that are, at least in part, similar to a food hub. For example, comparable output multipliers for wholesale trade, truck transportation, and warehousing and storage are 1.60, 1.69, and 1.73, respectively, for NYS.

distribution across industries is similar across versions of the model (except for, obviously, the impact to wholesale trade), we restrict our attention to the model that explicitly accounts for opportunity costs. As expected, the food sold-farm sector receives the largest positive impact ($181,122) from the change in final demand, and is almost entirely from indirect effects. The food sold-nonfarm sector has the second largest total impact ($78,173), once again almost entirely due to indirect impacts. Real estate and rental has the third largest impacts ($50,941), of which roughly one-third are due to indirect impacts and the other two-thirds due to induced impacts. The retail stores-gasoline stations sector receives the fourth largest impact ($44,459), of which almost all is attributed to indirect impacts. The health and social services sector is next ($32,378) where almost all of the impacts to this sector are attributed to consumer spending and are thus induced impacts.

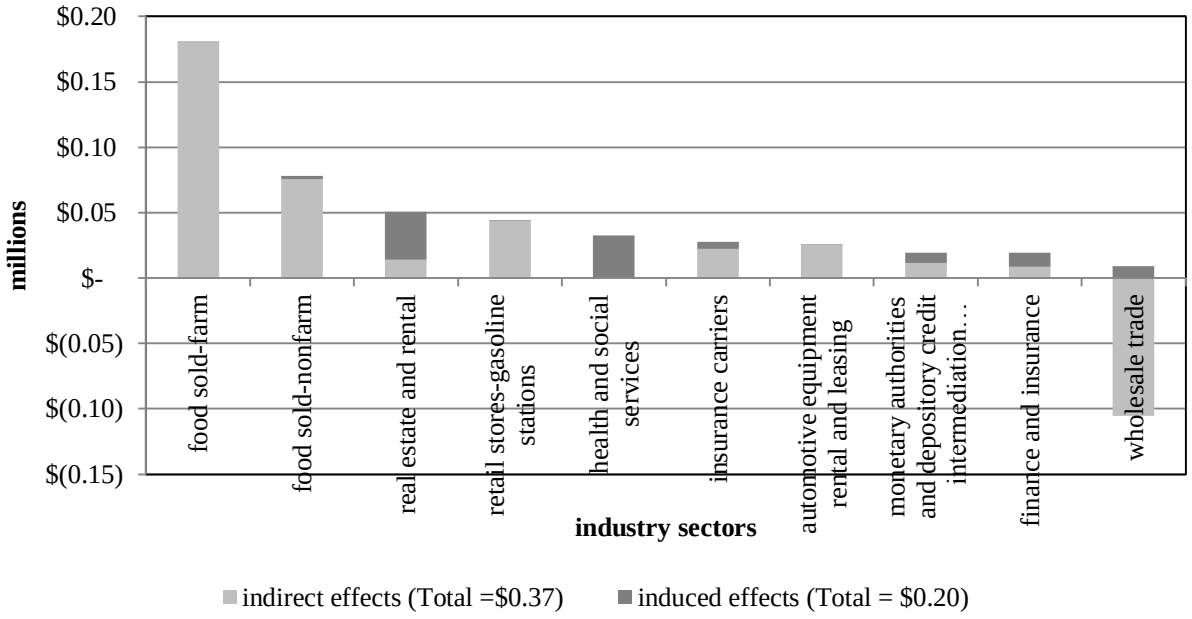

Figure 2: Indirect and induced effects per $1,000,000 increase in final demand (top impacted industry sectors), Model 1 including opportunity cost

5.12 Model 2

In Model 2, we assume the same hypothetical change in final demand as in Model 1 and allocated according to RA's detailed expenditure pattern. The only change is that the first-round indirect impact based on RA's purchases of farm grown products is now put into the food hub farm sector (recall that the food sold-farm sector no longer exists in Model 2, but was split into two distinct sectors, the food hub farm sector and the other farm sector). Thus to the extent that Models 1 and 2 elicit different results it will be due to differences in the expenditure patterns between the default IMPLAN agricultural sector data (i.e., the food sold-farm sector) and the food hub farm sector data we collected.

Comparable results to Table 5 (Model 1) are shown for Model 2 in Table 6. Here, when opportunity costs are not considered, the combined indirect and induced effects are now $816,911. Considering the direct effect of $1M, this implies a gross output multiplier of 1.82,

4.0% higher than its counterpart in Model 1. The relative allocation to indirect effect (0.56) and induced effect (0.26) are similar to that for Model 1.

Table 6: Model 2 (differentiated food hub farm sector) impact results

Industry Sectors	Indirect and Induced Impacts	
	No Opportunity Cost	Opportunity Cost
food hub farm	$ 175,600	$ 175,592
all other sectors	$ 173,966	$ 143,960
food sold-nonfarm	$ 81,399	$ 80,793
real estate and rental	$ 60,245	$ 49,833
retail stores-gasoline stations	$ 44,801	$ 44,649
health and social services	$ 42,725	$ 35,839
insurance carriers	$ 33,052	$ 31,170
retail trade	$ 29,348	$ 25,893
automotive equipment rental and leasing	$ 25,904	$ 25,776
finance and insurance	$ 23,731	$ 20,688
other farm	$ 19,740	$ 19,602
utilities	$ 20,482	$ 18,827
meals and entertainment	$ 19,829	$ 16,662
monetary authorities and depository credit intermediation activities	$ 17,456	$ 14,761
support activities for agriculture and forestry	$ 14,198	$ 14,194
wholesale trade	$ 34,435	$ (83,370)
Total industry sectors	$ 816,911	$ 634,869

The consideration of opportunity costs remains important to the impact results. Now, the additional negative shock to the wholesale trade sector results in reduced indirect and induced effects to $634,869, implying a net output multiplier of 1.63, a similar relative decrease to that in Model 1.

As with Model 1, the relative distribution of effects is similar across versions of Model 2, we restrict our attention to the model that explicitly accounts for opportunity costs. Figure 3 provides a visual representation of the industry effects, along with the component indirect and induced contributions. As expected, the food sold-farm sector receives the largest positive impact ($175,592) from the change in final demand, and is almost entirely from indirect effects. To make a proper comparison with the Model 1 farm effects, however, we need to combine the indirect and induced effects from the food hub farm sector and the other farm sector.[19] This results in a total farm sector effect of $195,194, or a 7.8% increase from Model 1. This is expected given food hub farm sector expenditures have a higher local component (increasing indirect effects) and a higher allocation to labor (increasing induced effects).

[19] Recall that purchases made by food hub farms from other farms were split evenly between food hub farms and other farms.

The ranking of the top five sector effects remain the same as that with Model 1; i.e., the remainder of the top five affected industries are food sold-nonfarm, real estate and rental, retail stores – gasoline stations, and health and social services. Notably, support activities for agriculture and forestry are considerably higher in Model 2 ($14,194) than Model 1 ($3,278), reflecting the higher industry linkages with this sector by food hub farms (Table 6).

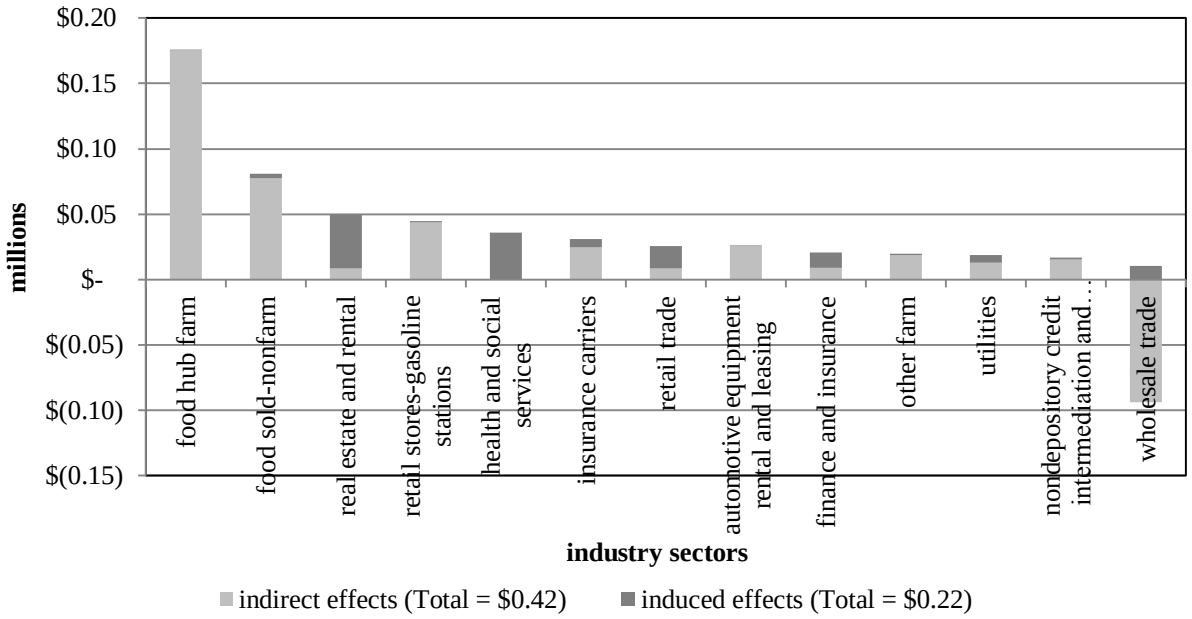

Figure 3: Indirect and induced effects per $1,000,000 increase in final demand (top impacted industry sectors), Model 2 including opportunity cost

5.2 Qualitative Results

This sub-section presents qualitative results from our interviews with food hub farms and customer surveys. Recall that these results are important contributions to our economic impact assessment in that they help us to understand how food hubs impact participating producers, including the extent to which they increase overall demand for and consumption of local products.

5.21 Food Hub Farmer Results

Consistent with RA's primary business functions (Table 7), food hub farmers reported that RA supported their business through performing a variety of activities, including: freight, crating/packing goods for shipping, storage/warehousing, retailing, wholesaling and marketing. Based on our food hub farm interviews, freight is the most commonly performed activity by RA on behalf of its farmer vendors—farmers reported on average that RA was responsible for freighting 26% of total output (i.e., total sales divided by total value of sales freighted by RA), followed by storage/warehousing (14%) and wholesaling (9%).

Table 7: Activities performed by RA on behalf of its farmer vendors

		% of total farm product RA services		
Activity	Count	Average	Max	Min (if performed)

freight	20	26%	93%	1%
crating/packing goods for shipping	1	1%	40%	40%
storage/warehousing	11	14%	85%	2%
retailing	6	3%	50%	1%
wholesaling	12	9%	98%	1%
marketing	6	4%	98%	1%

Food hub farmers were asked a series of questions to determine the dollar-value of sales facilitated by services performed by RA, as well as the extent to which RA enabled their farm business to expand. Food hub farms reported enhanced market access due to their relationship with RA. Of the farm vendors, those that were mid-scale (farms with gross sales between $250,000 and $500,000) reported being most reliant on RA's services (see figure 4). All six of the mid-scale food hub farmers we interviewed reported that over 20% of their farm's total sales were facilitated by RA (two mid-scale farmers reported that 20% of their farm's sales were facilitated by RA, the other four reported 40%, 55%, 85%, and 93%). Of the small farms we interviewed (those that earned under $250,000 in gross sales), six had less than 20% of their total gross sales facilitated by RA, three had 20-50%, and six had over 50%. Large farms (those with over $500,000 in gross annual sales) reported much less reliance on RA-facilitated sales than the farmers in the other farm size categories. Of the nine large farms interviewed, seven reported that under 20% of their sales were facilitated by RA. Of those respondents, three reported less than one percent of total sales facilitated by RA, the other reported two percent, three percent, and five percent. Interestingly, the remaining two large farms reported 51% and 93% of total sales facilitated by RA.

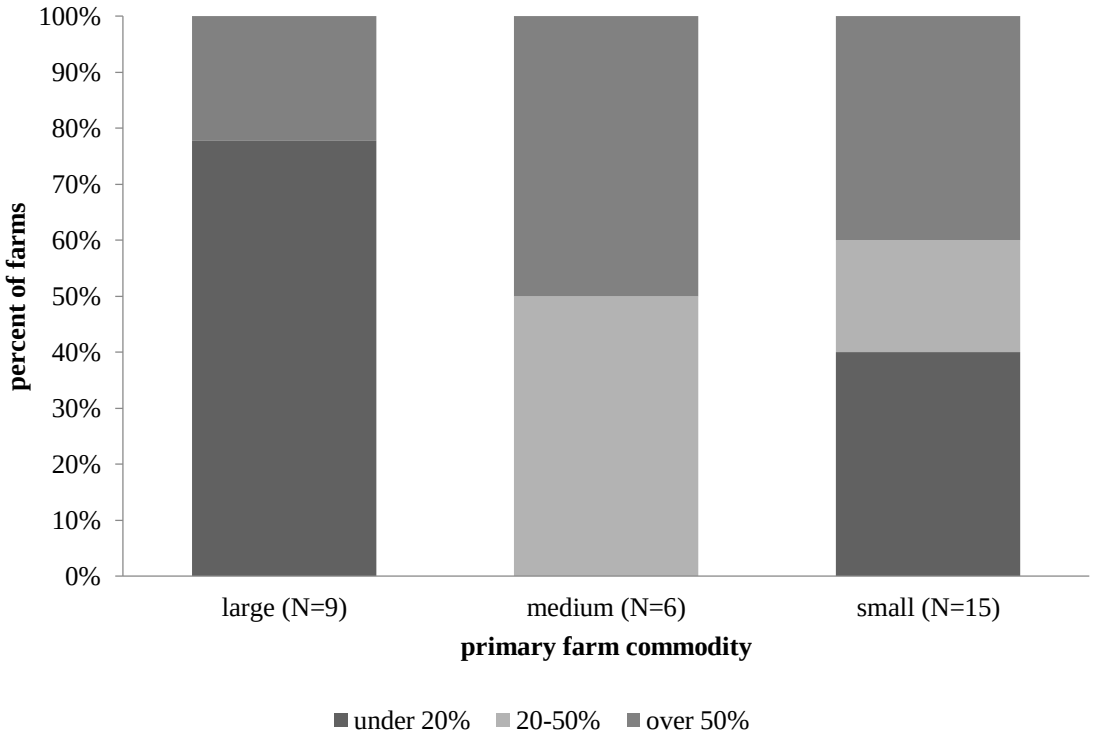

Figure 4: Percent of farms by level of facilitated sales from RA, by farm size category (small = <250k, medium = 250-500k, large = >500k)

We also looked at RA facilitated sales by primary farm commodity (livestock, fruit and vegetable, and value added). Accordingly, we found that the distribution of RA facilitated sales by commodity was fairly evenly distributed. Between 27-56% of the producers from each primary commodity category had less than 20% of their sales facilitated by RA (fruit and vegetable producers 56%, value added 50%, livestock 27%), and 33-40% from each category had over 50% of their sales facilitated by RA. Livestock producers had a larger share of 20-50% of sales facilitated by RA, compared to fruit and vegetable or value added producers (36%, 11%, and 10%, respectively) (see figure 5).

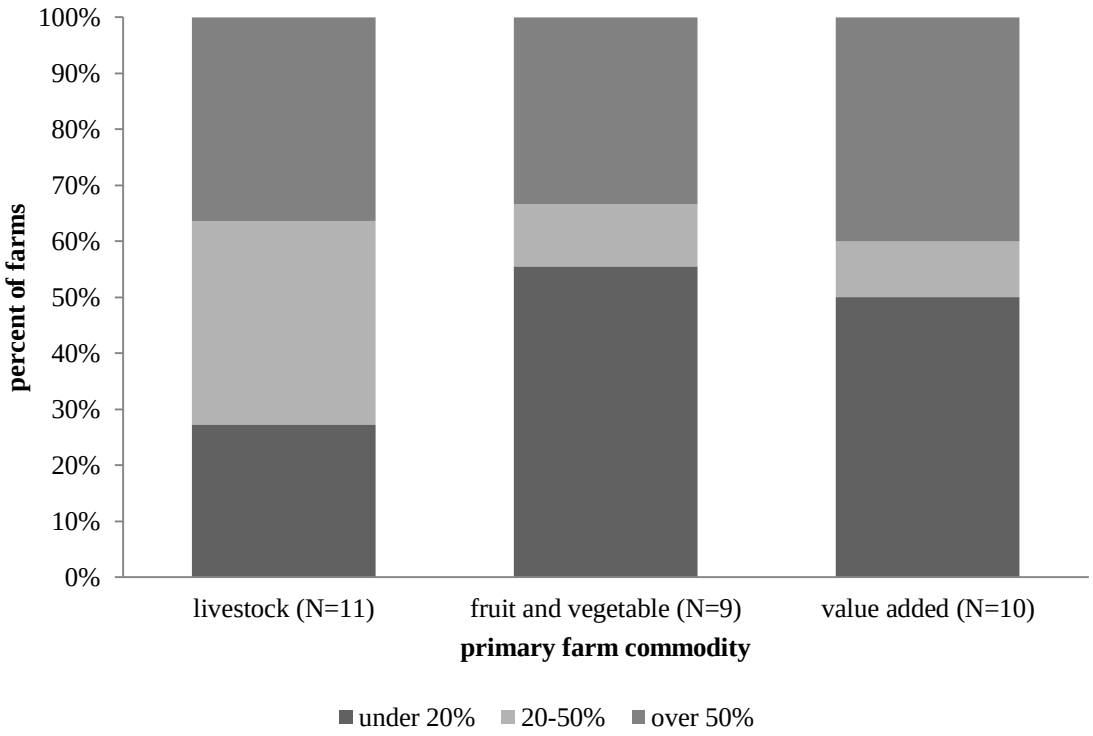

Figure 5: Percent of farms by level of facilitated sales with RA, by primary farm commodity

Of the farm vendors we interviewed, 60% reported that their business relationship with RA enabled their business to expand. An additional 10% were unsure if RA had supported farm business expansion, and 30% reported that RA had not enabled farm business expansion. Of the farms that responded that RA had not enabled their business to expand, two reported that their business was not currently interested in expanding, and another five mentioned the importance of gaining access to the NYC market through RA.

Only one farm vendor with over $1,000,000 in total annual gross sales responded affirmatively that RA had enabled their business to expand. These larger farms generally felt that the volume of sales facilitated by RA was too small to make a significant difference in their business' total sales or production, and that they had other market options.

Access to the New York City market was the most frequently cited reason for expanded sales, though improved market access generally was consistently reported. Even farms that were unsure about RA's role in its expanded sales frequently cited RA's freight service and its pick-up and delivery flexibility as the primary reasons farmers chose RA over other freight services to NYC. Others used RA's 'good reputation' as a 'values-based distributor' to gain market access. This sentiment was particularly true among newer businesses that had not developed direct wholesale purchasing agreements with stores or restaurants.

RA's warehouse capacity was also cited as facilitating business expansion for farms too small to have significant cooler or storage space. Many farms keep frozen meat or storage crops (i.e., potatoes, root vegetables) at RA's warehouse, retrieving them periodically to sell through winter

markets, community supported agriculture (CSA), or wholesale outlets. As a result of access to additional storage, some farmers reported putting more acres into operation specifically for storage crops as a way to increase winter (year-round) income.

For almost all of the farmers interviewed, regardless of their response to whether RA contributed to business expansion, RA was one of a confluence of factors that contributed to business expansion. We specifically asked farmers about other *critical* pieces of infrastructure that enabled their farm business to expand. Farmers cited access to: good agricultural land, particularly located in agricultural districts; capital, especially start-up businesses; processors (i.e., wineries that want to purchase grapes) and processing facilities (i.e., meat, fruit and vegetable); sympathetic government programs (i.e., farm brewery legislation) that incentivize processors to utilize local products; risk management services and support; input supply companies (i.e., container companies, appropriately scaled or specialty equipment); other distributors; labor, particularly seasonal; farm contracts; cold storage or warehousing in New York City; the internet; rental vehicles, especially trucks; marketing collectives (i.e., farmers' markets, CSAs); media coverage; extension services, farming groups, and conferences for knowledge transmission and sharing; natural amenities and transportation infrastructure that help to attract tourists; agritourism events (like festivals); wholesale customers (i.e., restaurants, natural food stores, and grocery stores); and, consumers interested in 'local food'.

5.22 Customer Survey Results

On average, household customers reported purchasing 12% of their total 2011 grocery items from RA (standard deviation 13.79), only some of which were from local farms (i.e., they purchased local and non-local items from RA). Thirty-three percent reported that if RA expanded in some way (i.e., carried more items, added additional delivery routes/times) that they would increase their purchases, 16% reported they would not increase their purchases, and 51% responded they were unsure. For those who said that they would or were unsure, the ability to purchase items in smaller quantities was the most frequently cited desire, followed by expanded delivery routes and times. The majority of household customers (62%) did not know or were unsure of businesses offering similar types of local products.

Business customers were asked a series of questions to better understand the extent to which their purchases from RA displaced other purchases and/or expanded their total purchases of locally-grown or processed products. Almost 80% of business customers surveyed reported that their relationship with RA enabled their business to expand their product offerings. And when asked to quantify the amount of additional products, they reported expanding offerings by 31%. We asked business customers to elaborate on how the relationship with RA enabled their business to expand local offerings. Some particularly illustrative responses include: "Regional Access provides a link to some local farmers that streamlines our procurement process. I wish some more of my local farmers would use Regional." And, "They offer a lot of local farms and we're able to work with local farms through one business as opposed to working with all farms separately."

We also asked businesses if they purchased fewer products from other distributors in 2011 due to their relationship with RA. Accordingly, 49% reported that they purchased less product, 46% report that their purchases from RA did not impact their purchases from other distributors, and

5% reported that they did not know (n=164). For those who responded that purchases from RA decreased their purchases from other distributors, they estimated their purchases from other distributors decreased by 23% (n=69). This was the information used above to estimate opportunity costs of expanded RA sales.

The majority of business customers (57%) reported that if RA did not exist, they did not know or were unsure of a place to purchase similar 'locally grown' items. Further, most businesses (66%) were interested in expanding their purchases if RA expanded its product availability (i.e., worked with farms with expanded year-round offerings, carried a more diverse selection of products).

We also asked businesses if they receive a price premium from their customers for items marketed as 'locally grown.' We asked businesses to rank on a scale from 1 to 5 the premium that they received from their customers for items marked 'locally-grown' (1 = significantly lower price for local, 3 = no price difference, 5 = significantly higher price for local). On average, customers responded that they received a slightly higher price for items labeled locally-grown (3.49), with 3% reporting significantly higher prices for local, 49% somewhat higher prices, 42% no price difference, 5% somewhat lower prices, and 1% significantly lower prices (figure 6).

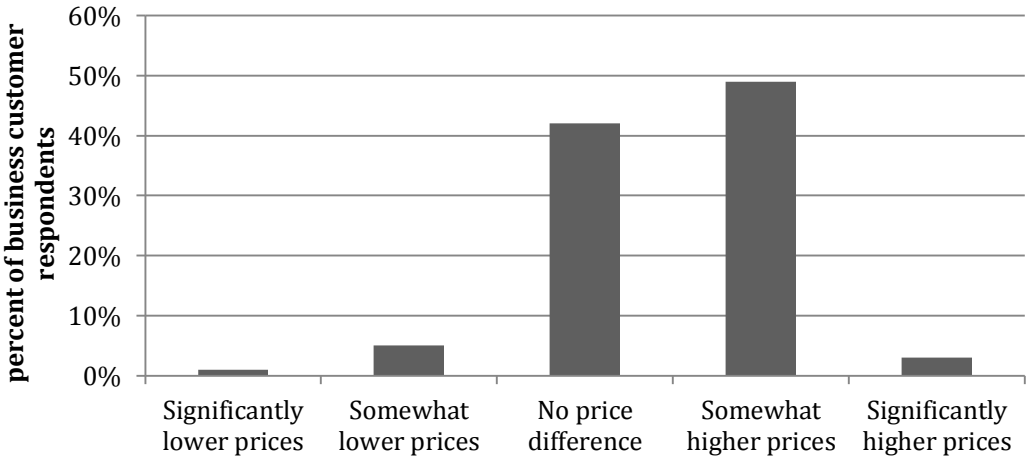

Figure 6: Do customer receive a price premium for items marketed as 'locally grown'?

Finally, business customers were asked a series of questions addressing the scalability of the food hub sector (i.e., if RA expanded its delivery routes/days, more products, etc. would the customers purchase more product). Though we know asking questions about possibility for expanded sales from RA's customers presents a limited view of the potential to scale the food hub sector, the responses provide some clarity into the unmet demand for food hub outputs.

Business customers overwhelmingly (67%) reported that they were interested in making additional purchases if RA expanded its product availability, delivery routes, or times. (n=167). Customers were asked to elaborate on the ways in which RA could expand that would cause them to purchase additional product. The range of responses was classified into three general categories: improved logistics, lower prices; and increased product selection.

The largest area for RA expanded sales is through increasing product selection. Most customers (73%) cited that expanded product offerings would result in their business purchasing more from RA. Many customers reported that they currently purchase items directly from farms that they would prefer to purchase through RA, due, in part, to limited means of distribution from individual farmers.

Another important area to expand product sales was through improved logistics; 40% of customers reported that improved logistics would support increased ordering. Specifically, customers mentioned the needs for a better ordering system, expanded delivery times, smaller minimum order sizes, reduced time lags between order and delivery, additional marketing people; and improved service and dependability. The most frequently cited logistical barriers were the frequency of the deliveries and the delivery fee/minimum order requirements.

Finally, 22% of business customers mentioned pricing concerns. In general, customers do not solely purchase from RA based on pricing, but based on other factors (wanting to support local farms and communities, the availability of high quality specialty items, etc.). While some of customers mentioned they would create room for more local products if RA carried them, others explicitly said they would purchase more from RA at the expense of other distributors. This reiterates the importance of considering opportunity cost when considering the expandability/scalability of the food hub sector.

6.0 DISCUSSION AND CONCLUSIONS

This research report provides a replicable empirical framework to conduct impact assessments for food hub organizations. By collecting detailed expenditure and sales information from food hubs, an analysis-by-parts approach was shown to estimate the multiplier effects of a change in final demand for food hub products. In addition, by collecting similar detailed-level information from the farms supplying products to the hub, the downward bias in using default agricultural production data when considering farming operations that supply to food hub operations can be remediated and result in more accurate assessments of a food hubs economic activity. Finally, by collecting detailed farmer (upstream) and customer (downstream) information on sales and purchasing patterns with food hubs, a better understanding of the important factors affecting the growth and scalability of food operations can be attained, along with estimating the opportunity costs associated with increases in food hub product purchases (i.e., offsets via decreases in purchases in other sectors).

Our particular application considered RA, a food hub operating in upstate New York, a $6 million operation that purchases and markets food products (both fresh and processed) from farms and agribusinesses primarily in NYS. Importantly, we demonstrate that the farms selling to the food hub have differential production functions than those constructed using an aggregate NYS farm sector in IMPLAN. Put differently, the SAM coefficients found in the default IMPLAN agricultural sectors do not accurately reflect activities of the food hub farms in our study. From the comparative modeling exercise, we show that the estimated multiplier effects to the farm sector are nearly 8% lower when using the default data and, overall, result in a total output multiplier that is biased downward by 4%. If similar characteristics of farms are apparent in similar studies, the impact of food hubs utilizing default IMPLAN agricultural sectors will

likely under-estimate the true magnitude of the local economic impact given food hub farms propensity to spend more money in the local economy. Further, additional spending by the food hub farms per unit of output on employee compensation, other agricultural sectors, and support activities for agriculture and forestry, may be particularly important for rural economies. To the extent that the goal of a stimulus to the food hub sector is to support rural economies, capturing more accurate inter-industry linkages of farms that work with food hubs is important.

Results from the model incorporating food hub-farm specific data show a gross output multiplier of 1.82, indicating that for every additional dollar of final demand for food hub products (and no opportunity cost), an additional $0.82 is generated in related industrial sectors. However, using customer data, we estimate that for every $1 increase in final demand for food hub products, a $0.11 net offset in purchases from other sectors occur (specifically applied to wholesale trade). After applying the additive negative shock, the net output multiplier is 1.63, reducing the gross multiplier by over 10%. Future impact assessments on food hubs should importantly consider opportunity costs.

Food hubs support the expanded availability of local farm products. Information collected from farm vendors reveal that RA positively contributes to farm business expansion. Freight service and access to storage to enhance year-round marketing were important services provided by RA. In addition, RA particularly facilitates sales for new businesses where access to intermediated/wholesale customers is particularly problematic. Also, sales facilitation by RA for medium-scale operations was particularly important. Smaller-scale operations tend to operate more fully through direct markets and larger-scale operations are more easily able to access larger customer markets on their own. One of the key ways that RA supports these producers is by facilitating distribution from farms located in more rural parts of NYS to major metro centers, including New York City.

While business customers appreciate the ability to work with one entity accessing multiple farms' products, other local food purchase opportunities exist. In particular, we show that an increase in demand for food hub products results in decreased demand for other wholesale products. Additionally, customer survey results provide evidence that there are opportunities for expansion within the food hub sector, primarily through improved logistics (e.g., lower minimum order sizes and increased frequency of deliveries) and expanded product offerings.

As discussed earlier in this report, our results are based on one case study, and thus extending the results beyond the methodological recommendations may be problematic, particularly for food hubs whose business model is considerably different (e.g., do food processing). Though we caution against generalizing the results of our case study to other food hubs, in the context where a food hub operates in a region with similar scale producers growing similar commodities, and performs similar functions, one may be able to utilize the adjusted production functions for the food hub farm sector found in the case study. Further, given that Fischer, et al. (2013) estimate a very similar level of COGS, may give some indication that RA, in some capacities, exhibits an expenditure pattern similar to an average food hub. In any case, the data collection procedure described can be used by researchers interested in conducting similar studies of food hub operations.

7.0 FUTURE RESEARCH

There are many areas for future research that emerged from this project. We fully support the recommendations for future research of O'Hara and Pirog (2013) that "collective understanding of the relationship between local foods and economic development can be enhanced through improving data collection, undertaking studies on larger geographic scales…and forming a learning community to review and critique studies" (p.1).

Our results provide strong evidence that economic impact assessments of food hubs require data collection from farm participants. The challenge is that this type of data collection is time consuming and expensive; as presented, the data needs for this type of research are significant.. The USDA Agricultural Resource Management Survey (ARMS) data provide a valuable source of information on farm expenditure patterns, but the sample size for local food system participants (not to mention those selling to food hubs) is extremely small. In addition, there is not useful information on *location* of expenditures. This information would be extremely useful, and facilitate more regular evaluation of these types of initiatives.

This study presents information based on one case study, and the expandability of its recommendations will clearly benefit from a learning community. Recently completed studies from Fischer, et al. (2013), as well as Farm Credit Council and Farm Credit East (2013), will help to determine, for example, the extent to which RA's expenditure pattern, as well as the expenditure pattern of food hub farms, are similar to other food hubs and participating producers. For example, how do the economic impacts of food hubs change when a hub works only with fresh product producers (i.e., no value added products)? Further, the food hub farm survey (Appendix 2) was designed to correspond to IMPLAN sectors, rather than to farm profit and loss statements. There are merits and weaknesses to this approach, and as data of this sort continues to be collected, future research to determine more standardized data protocol is extremely important – particularly to compare the results across studies.

Finally, we recommend additional research that compares different models and structures for aggregating and moving locally-grown products into different types of market outlets. Additionally, conducting market channel assessment studies similar to those conducted by Hardesty and Leff (2010) and LeRoux et al. (2010) are recommended to better understand the net impact of food hubs on participating producers, particularly in comparison to other available market outlets.

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APPENDIX 1: Regional Access Sector Aggregation Scheme

Regional Access Expense	Model Sector	Original 2-digit NAICS sectors	Revised IMPLAN sectors
--	11 Ag Forestry Fishing and Hunting*	1-19	5, 7-9, 15-18
Food Sold – farm	Food Sold – farm	--	1-4, 6, 10-14
--	Support activities for agriculture and forestry	--	19
--	21 Mining	20-30	20-30
Utilities – electric	22 Utilities	31-33	31-33
--	23 Construction*	34-40	34-38, 40
Repair and maintenance driveways, grounds and warehouse	Maintenance and repair construction of nonresidential structures	--	39
--	31-33 Manufacturing*	41-318	41, 42, 48, 49, 71-318
Food Sold - Nonfarm	Food Sold - Nonfarm	--	43-47 + 50-70
Office supplies, dry ice, warehouse supplies	42 Wholesale trade	319	319
--	44-45 Retail trade*	320-331	320-323, 325, 327-331
Meals and Entertainment	Retail stores – Food and beverage; Food services and drinking places	--	324, 413
Fuel Expense	Retail stores – Gasoline stations	--	326
--	48-49 Transportation and Warehousing*	332-340	332-334, 336, 337, 339, 340
Freight In - other	Transport by truck	--	335
Truck registration and inspection	Scenic and sightseeing transportation and support activities for transportation	--	338
--	51 Information*	341-353	341-350, 353
Phone, cable, equipment leases (satellite tracking)	Telecommunications	--	351
Professional expense – computer consulting; Dues, licenses and subscriptions	Data processing, hosting, ISP, web search portals and related services; Custom computer programming services; Computer systems design services; Other computer related services	--	352, 371-373
--	52 Finance and Insurance*	354-359	356, 358, 359
Returned check fees; Bank Charges/Credit Card Finance Charges	Monetary authorities and depository credit intermediation activities	--	354
Interest expense; credit card merchant fees	Nondepository credit intermediation and related activities	--	355
Health insurance; warehouse insurance; worker's compensation insurance;	Insurance carriers	--	357

disability insurance			
--	53 Real estate and rental*	360-366	360, 361, 363-366
Rental truck expense; lease trucks	Automotive equipment rental and leasing	--	362
--	54 Professional-scientific and technical services	367-380	369, 370, 375-380
Professional expense – legal	Legal services	--	367
Professional expense – accounting	Accounting, tax preparation, bookkeeping, and payroll services	--	368
Professional expense – business consultation	Management, scientific, and technical consulting services	--	374
--	55 Management of companies	381	381
--	56 Administrative and waste services*	382-390	383-389
casual labor; temporary drivers	Employment services	--	382
Utilities - Solid Waste	Waste management and remediation services	--	390
--	61 Educational Services	391-393	391-393
--	62 Health and social services	394-401	394-401
--	71 Arts-entertainment and recreation	402-410	402-410
--	72 Accommodation and food service*	411-413	412
Meals and Entertainment	Hotels and motels, including casino hotels	--	411
--	81 Other services*	414-426, 433-436	415, 416, 418-421, 423-426, 433-436
Truck repairs and maintenance	Automotive repair and maintenance, except car washes; Commercial and industrial machinery and equipment repair and maintenance	--	414, 417
Parking Expenses	Other personal services	--	422
Advertising	Civic, social, professional, and similar organizations	--	425
--	92 Government and Non NAICS*	427-432, 437-440	428-431, 437-440
Postage	US Postal Service	--	427
Utilities - Water	Other state and local government enterprises	--	432

*Edited 2-digit NAICS sector

APPENDIX 2: Farmer Survey

GENERAL QUESTIONS

1. In which county is your operation located? _____ COUNTY

2. Type of farm operation (please mark % of total gross sales derived from each type of farming. The sum of all categories should equal 100%).

Type of operation	Sales (y/n)	% of total gross sales
Oilseed farming		
Grain farming		
Vegetable and melon farming		
Fruit farming		
Greenhouse, nursery, and floriculture production		
All other crop farming		
Cattle ranching and farming		
Dairy cattle and milk production		
Poultry and egg production		
Animal production, except cattle and poultry		
Other (explain)		
Total		100%

3. Please describe the services Regional Access performs for your business.

Activity	Performed by Regional Access (y/n)	% of total farm product that RA services
Freight		
Cleaning, sorting, grading, or packing of your product		
Light processing/manufacturing of your product (i.e., freezing, cooking)		
Crating/packing goods for shipping		
Storage/warehousing		
Technical services or support (i.e., assistance determining appropriate packaging and/or labeling) If yes, please identify what		
Retailing/wholesaling/marketing your product If yes, please identify which		
Bookkeeping, accounting, insurance, and/or certifications If yes, please identify which		
Other (explain)		
Total		**100%**

4. What percentage of your 2011 total annual gross sales was facilitated through the services provided by Regional Access? (i.e., not only what Regional Access is paid to do, but the totality of your gross sales enabled by RA) _____%

5. If Regional Access did not exist, is there another company that you could work with in New York State to perform the same/similar business functions? _____ (yes/no/don't know)

Explain:_____
_____
_____
_____

6. Has your relationship with Regional Access enabled your farm business to expand? _____ (yes/no/not sure)

If yes, please quantify in terms of expanded acreage in production, additional livestock (whole animal) sales, gross revenue, etc. (can respond in terms of all of the above or just one): _____
_____

7. Besides Regional Access, are there critical pieces of infrastructure (e.g., market availability, slaughterhouse availability) that have enabled your farm business to expand?

_____
_____
_____

8. What do you appreciate the most about working with Regional Access?

_____
_____
_____

9. What are your biggest challenges working with Regional Access?

_____
_____
_____

10. Please provide your farm's total annual gross sales and operating expenses for 2011, as well as other descriptors of the size of your operation in 2011 (fill in all).

Total annual sales ($)	Total operating expenses ($)	Total annual payroll	Number of livestock	Acres farmed	Acres owned	Acres rented

# Paid employees				
Part-time	Full-time	Seasonal Part-time	Seasonal Full-time	Unpaid labor

OPERATING RECEIPTS AND SALES DISTRIBUTION AREAS

This part of the survey asks you questions about where you sell your product –the types of businesses to which you sell product, where the businesses are located (County), and how the product travels from your farm to market.

- Retail sales are defined as direct-to-consumer sales (i.e., sales at farmers' markets, farm stands, CSAs).
- Wholesale sales involve selling to buyers who package or process products or re-sell fresh products.

It may be easiest if you complete the '% of total sales' column first.

11. Please provide percentages of total sales by market channel for 2011 as specifically as possible.

Marketing channel, sales outlet	**% of total sales**	**% of individual category sales by location (where you sold it)***			
		County(ies) of market location	**% sold within NYS**	**% sold outside NYS**	**TOTAL**
SALES TO OTHER FARMS					
RETAIL SALES					
WHOLESALE SALES					
Regional Access					
Other_____					
COMMODITY SALES					
TOTAL	100%				

* Sales locations: where your sales are destined for either consumption or processing. If you know the operating location of the buying agent/firm (e.g., a food processing plant in Western NY, a grocery store in your home town, or a local food distributor in your county), use their location to respond. If the buyer's place of operation or residence is unknown (e.g., consumers at a farmers market, or wholesale auction barn) note where the sale takes place.

OPERATING EXPENSES AND INPUT PROCUREMENT AREAS

We next ask about the types of inputs your operation purchases. We also ask if the purchases are made within NYS. *It may be easiest if you complete the 'input expense in this category' column first, followed by the '% of total expenses' column, before moving to the grey boxes.*

TOTAL (2011) OPERATING EXPENSES FROM QUESTION 3: _____

12. Please provide percent of total operating expenses for 2011 as accurately as possible. Edit or add categories as needed.

Major inputs and services	Input expense in this category (y/n)	% of total expenses	Percent of individual category purchases by location (where you bought it)*			
			County(ies) where item is purchased	Within NYS	Outside NYS	TOTAL
Agricultural commodities from other farms (i.e., hay, grain, feeders)						100%
Ag services (i.e., fertilizer, farm labor contractors, insemination, milk testing, vaccination - except by vets, custom harvesting)						100%
Utilities • Purchases from fuel dealers						100%
• All other						100%
Repair and maintenance of farm buildings, land, fencing and other non-residential buildings						100%
Items related to: • ON farm processing (what?)						100%
• OFF farm processing (e.g., slaughtering)						100%
Items purchased from wholesalers/ distributors						100%
• Purchased from RA (i.e., for resale at farm)						100%
• Purchased from other (business name?)						
Tractor/machinery						100%

parts/repair • Purchase parts/ repair on farm • Repair done at shop						100%
Items purchased from retail stores (i.e., gas, tools, office supplies, farm supply stores)						100%
Transportation (truck transit and freight – including hauling livestock) – • utilizing RA						100%
• NOT utilizing RA						100%
Warehousing - rented • from RA						100%
• NOT from RA						100%
Information services (advertising, phone, internet, website)						100%
Insurance						100%
Rented/leased land/property						100%
Rented equipment (ag machinery, vehicles, construction equip) – must be used by farm (i.e., not hired contractor)						100%
Professional services (legal, accounting, engineering, surveying, web design, ag consultant)						100%
Veterinary services						100%
Waste disposal/hauling services						100%
Education/training programs						100%
Taxes (all – labor, property, sales)						100%
Labor (employees, not contracted)						100%
Other						100%
TOTAL		**100%**				

END OF SURVEY – THANK YOU!

APPENDIX 3: Online Customer Survey

Consent

Consent Form (Online)

As a customer of Regional Access, we hope that you will participate in a brief survey. The survey is part of a study funded by the U.S. Department of Agriculture developing a methodology for assessing the economic impact of regional food hubs to agricultural producers. To do this, we are conducting an in-depth case study of Regional Access. This is the first study of its kind in the country. Our goal is to find ways to support the viability of local farmers. Only the project work team will review your individual responses to the survey questions. In any sort of report we make public, we will not include any information that will make it possible to identify you or your business, unless you give explicit permission. Taking part in this study is completely voluntary. You may refuse to participate at any time, or skip any questions that may make you feel uncomfortable.

The main researcher conducting this study is Todd Schmit, a professor at Cornell University. If you have any questions, please feel free to contact him at any time:

Todd M. Schmit
(e) tms1@cornell.edu
(w) 607-255-3015 (c)
607-592-2316

By proceeding with this online survey, you acknowledge that you have read the above information and provide your consent to participate.

I Agree	I do not Agree
○	○

Split Question

In 2011, were you purchasing product from Regional Access for your household or business?

- ○ Household
- ○ Business

All Customers

In 2011, which of the following products did your ${q://QID1/ChoiceGroup/SelectedChoices} purchase from Regional Access?

- [ ] Fresh vegetables and melons
- [ ] Fresh fruits
- [ ] Greenhouse or nursery items
- [ ] Eggs
- [ ] Processed fruits and vegetables - frozen, dried, canned, pickled, sauces or condiments (explain)
- [ ] Beef
- [ ] Lamb/pork
- [ ] Chicken
- [ ] Other meat (explain)
- [ ] Grain
- [ ] Dairy
- [ ] Oils & Vinegars
- [ ] Breakfast cereals
- [ ] Bread, tortilla, pasta, or tofu
- [ ] Snack foods
- [ ] Alcoholic beverages (beer, wine, distilled beverages)
- [ ] Other (explain)

Of the products purchased from Regional Access, please indicate the percentage grown or processed within NYS.

% 0 » Fresh vegetables and melons

% 0 » Fresh fruits

% 0 » Greenhouse or nursery items

% 0 » Eggs

% 0 » Other (explain)

% 0 » Processed fruits and vegetables - frozen, dried, canned, pickled, sauces or condiments (explain)

% 0 » Beef

% 0 » Lamb/pork

% 0 » Chicken

% 0 » Other meat (explain)

% 0 » Grain

% 0 » Dairy

% 0 » Oils & Vinegars

% 0 » Breakfast cereals

% 0 » Bread, tortilla, pasta, or tofu

% 0 » Snack foods

% 0 » Alcoholic beverages (beer, wine, distilled beverages)

Household Customers

In 2011, was your household located in NYS?

- Yes
- No

What percentage of your household's grocery purchases were made from Regional Access in 2011?

0 %

If Regional Access carried more items, expanded the number of delivery dates, etc. would you purchase more product from them?

- Yes
- No
- Maybe

What would make you purchase more product(s)?

If Regional Access did not exist, are there other stores or home delivery services offering access to the same or similar product(s)?

- Yes
- No
- Don't know

Business Customers

In 2011, were the products your business purchased from Regional Access utilized in NYS?

- Yes
- No
- Partially

What percentage of the products your business purchased from Regional Access in 2011 was utilized in NYS?

0 %

For your business, please give the percentage of gross sales derived from each type of business function in 2011. (The sum of all categories should equal 100%.)

Processor/ Manufacturer (describe)	0 %
Wholesaler	0 %
Retailer	0 %
Distributor	0 %
Grocery/meal delivery service	0 %
Restaurant	0 %
Other (explain)	0 %
Total	0 %

What percentage of your business' 2011 gross annual expenses was spent on grocery (i.e., food) product(s)?

0 %

Of that percentage, what percent was purchased from Regional Access?

0 %

Has your business been able to expand its product offerings (either in terms of types of items offered or quantity of offerings) due to the existence of Regional Access?

- Yes
- No

By what percent has your business been able to expand its product offerings because of Regional Access?

0 %

Can you tell us a little more about how your business has expanded? We are interested in your business' story: how did purchases from Regional Access enable your business to expand? For example, did your business add an additional cooler for 'local' products? Has your business expanded its customer base to include those looking for 'locally-grown' or specialty products?

Did your business purchase less product from other distributors in 2011 due to its relationship with Regional Access?

- Yes
- No
- Don't know

Can you quantify the percentage of purchases from Regional Access in 2011 that your business previously purchased from another distributor?

0 %

If Regional Access did not exist, is there another company from which your business could purchase similar 'locally grown' product(s)?

- Yes
- No
- Don't know

If Regional Access expanded its product availability (i.e., worked with farms that had expanded year-round offerings, carried a better product selection, delivered product to your area more frequently), would your business purchase more product(s) from them?

- Yes
- No
- Don't know

Please explain your answer above:

On average, does your business get a premium price from its customers for items marketed as 'locally grown'?

- 1 - significantly lower prices for 'local'
- 2 - somewhat lower prices for 'local'
- 3 - no price difference
- 4 - somewhat higher prices for 'local'
- 5 - significantly higher prices for 'local'

Is your business currently meeting its customers' demands for 'locally grown' products through purchases from Regional Access or other distributors?

- 1 - not meeting customers' demand for 'local' products
- 2
- 3 - meeting some of the demand for 'local' products
- 4
- 5 - meeting all of the demand for 'local' products

Please explain your answer above:

Please provide your business' total annual gross sales, as well as other descriptors of the size of its operation in 2011.

Total 2011 annual sales ($)	
Years in Operation	
# Paid full time employees	

Follow-up

If we have additional questions, may we contact you?

- Yes
- No

Please provide your contact information:

Name	
Phone number	
Email	