

# Farm to Institution Markets in Massachusetts

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# Part I: Massachusetts Farm to Institution Programs

## Introduction

Farm to Institution programs seek to link institutional food service purchasers to local farmers, and have grown considerably throughout the country and throughout the Commonwealth of Massachusetts in the last decade. Programs are generally operated by non-profits, institutions such as schools or hospitals, or local or regional governments or departments. According to advocacy groups, the first documented “Farm to School” program began in Santa Monica, California in 1996 (Community Food Security Coalition, School Food FOCUS, & National Farm to School Network, 2010). By 2001, there were 6 documented programs in the United States, 400 programs by 2004, and 2,350 programs by 2011 (Community Food Security Coalition, 2012). The National Farm to School Network reports that in 2012 there were 2,571 programs in all 50 states, involving 10,217 schools and 2,470 school districts (2012).

Farm to Institution (Fti) programs have been inspired by a range of motivations including: to provide consumers of institutional meals nutrition education and access to fresher, more appetizing, and more healthful meal options in order to combat nutrition-related illness and disease; to provide a new market for farmers; to spur local economic growth by increasing the scale of locally-grown sales; and to improve the environmental sustainability of the food system (i.e., cutting down on “food miles” or limiting pesticide use). Fti programs may provide support to any of the participants in the supply chain – from the end consumer and the institution where they eat their meal, to the farmer. Nationally, Fti programs began in public elementary and secondary schools, and have subsequently spread to private schools, colleges, universities, pre-schools, hospitals, nursing homes, and group homes.

In 2002, the Massachusetts Department of Agricultural Resources (MDAR) sponsored a farm-to-college event at Tufts University, which resulted in an Institutional Sales Task Force under then-Commissioner of Agriculture Jay Healy. The Task Force supported Massachusetts’ colleges and private schools to purchase locally grown produce. By the fall of 2003 budget cuts at MDAR eliminated staffing for the Task Force, but the Mass. School Food Service Association (now called Mass. School Nutrition Association) had hired the former MDAR staff person to do a one year grant-funded farm to school pilot project with five public school districts. The former staff person founded the Massachusetts Farm to School Project (MFTSP) in 2004.

MFTSP has been at the forefront of the national Fti trend, and has contributed to a particularly robust landscape of programs in the Commonwealth. MFTSP was the first entity in Massachusetts devoted exclusively to “connect[ing] farms and institutions to improve access to locally grown foods and strengthen our local economy” (MFTSP, 2012). Over the course of the eight subsequent school years, Massachusetts Public School Districts’ participation in Farm to School programs increased from 1% in 2004-2005, to 44% in 2011-2012 (Erwin, 2012). This increase in the percent

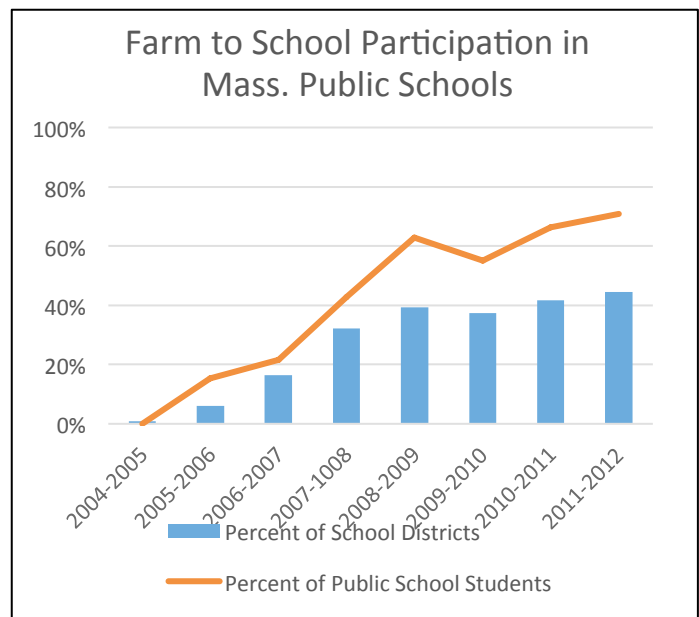


Figure 1. Mass. Public School District Farm to School Participation 2004-2012 (Erwin, 2012; DOE, 2012)

<b>Massachusetts Ftl Support Entities</b>	
<b>Agricultural Business Associations</b>	<i>Farm Bureau Agricultural Preservation Corporation</i>
	<i>Mass. Fruit Growers Association</i>
	<i>National Association of College and University Food Services</i>
<b>Food Service Associations</b>	<i>School Nutrition Association of MA</i>
<b>"Buy Local" Non-Profits</b>	<i>Berkshire Grown</i>
	<i>Northeast Harvest</i>
	<i>Southeastern Mass. Agricultural Partnership (SEMAP)</i>
	<i>Community Involved in Sustaining Agriculture (CISA)</i>
<b>Childhood Health &amp; Nutrition</b>	<i>Mass. Public Health Association</i>
	<i>Project Bread</i>
	<i>Health Care Without Harm</i>
<b>Economic Development</b>	<i>MassDevelopment</i>
	<i>Franklin County Community Development Corporation (FCCDC)</i>
<b>Farm to Institution</b>	<i>Project Bread</i>
	<i>Mass. Farm to School Project</i>
	<i>Springfield Farm to Preschool and Families Project</i>
<b>Government</b>	<i>Mass. Dept. of Agricultural Resources</i>
	<i>Mass. Dept. of Public Health</i>
	<i>USDA Rural Development</i>

Table 1. Massachusetts Ftl Support Entities of public school students in Massachusetts who are served local food is shown in Figure 1, along with the concurrent rise in the percent of schools that adopt preferential purchasing of local foods in their school food service budgets (MFTSP, 2012). In 2013, MFTSP became a subsidiary of Project Bread, a non-profit organization that assists those in need of food.

MFTSP also reports increases in programs in hospitals, pre-schools, private schools, colleges and universities in the Commonwealth (Leib, 2012). A list of the entities that joined MFTSP to promote Ftl programs in Massachusetts is listed in Table 1 – they include agricultural business associations, non-profit “Buy Local” advocacy organizations, childhood health

and nutrition organizations, municipal farm to institution programs, economic development and government agencies, school food service staff and farmers, as well as individuals in communities around the Commonwealth.

Despite the increase in number of Ftl programs and the volume of product sold, it is not yet clear how or whether these programs necessarily deliver all of the benefits attributed to them. Massachusetts’ diverse and deep offering of Ftl programs makes it an ideal environment in which to study how different Ftl programs may achieve these benefits. In particular, this paper will provide the research foundation needed to analyze the market structures under which the claims that Ftl contributes significantly to increased revenues to regional farmers.

This paper reviews the varied origins and goals of Massachusetts Ftl programs, describes the institutional wholesale markets for regionally grown differentiated products, and summarizes the current market and suggests topics for future research, based on currently available data. In addition to the review of relevant published and publicly available literature, the author conducted interviews and reviewed internal organizational documents.

This paper is not intended to be an exhaustive survey of all Farm to Institution programs in Massachusetts, but an outline of the markets that underlie these programs.

## Origins and Goals

Farm to Institution programs have been inspired by a wide range of goals and pursued by a variety of organizations. The major proponents of Ftl programs in Massachusetts have been:

- Nutritionists, food access and public health advocates,
- Organizations that advocate for regional economic development, and
- Organizations that support farmers

Environmental sustainability does not appear to have been a primary driver of Ftl programs in Massachusetts, and this paper will not address environmental goals. This section will offer a brief review of the origins and goals of Ftl programs like those in Massachusetts, and the state of current research that seeks to demonstrate the links between them.

### ***Nutrition and Access to Healthful Foods***

Evidence that nutrition and health are closely linked has motivated nutritionists, public health professionals, and other food access advocates to implement preventative measures that combat nutrition and diet-related illnesses. It is not surprising that institutional food service is seen as an ideal mechanism through which more healthful meals can be offered to at-risk populations in schools, hospitals, nursing homes and other public or quasi-public settings (Briefel et al., 2009; Cohen, et al., 2012; Conner et al., 2012). Institutional food service providers frequently supply basic sustenance to consumers who are considered to be members of at-risk populations for nutrition-related illness or disease, such as obesity or diabetes, and who may lack access to healthful foods (Briefel et al. 2009, Cohen et al. 2012; Gordon, et al., 2009; Hawkes, 2009). This subsection will outline the proposal that increased regional foods in institutional settings can improve health outcomes.

Ftl is not considered to be effective to reduce nutrition-related disease and illness as a stand-alone program; Ftl programs are pursued as one component of broad-based health interventions for at-risk populations (Cohen, et al. 2012). Effective programs comprehensively address a number of the economic, psychological and behavioral issues that have been identified as barriers to healthful eating (Cohen, et al. 2012; Just, et al. 2008). For example, a comprehensive approach might offer a meal made with fresh produce from a local farmer with a subsidy to incentivize the purchase of healthful foods, a cooking class to promote the idea that healthful foods are satiating and taste good, a visit to a local

farm to teach students where food comes from, and the removal of snack machines in cafeterias to help support new eating habits that include decreased consumption of less healthful foods. The comprehensive approach sources and procures healthful food; trains food service staff in nutrition and preparation of healthful foods; provides consumers with information about health and nutrition; offers healthful foods in a manner that encourages the selection of more healthful over less healthful foods; reduces the availability of less healthful foods; and tracks the actual consumption of healthful foods (Just, et al. 2008; Briefel, et al., 2009).

The multi-faceted nature of the comprehensive approach, in addition to the recent introduction of these programs, makes it difficult to isolate the importance of the role of Ftl, in and of itself, in achieving these health and nutrition related goals. Health and nutrition-related studies that seek to verify the value of Ftl programs in addressing these issues appear to be focused on Farm to School programs, as opposed to Farm to Hospital, or more general Farm to Cafeteria programs.

To demonstrate the value of Ftl as a component of a comprehensive approach to improve health outcomes, one would need to demonstrate that regional foods are nutritionally superior or are more likely to be consumed than non-regional foods; that education about and increased access to regional foods is directly linked to the increased purchase and consumption of these foods; and that the increased consumption leads to a decrease in nutrition related diseases. This is obviously a high bar, and these links have not yet been conclusively demonstrated (Cohen, et al. 2012). The rest of the section will focus on the pieces of evidence that Ftl programs can impact health and nutrition outcomes.

Farm to School programs operate under a specific set of constraints. These constraints bind school food service providers to work within very tight budgets, and adhere to an evolving landscape of nutritional requirements (Izumi, et al., 2010; Gordon, et al., 2009). Public and non-profit private schools

frequently participate in the National School Lunch Program (NSLP) and School Breakfast Program (SBP), which subsidize and provide USDA food for schools which offer free and reduced cost meals that meet the USDA's dietary guidelines to eligible children (FNS, 2011). In addition, these schools may have access to Department of Defense (DOD) commodity foods (FNS, 2011). Meals subsidized under NSLP and SBP are available to students whose families are at or below 130 percent of the federal poverty level (free meals) and to students whose families are between 130 and 185 percent of the federal poverty level (reduced-price meals) (Fox et al., 2012). Many schools supplement meals offered via USDA and DOD programs with "competitive foods" - à la carte menu items, vending machines, school stores, snack bars, and fundraisers, which students pay for in cash (Gordon et al., 2009). These competitive foods are not required by the USDA to meet specific dietary guidelines, although in 2010 the Commonwealth of Massachusetts Legislature revised Chapter 197 to regulate competitive foods (Erwin, 2012).

The USDA's dietary guidelines for NSLP and SBP have changed over the years as the understanding of the roles of different nutrients in a healthful childhood diet has improved (Fox et al., 2012). The most recent guidelines limit the intake of total fats, saturated fats, and sodium as well as recommended Dietary Allowances (RDA) or Dietary Reference Intakes (DRI) for vitamins and minerals. Meals offered in schools generally meet the dietary guidelines and NSLP nutritional requirements, but these requirements have not historically limited or specified guidelines regarding sodium, whole grains or fiber content, much less taste or palatability (Cho, et al., 2004; Clark, et al., 2009). The USDA's Food and Nutrition Service (FNS) periodically conducts the School Nutrition Dietary Assessment (SNDA) to determine student nutrient intake, including both NSLP and SBP participants and non-participants. The most recent SNDA, which used a 24 hour student dietary recall along with 2004-2005 school menu reports, found that while the number of schools that offer more healthful meals has increased, "...Fewer

than one-third of public schools offered and served school lunches that met the USDA standards for total fat (no more than 30 percent of calories) or saturated fat (less than 10 percent of calories)..." (Gordon et al., 2007).

Because many of these food service providers work on tight margins, often with significant public funding, school food service providers have prioritized meeting the NSLP nutritional requirements, at times by relying on low-cost inputs (Gordon, et al., 2009; Just, et al., 2008). The nutritional quality and palatability of meals prepared with these low-cost inputs has been questioned, and has fed the notion that more healthful meals would actually be consumed if better quality products were offered (Cho, et al., 2004).

Research that validates the role of regionally sourced fresh fruits and vegetables to achieve nutrition and public health goals is in its infancy, and reports that substantiate this role often rely on program-level case studies and survey data (Graham, et al., 2004; King, et al., 2010). Many non-peer reviewed studies indicate that consumption of fruits and vegetables may increase when local or regional foods are offered through farmer's market salad bars or other farm to institution programs (Graham, et al., 2004). In 2007, Faith, Monatine, Allison and Baskin reviewed different ways that institutions can address the problems of food consumption and obesity by changing the food environment. Few of the reviewed studies presented sound evidence that increased access to healthful food had a direct impact on consumption or changes in consumption, though they found evidence that indicated that subsidies for healthful food products did increase the purchase of more healthful foods (Faith, et al. 2007). In some non-peer reviewed reports, the Faith et al. study is used to substantiate the link between increased access to -- and increased consumption of -- more healthful foods. The validity of this link begs further analysis that allows proper inference.

However, a recent study, published in 2012 in the *Journal of the Academy of Nutrition and Dietetics*,

analyzed the nutritional content of school meals offered through the Boston Chef Initiative compared with the nutritional content of traditional meals in control group schools that did not participate in the Chef Initiative program (Cohen, et al.). The Chef Initiative program funded four trained professional chefs to work in two public middle school cafeterias in Boston. The chefs worked with cafeteria staff to revise the school lunch menu in selected schools to offer more flavorful lunches while increasing whole grains, fruits and vegetables, and reducing sugar, salt, saturated fats, and trans fats, and to plan and train kitchen staff to prepare more nutritionally healthful meals. Meanwhile, two demographically comparable Boston public middle schools continued to offer the “traditional” school lunches as a control. Pre- and post- consumption weights of plates from these schools were compared to determine whether there was a difference in the quantity of the meal consumed. The results of this two-year plate-weight pilot study indicated that, compared to the control group that offered less healthful meals, when more healthful meals were offered to middle school students, a similar percentage of school meals were consumed, which resulted in higher overall consumption of more healthful foods (Cohen, et al. 2012). They hypothesized that a broad-based program designed to incorporate more healthful foods and improve palatability of school meals would not negatively impact the amount of food consumed was validated in this study. The study results supported this hypothesis, and Cohen et al. found no support for the contrary argument that students would eat less and waste more when healthy foods were served to them via this program.

The Chef Initiative study did not use regionally grown food explicitly. No study has demonstrated conclusively that regionally grown food is healthier. One frequently cited and cautiously presented article, published in the *Journal of the American College of Nutrition* in 2004, did conclude that there were real declines in certain nutrients (protein, calcium, phosphorus, iron, riboflavin and ascorbic acid) in garden crops between 1950 and 1999 (Davis, et al.,

2004). The authors attribute these declines to the increased cultivation of high-yield varieties (Davis, et al., 2004). To the author’s knowledge, no comparable study of farm crops has been conducted, and no study has demonstrated that “local” or “regional” foods have higher nutritional value than other foods.

The Cohen et al. and Davis et al. studies are examples of the research currently being undertaken to identify how to fit the causal links proposed by those who advocate Ftl programs to actual health outcomes. While these studies do not explicitly connect regionally grown food with health outcomes, they offer pieces of the puzzle. Understanding how, or whether, the pieces of a comprehensive campaign to prevent diet and nutrition related illness fit together, and the role that Ftl plays in that campaign, will likely take many years. In the interim, public health professionals, nutritionists, and food access advocates continue to incorporate Ftl programs as components of campaigns that introduce new, more healthful ways of eating to at-risk populations

### ***High-Revenue Diversified Markets for Farmers***

Supporters of local and regional agriculture, including regional interest groups, non-profits and state departments of agriculture, advocate for Ftl programs as a consistent high-revenue market for nearby farmers (Anderson, 2007; Conner et. al. 2012; Izumi et. al, 2010). Some supporters purport that the large scale of institutional food service providers offers access to a large market for direct sales of locally or regionally -based differentiated products with relatively small transaction costs, compared to direct retail sales to consumers or smaller wholesale purchasers such as grocery stores and restaurants (Conner et. al, 2012; King, et al., 2010; Izumi, et al., 2010). The economic justification for the capacity of regional foods in the wholesale institutional market to deliver higher revenues to farmers thus depends upon:

- a) whether the “short” supply chain is able to minimize transaction costs and deliver increased marginal revenues to farmers,



similar to those resulting from regional direct sales, and

- b) whether the price premium for a regionally differentiated product is able to capture a large enough premium over traditional wholesale products to deliver a higher net revenue to farmers than other available markets (Brown et al., 2012; Feenstra, et al., 2011; Low et al., 2010; Sexton, 2012).

This subsection will outline the proposal that farmers can increase revenues by selling to the institutional market.

Early Ftl sales linked farmers to occasional wholesale direct sales at schools, often to prevent waste due to a bumper crop or a saturated market, or in a region where an export crop was already in abundance (King, et al., 2010; Izumi, et al., 2010). More consistent direct wholesale sales relationships followed, often coordinated by entities “outside” of the supply chain, including non-profits or state departments of agriculture (King, et al., 2010). As volume and regularity of sales increased, operational discrepancies between schools’ food procurement systems and farmers’ capacities became more problematic (Brayley, et al., 2012; Conner, et al., 2011; Feenstra, et al., 2011; Fitzsimmons, 2011; Leib 2012). Farmers do not always have the capacity to produce large enough quantities of a particular product for delivery at a particular time, the capacity to coordinate with other farmers to aggregate, the ability to lightly process or wash produce to meet food service expectations, the ability to offer online purchasing or become an approved vendor for school districts, or the ability to meet the rising bar for on-farm food safety precautions, for example. For farmers who do have the capacity to participate in direct sales to institutions, there is the potential to receive almost 100% of the sale price. However, transaction costs absorbed by farmers associated with direct sales are estimated in case studies to be between 13 -62% (King, et. al, 2010). As a result, Ftl advocates have explored the addition of market intermediaries, such as wholesale aggregators,

broadline or regional food distribution companies, to the supply chain, as these intermediaries’ capacities could fill the market gaps (Brayley, et al., 2012; Lieb, 2012).

Intermediaries can offer farmers and institutions with market services like orders, purchases, packaging, sanitation guarantees, delivery, and billing, which are more in line with a food service provider’s needs. The cost of these services must be absorbed by farmers and institutions. In addition to an estimated 15-25% purchase price markup to cover the transaction costs mentioned above, farmers can be required by intermediaries to meet stringent and expensive food safety liability insurance (FSLI) and on-farm sanitation guidelines like Good Agricultural Practices (GAP) that do not necessarily reflect the nature or scale of the farm (Feenstra, et al., 2011; King et.al. 2010; Erwin, 2012). In addition, the costs associated with transferring product information like the characteristics of the differentiated product -- farm’s identity, growing conditions, and sometimes the “local” quality of the product -- may be too high to be consistently communicated to the purchaser, and thus to the consumer (Feenstra, et al., 2011; King et al. 2010; Erwin, 2012).

The exercise of market restraints, like FSLI, GAP, purchase minimums, and the capture of margins associated with them, is common in agricultural markets where downstream firms typically set contracts to protect food quality and safety (Sexton, 2012).

In the recent paper, “Market Power, Misconceptions, And Modern Agricultural Markets,” Richard Sexton writes that:

*Market intermediaries, with even rather modest amounts of market power, can capture large shares of the benefits from policies intended to benefit farmers (2012).*

While there is evidence that farmers who participate in direct-to-consumer sales are able to capture a higher share of the food dollar, whether farmers who participate in intermediated regional markets are

able to capture a similarly high portion of the food dollar is in question (Low & Vogel, et al., 2010). These realities challenge both the notion that Ftl programs necessarily generate net revenues to farmers comparable to those seen in direct markets, as well as the idea that “regional” product differentiation necessarily generates a price premium to farmers (Izumi, et al., 2010; King, et al., 2010).

These challenges, however, do not preclude the possibility that there are other aspects to this market that do serve to increase revenues to farmers. To the extent that off-grade or surplus produce (smaller apples, peppers harvested at peak-season) are preferred by institutional buyers, these markets could be seen to offer farmers a premium price for their marginal (but still regionally differentiated) products (Fitzsimmons, 2011; King, et al., 2010). The willingness and capacity of institutional buyers to absorb transaction costs or otherwise augment benefits to farmers (such as promoting the farmer through school events) may bolster farmers’ revenues. In addition, participating in these markets clearly is a way that farmers can diversify their businesses, and revenues are not thought to be lower than in mainstream wholesale channels (King, et al., 2010). More relevant to an analysis of market structure, some studies suggest that there is in fact a premium available for regionally differentiated produce, and that some market structures are more likely than others to preserve this premium for pass through to farmers (Brown, et al., 2012; Feenstra, et al., 2011; King, et al., 2010). These concepts are explored in more depth in the sections below.

There has been some indication that institutional sales in Massachusetts can be profitable to farmers. The Massachusetts Farm to School Project commissioned telephone surveys with farmers who sold institutions in 2008 and 2010 to inquire about the impact of Ftl sales on farmers’ profits (Adams, 2011). The survey results describe Massachusetts farmers’ understanding of the profitability and role of Ftl sales. The 2010 survey

asked farmers who sold to institutions about:

- Gross income from institutional sales
- Whether the sales to institutions were profitable (Yes, No, Somewhat)
- What percent of total annual product sales were institutional sales, if known
- Whether the farmer sold to a distributor that sells to institutions

The survey had a 68% response rate; 73 farmers completed the survey. Of these 73, 56% sold exclusively through direct sales to institutions, 14% sold both directly to institutions and through distributors to institutions, and 3% sold exclusively through distributors to institutions. About 27% of the respondents did not sell to institutions in 2010.

Of those farmers who sold directly to institutions, 55% indicated that Ftl sales were profitable, 27% indicated that Ftl sales were somewhat profitable, 14% indicated that Ftl sales were not profitable, and 4% did not know whether Ftl sales were profitable. Profitability responses from farmers who sold exclusively to distributors were not reported, and the profitability for farmers who sold both through distributors and directly to institutions did not indicate whether one supply chain contributed more or less to profitability than the other.

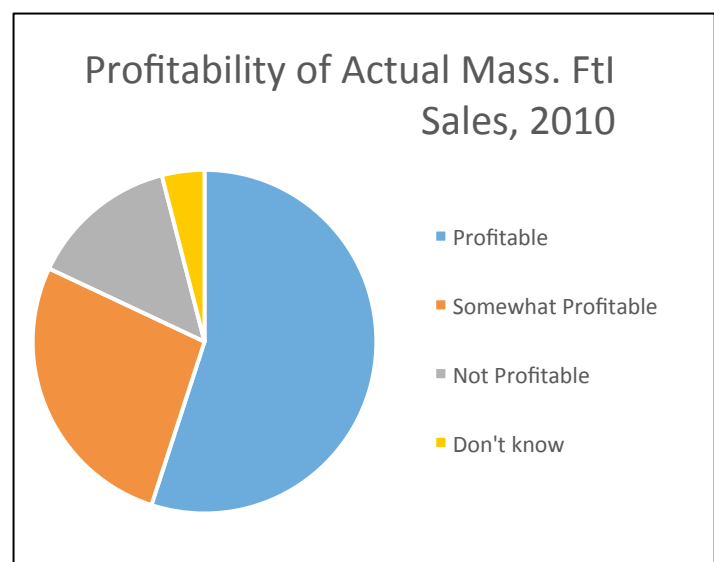


Figure 2. Profitability of Actual MA Ftl Sales, 2010, (Adams, 2011)

About 91% of respondents who sold to institutions estimated gross income and the percentage of gross income from Ftl sales. All of

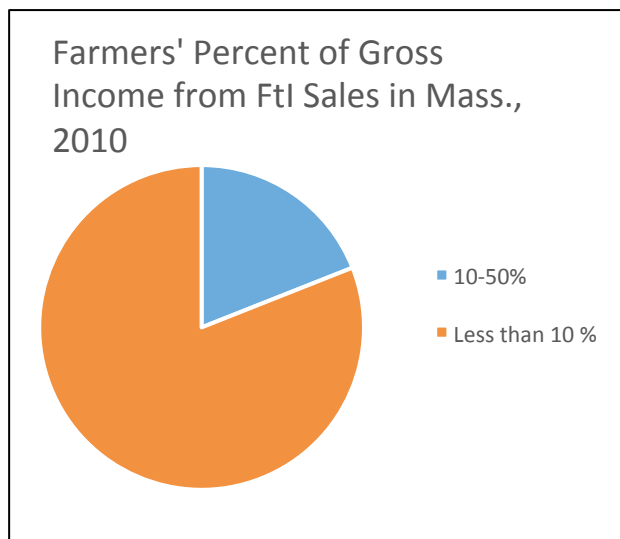


Figure 3. Farmers' Percent of Gross Income from Ftl Sales in Mass., 2010 (Adams, 2011)

these respondents indicated that less than 50% of gross sales were institutional sales, about 19% indicated that Ftl sales accounted for 10-50% of gross sales, and 81% indicated less than 10% of gross sales were Ftl sales. Dollar amounts for income from sales to institutions were provided by 79% of respondents and totaled \$1.32 million for the 2009-2010 school year. While the average income from Ftl sales, based on these results, is about \$31,474 per farm, the author of the report notes that correcting for a few outlying farms with large reported Ftl sales puts the per farm average sales at \$5,753 per farm.

The report also noted some farmers' comments. Farmers noted the trade-offs between costs associated with Ftl sales and the profitability of these sales, the non-economic benefits of Ftl sales such as community "exposure", the role of Ftl sales in stabilizing seasonal income streams, the personal value of helping feed schoolchildren, and the "premium" nature of the product sold.

In the language of economics and market structure, these comments and the survey results identify a need to understand the relationships between

profitability of direct sales and intermediated sales, the trade-offs associated with added transaction costs, the market value of the differentiated product, and the motivations beyond profit for farmers who sell to institutions.

### **Local Food as Economic Development**

Recently, public officials and economic development organizations joined regional and local Ftl advocates, who emphasize the role of agriculture in local and regional economic development (Izumi, et al., 2010). The idea that there are multiplier effects created from the purchase of local products flows from the idea that money is kept in circulation within a region, as opposed to flowing out of the region (King, et al., 2010). This would occur, as O'Hara and Pirog point out, if farmers subsequently purchase inputs, hire labor, and access capital within the region in question (Hilchey, 2013). This subsection will outline the proposal that increased sales of regionally grown foods to institutions can have a net positive effect on the regional economy.

Studies that attempt to quantify the general or broad "impact" of local and regional agriculture on a regional economy generally estimate the potential economic value of a large increase in fruit and vegetable production and purchasing in a given region, often based on a "what-if" scenario. For example, "What if all of the end consumers for institutional food in a region consumed the USDA recommended quantities of fruits and vegetables, and these fruits and vegetables were all grown within the region?" Input-output models and tools (e.g., IMPLAN) used to calculate the direct, indirect, and induced effects of these "what-if" scenarios can be illuminating, but require a series of assumptions that may or may not reflect the actual regional economy being modeled. Such assumptions include both the parameters that are assigned to different events within the economy, as well as the nature of the regional economy itself.

A handful of recent studies that aim to quantify economic impact from regional or local food modify

the parameters in standard input-output models to obtain more accurate results – these studies, along with the recent article “Economic Impacts of Local Food Systems: Future Research Priorities” offer a review of the challenges associated with conducting and drawing inferences from a rigorous input-output study (Gunter, 2011; Hilchey, 2013; Otto et al., 2005; Swenson, 2011; Tuck, et al., 2010).

O’Hara and Pirog note four potential challenges associated with the parameters values of input-output models. The values may:

1. Be out of date
2. Be “at a coarser resolution than the researcher’s specified area of study”
3. Represent “average conditions”, while the researchers may be attempting to model specific conditions
4. May not be “based on statistical analysis”

They further recommend that researchers who use these models customize the parameters in question, and document these modifications for future comparison (Hilchey, 2013).

While regional economic “impact” studies of increased local production and consumption can include institutional purchases, most studies do not specifically address the role of Ftl programs on economic development outcomes. An input-output study that pursues this line of questioning for Massachusetts would likely need to ask “What if Massachusetts producers grew enough fruit and vegetables to supply all of the wholesale institutional purchasers in Massachusetts, and these purchasers restricted their purchases of these products to only those products grown in Massachusetts?” Two studies, which use Ftl programs in Colorado and Minnesota, have made some progress towards answering similar questions on smaller scales.

The Minnesota study proposed to answer the question “what is the potential economic impact of farm-to-school programs in Central Minnesota,” and to model impact that explicitly “accounted for decreased expenditures in the current supply chain

and the potential for increased costs to the community in the form of higher lunch prices” (Tuck et al., 2010). Tuck et al. both conducted interviews with food service providers and farmers, and used pre-existing Minnesota food service survey demand data to frame IMPLAN scenarios. The study created scenarios under which schools serve all meals, some meals, or only special monthly meals, to model the “what if” shift in demand, and used three different prices – one price that reflects a “farm price” near to the farmer’s current market price, another “school price” that reflects the lower price that schools currently pay for equivalent product, and a third “intermediate price” that is halfway between the “farm price” and “school price.” The study finds that the largest multiplier effects result from the scenarios under which all of the products that are available locally are purchased, and where the farm price is used. However, the greatest positive regional economic effect occurs when the “school price” is used, as any higher price increases the costs to the public, which must pay for the increased cost of school meals. This result suggests that there may be a tension between achieving all Ftl goals – an increase in the quantity of local foods served may not always be compatible with offering a price premium to the farmer.

The Colorado study also uses IMPLAN to “quantify the direct impact of the Weld 6 [School District] Farm to School program on the local economy” (Gunter, 2011). The Colorado study, however, goes to greater lengths to customize IMPLAN to more accurately represent the direct marketing sector (Gunter, 2011). Gunter relied more heavily on survey and secondary data than did Tuck et al. to modify farmer decision making parameter values and the relative importance of key economic decisions by all supply chain actors. The study estimated demand for the school district in question as 10% of all direct sales in Colorado for both fruits and vegetables, calculated with 2007 Census data, and further assumes an allocation of sales between fruit and vegetables based on the school district’s purchase data. Gunter models four scenarios, but

suggests that the most accurate scenario is that under which demand is not “new”, but shifts from already existing wholesale demand, and the above mentioned modifications to IMPLAN are incorporated. In this scenario, the increased local food purchases resulted in a modest positive net effect on the regional economy.

An additional challenge for economic impact assessments is to appropriately factor in the opportunity costs of transferring land, labor and technology from one area of production to another (Swenson, 2010). Regions are distinct in both the existing areas of production that would be reduced and the potential area that could be increased. Each region is distinct in productivity of its farmland - the yields from an acre of land devoted to carrot production in Iowa may not be comparable to that of an acre of land in Massachusetts. Further, each region is distinct in the availability of productive farmland – “what if” scenarios do not generally restrict the potential supply of production.

These caveats, along with others outlined in the reports mentioned in this section, suggest that “economic impact” studies conducted with input-output models warrant a cautious reading, and that it is nearly impossible to extrapolate the findings of a particular study to predict the nature of effects in other regions.

For example, Swenson’s 2010 report sought to quantify the economic value of increasing fruit and vegetable production and consumption within each of the Upper Midwest states, and again with selected sub-regions within that region. In this report, the cost of taking agricultural land out of corn and soybean production, including subtracting income from farm workers and revenues to local seed and supply firms, e.g., was weighed against the increase in employment and revenues from new fruit and vegetable production. Similar reports in other

regions likewise used input-output models and found potential positive economic effects to increased regional fruit and vegetable production and consumption, but to date these studies appear to focus on regions that would swap one agricultural use of land for another (Conner, et al., 2008; Otto & Varner, et al., 2005; VSJF, 2011).

To date, no comparable study has been conducted for Massachusetts, and it is therefore very difficult to state with any confidence that increased production and consumption of Massachusetts produced food could be a net driver of economic development in the manner often suggested. In addition to the concerns above, a key component of these studies – i.e., the switch between agricultural uses of land - does not accurately represent the trade-offs that would need to be taken into consideration in Massachusetts. The value of land in Massachusetts is relatively high and alternative uses of land are likely to return higher economic values to non-agricultural uses, and perhaps non-Ftl agricultural uses. For example, the “farm real estate value” of land, which the USDA defines as an average of “the value at which all land and buildings used for agricultural production, including dwellings, could be sold under current market conditions, if allowed to

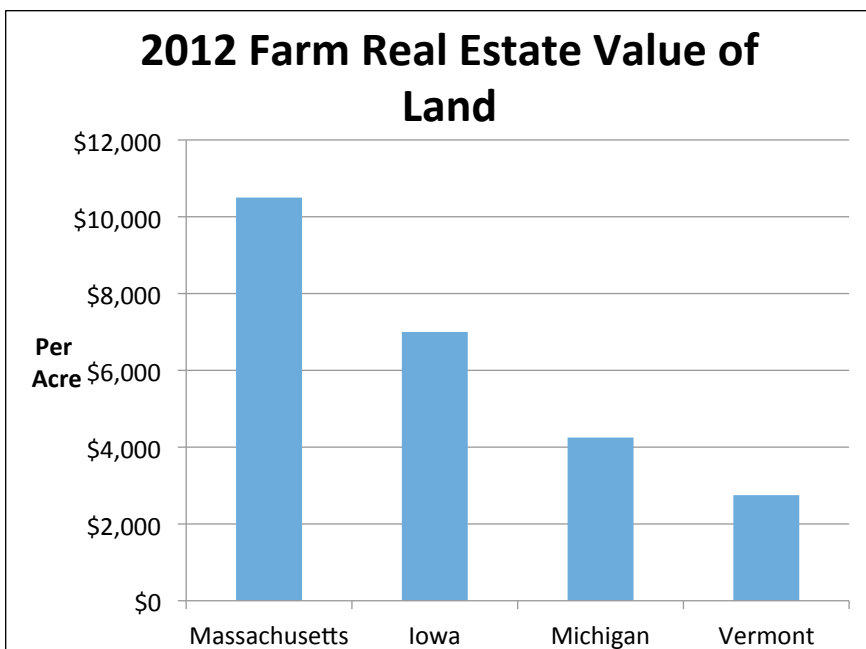


Figure 4. 2012 Real Estate Value of Land (USDA, 2013)

remain on the market for a reasonable amount of time” for Massachusetts was \$10,500 per acre in 2012 (USDA, Land Values, 2012). The 2012 farm real estate value per acre of land in Iowa, which had the highest average land value of the states used in Swenson’s report, was \$7,000. Average land value in Vermont, which was studied in the Vermont Sustainable Jobs Fund report was \$2,750 per acre, and the value per acre in Michigan, which was studied in the Conner et al. report, was \$4,250. Swenson’s report used 2007 Agricultural Census and purchased IMPLAN data; the difference between Iowa and Massachusetts farm land values in 2007 was even greater - \$3,958 per acre in Iowa versus \$14,276 in Massachusetts (USDA, Agricultural Census, 2007).

Another important difference between the scenarios offered above and the intermediated market of interest in Massachusetts is the relationship between prices, transaction costs and the availability of supply chain infrastructure. While the Swenson study assumes that the infrastructure required for “scaling up” is available, both the Tuck and Gunter studies assume that Ftl sales are direct sales, and that farmers in these scenarios absorb the additional transaction costs associated with Farm to Institution sales and earn any associated increase in the share of food dollars.

Finally, it is not entirely clear that agricultural markets for regionally differentiated goods are perfectly competitive markets. Input-output models are based on the economic assumption that the markets modeled are perfectly competitive and in equilibrium. If these markets are not, in fact, perfectly competitive, then input-output models may not have the power to illuminate economic effects of changes in the market inputs or parameters.

The diversity of the origins and goals of these programs in Massachusetts has resulted in a number of innovative Ftl programs. While increasing the amount of locally or regionally produced food in institutional settings is the common short-term strategy among the programs, the end goals diverge

and are often more in line with the provenance of the group that has promoted or implemented the program. However, it is generally agreed among these groups that each of the goals contribute to a larger shared vision of a more equitable and just food system. Ultimately, health goals, economic development goals, and environmental goals of Ftl all depend on whether the farmer can profitably sell to the institutional market.



## Part II: Massachusetts Grown Wholesale Ftl Market

Whether the farmer can profitably sell to the institutional market depends on whether the product can command a price premium, or whether the costs associated with production and marketing preserve enough of the sale price for farmers. The structure of the market influences these conditions. This section introduces the language and structure of the micro-economic theories of industrial organization and information to the existing market in Massachusetts, as described by market participants in interviews, and internal organizational documents, such as annual surveys, intake sheets, and meeting notes.

This section first describes the differentiated local or regional product and how the product attributes relate to unique characteristics of the market. The context and institutions under which this market may exist are explored, including market channels, supply and demand for these products, supply chain actors, and characteristics of the supply chain with respect to contracts, information and regulation. This section will then offer five different models of operational Ftl supply chains within this market in Massachusetts. Three recent USDA reports, the 2010 report “Local Food Systems: Concepts, Impacts, and Issues” and “Comparing the Structure, Size, and Performance of Local and Mainstream Food Supply Chains,” and the 2011 “Direct and Intermediated Marketing of Local Foods in the United States,” offer helpful compilations of similar regionally-grown market studies from around the country, as well as useful common sets of terms, which we employ throughout this report (King, et al., 2010; Martinez, et.al., 2010; Low & Vogel, 2011).

The scope of this section will be limited to fresh fruits and vegetables, as they represent the most common products delivered through Ftl supply chains, and existing research and policy tends to be centered on these products. Massachusetts Ftl

programs also encompass beef, poultry, fish, and dairy supply chains (Erwin, 2012).

### “Locally” or “Regionally” Differentiated Product

There is currently no concise, universal definition for what constitutes a “local” or “regional” product. The most widely referred-to guidelines are defined by Martinez et al., and rely on a spatial definition that links the products’ origins to their points of consumption, usually in terms of miles, but also in terms of the state or region (2010). Reports and studies that use USDA data tend to employ the NASS Census agricultural product designation “Direct Sales for Human Consumption” as the best proxy for “Local”, but acknowledge that this category is imperfect, as it omits products that are sold through intermediated channels, such as wholesale institutional sales through regional distributors.

However, case studies and experiments indicate that the terms “local” and “regional” may imply more than the distance between producer and consumer (Conner et al., 2012; Darby et al., 2008; Dentoni, et al., 2009; Feenstra, et al., 2011; Thilmany, et al., 2008). For consumers, these terms may carry connotations of quality and freshness, the impact that the growing practices may have on the consumers’ community and environment, and an idea that their purchase has a positive net effect on the local or regional economy (Cembalo, et al., 2012; Darby, et al., 2008; Dentoni, et al., 2012; Wirth, et al., 2012; Lusk, et al., 2006; Thilmany, et al., 2008).

These connotations are quality attributes, or characteristics of the product which indicate that consumers may be willing to pay a premium for the product, compared to a similar product without the “local” or “regional” designation. In this sense, these products are differentiated from other available products, which may look and taste the same, but do not carry additional information about the perceived impact of the consumers purchase. These quality attributes are “credence attributes,” or attributes that some consumers may believe to be true, but do



not have means to verify (Dentoni, et al., 2009; Sexton, 2012). Such information about specific qualities of regionally differentiated products – and therefore traceability and food safety attributes – is considered to be more accessible in shorter supply chains.

This implicit product differentiation is thought to create market value (Feenstra, et al., 2011, Izumi, et al., 2010; King et al., 2010; Thilmany, et al., 2008). In the case of regionally differentiated products in institutional wholesale markets, it can be difficult for an end consumer to know with certainty whether the product available for purchase meets the standards that the individual consumer has in mind. This certainty should arise from the consumers' belief that each of the intermediaries, who prepared, purchased, sourced, transported, and grew the product, both shared these standards and verified the standards at each step along the way.

For this reason, the institutional market for regionally differentiated products is unique from both the traditional wholesale institutional market and the direct to consumer market for regionally differentiated products. Market interactions carry an additional burden of information verification. This burden can be interpreted as one of traceability and labeling, which begs the question of enforceability, or as a burden of trust and relationships, which similarly begs the question of the dependence of the market on the non-market entities that foster and monitor these relationships (Feenstra, et al., 2011).

For the purposes of this paper, we will simply allow that participants in these markets share mutually agreeable definitions of "regional" or "local". We will use the terms "local" and "regional" interchangeably. Further discussion of the role these product attributes play in the FtI market will be addressed in the Information, Regulation, and Contracts section below.

### ***Value Added vs. Not Value Added Product***

A raw product that has undergone some physical change of state prior to its purchase by the food service institution, such as primary and secondary

processing, is considered a value-added product. Some examples include coined carrots or washed salad greens.

The USDA's definition of "value added" calls for the incremental market value added to the product by its change of state to accrue to the farmer, which can occur only if the product underwent this change of state prior to its purchase by the food service providers (USDA, Value Added Producer Grant, 2012). Primary Processing in these market channels is conducted on-farm. If the same kind of processing, for example, coin-cutting carrots, is conducted in the food service kitchen by the food service management company, it is referred to as On-Site Processing, and the product is not considered to be value-added. Secondary Processing in this supply chain is assumed to be value-added because the secondary processor in Massachusetts is a non-profit organization that passes the added value on to the farmer.

### ***Fresh vs. Frozen or Canned Product***

Fresh marketing channels, as opposed to extended-season marketing channels, appear to account for the highest volume of "regional" sales in the country, and can be divided into intermediated supply chains and fresh direct-to-consumer supply chains (Low & Vogel, 2011). Fresh marketing channels are characterized by their short supply chains, which allow farmers to capture a larger percentage of the sales price (Low & Vogel, 2011). Farms must perform additional tasks in this supply chain, such as marketing, storage, distribution, pricing, and sales that may increase farmers' transaction costs. Generally, small and mid-sized farms selling fresh direct ("annual sales of agricultural products are less than \$250,000 for small farms and \$500,000 for mid-size farms - hereafter referred to as small farms") can absorb these additional tasks given their smaller volumes (USDA, Small and Mid- Sized Farms, 2012; Martinez, et al., 2010).

However, larger farms (over \$500,000 in annual sales) either need to invest in on-farm capacity, or participate in an intermediated marketing channel (Martinez, et al, 2010; Low & Vogel, 2011). FtI

advocates maintain that a consistent fresh wholesale sales relationship with an end purchaser in the form of a large institution allows farmers to minimize transaction costs, while capturing a high percentage of the sales price. Sales to a fresh wholesale distributor or aggregator transfer these transaction costs to the intermediaries, but reduce the percentage of the sales price that flows directly to the farmer.

The fresh marketing channel in New England is restricted by seasonality. In response, a small “extended season” intermediated wholesale marketing channel has developed in Massachusetts. This intermediated marketing channel resembles the fresh intermediated marketing channel, with the addition of a secondary processor which purchases fresh product directly from the farmer, and freezes or cans the product for sale to institutions during the winter season. Frozen or canned products undergo a series of physical changes in state that allows the product to be consumed in the off—season. Some examples include frozen broccoli or canned tomatoes. Extended-season marketing channels are those channels in which Secondary Processing has occurred.

This addition incurs additional transaction costs, and likely reduces the net income to the farmer. However, in this case the processor is also non-profit market support entity with capital costs that are already invested, and the processor uses the regional produce market wholesale price index as a benchmark price. Thus, the processor does not extract economic profits and farmers receive prices for their products that represent their best alternative prices, which are current wholesale prices.

### ***Supply and Demand***

It is a challenge to estimate the supply and demand for local or regional fruits and vegetables, particularly with respect to intermediated markets (King, et al., 2010; Low & Vogel, 2011; Timmons, 2008). While publicly available data can describe who grew what, nationally gathered data has not historically identified product channels – it is difficult to say to

whom products were sold. In addition, aggregated consumer purchases of fruits and vegetables are not publicly available, so it is difficult to describe the actual demand for fruits and vegetables in general, much less for fruits and vegetables that come from a specified area and are sold to consumers within that area. Practitioners and researchers do not generally have access to food distributors’ private data, which can track where product is purchased and where it is sold. It is a challenge to track sales of a product grown in a specified area, particularly in New England, with relatively small states and distribution networks centered in multi-state regions.

It is clearly a challenge, then, to further isolate the relationship between Massachusetts farmers and Massachusetts institutions using publicly available data. The supply of, and demand for, fruit and vegetable products for Ftl programs in Massachusetts overlaps with Ftl programs in other New England states. This paper will not attempt to quantify either supply or demand in this market. Instead, this section will mention some of the methods used to estimate supply and demand of local or regional products, and offer data that describes the overall agricultural trends in Massachusetts. Placed alongside national characteristics of direct-to-consumer and the intermediated markets described in the Massachusetts Grown Wholesale Market section above, this section sketches the supply and demand in the Ftl intermediated wholesale market in the state.

The USDA’s National Agriculture Statistical Service (NASS) takes a census of agriculture every five years, and conducts annual surveys. However, past data collection has primarily emphasized producer and product characteristics, and has not requested detailed information about the various supply chains through which agricultural products flow. Data that track the number of farms participating in direct-to-consumer supply chains (a farmer who sells directly to the end consumer, e.g., at a farmers’ market, roadside stand, or through a CSA) and the value of these sales has been collected since 1978. However,

survey questions that elicit information about intermediated supply chains were introduced in the 2008 Agricultural Resource Management Survey (ARMS) survey conducted by the Economic Research Service (ERS), and only the 2011 ARMS separated questions on direct-to-consumer sales from intermediated sales and requested information that could allow researchers to quantify the role of institutional markets in intermediated marketing channels (Low & Vogel, 2011).

National 2008 ARMS data suggests that including locally marketed food that flows through intermediated market channels (farmers' sales to local retail, restaurants, and regional distributors) increases the estimated volume of "local food" about four-fold, compared to the volume suggested by the NASS census that tracks direct-to-consumer sales (Low & Vogel, 2011). The value of the food that flows through intermediated channels is three times that marketed through direct-to-consumer channels. While farms of all sizes sell through each of these marketing channels, more large farms sell through intermediated market channels with more supply chain steps, and more small farms sell through market channels with fewer supply chain steps (Low & Vogel, 2011). Nationally, USDA researchers estimate that for farms of all sizes who market local foods, 61% of gross farm sales are local foods (Low & Vogel, 2011). Low and Vogel further suggest that the high share of local food sales demonstrates integration of these farms into existing direct-to-consumer and intermediated supply chains (2011).

While the number of farms in Massachusetts has increased in the last 5 years, these farms decreased in size (USDA, 2012). At the same time, the number of farms engaged in direct-to-consumer sales has increased, as has the per farm sales of direct-to-consumer marketed products (USDA, 2012). "The value of sales directly to consumers on a per farm basis" in 2007 was \$25,356 in Massachusetts, which places the Commonwealth at the second highest per farm value of direct to consumer sales in the nation (USDA, 2011).

Studies do quantify the existing overall production of fresh fruits and vegetables in Massachusetts, and attempt to quantify the amount of production consumed locally, with varying degrees of success. Fruit and nut tree farms and vegetable and melon farms in Massachusetts reported the market value of products grown in Massachusetts in 2007 at \$58,995,669, or about 32% of the total market value of all farm products grown in the state; however, it is unclear what proportion of these sales were in-state, much less whether they were sold directly or through distributors to institutions, restaurants, processors, or retail operations (USDA, 2012). Timmons et al. used 2002 NASS data to estimate that a maximum of 5.6% of all foods grown in Massachusetts were sold as direct-to-consumer "local" foods (2008). For this to increase, some combination of increased farm productivity and the amount of land in production would need to increase. Increasing these factors may be a challenge in Massachusetts: "While Massachusetts has 519,000 acres of land in farms, only 119,000 acres of that land is cropland with prime agricultural soils—the best land for food production" (Bowell, et al., 2008).

It is not known how the increase in the percentage of Massachusetts schools that participate in Ftl, described in the introduction above, translates into the dollar value or quantity of product sold. While some schools are committed to increasing the volume of product they purchase, others only buy occasionally. The University of Massachusetts Amherst, for example, now purchases about 25% of its produce regionally, while some schools purchase one delivery of apples each year (Toong, 2010). The consensus at this time seems to be that there are very few scenarios under which the supply of Massachusetts grown products could keep up with the institutional demand for these regionally grown products (Erwin, 2012). In 2013, the USDA's Food and Nutrition Service conducted the first-ever National Farm to School Census, which asked public school districts about their participation in Farm to School programs. The results, when available, may be able to help quantify the current dollar value of

demand for Farm to School purchases in public school districts.

### **Market Channels**

The wholesale farm to institution market in Massachusetts is an intermediated market for locally-based differentiated products, comprised of five different marketing channels that are characterized by:

- How many times the product changes hands, or the potential “degree of markup”, explained in detail below.
- Whether the product has “undergone a change in physical state” –referred to as value-added or not value-added (i.e., washed, peeled, or chopped), and
- Whether the product is fresh, or frozen / canned (USDA Value-Added Producer Grant, 2012; Low & Vogel, 2011).

The use of the term “direct sales” poses a challenge in this scheme. According to Low and Vogel, literature on Ftl frequently describes sales between a farm and an institution as “direct”, although it is understood that there is an additional sale from the institution to the end consumer – the student, patient, etc. “Generally, marketing channels are classified as intermediated when local food products pass through one or more intermediate steps in the local food supply chain before reaching the consumer” (King, et al., 2010). The rest of this document will abandon the term “direct,” and instead refer to the degree of markup.

The market channels, in turn, are comprised of supply chains. The supply chains are models of relationships between different “supply chain actors” -- the farm businesses, aggregators, processors, distributors, food service providers, and other organizational entities that support markets. In this paper, end consumers, such as students and patients, are also referred to as supply chain actors. The life-cycle of the supply chain is modeled linearly, and actors are defined relative to other actors. “Upstream actors” refers to those firms whose actions are nearer the beginning of the chain, and

“downstream actors” refers to those firms and consumers whose actions are nearer the end of the chain (Waldmen et al., 2007). For example, a food service provider is upstream of the consumer, but downstream of the farmer.

### **Markup**

Potential “degrees of mark-up” refers to the minimum numbers of transactions through which the product has changed hands. Each time the product changes hands, a transaction cost is incurred, and there is potential to add a “markup.” The concept of markup arises from the ability of the supply chain actor to add an economic profit margin to a product, above the transaction cost to perform the supply chain step (Carlton & Perloff, 2005). Economic profit refers to profit that is extracted above and beyond the transaction costs incurred, including the cost of foregoing all other opportunities. Markup occurs when the supply chain actor possesses some degree of market power. In a perfectly competitive economy, like those modeled in the “Local Foods as Economic Development” section above, it is assumed that sellers do not make an economic profit from sales. It is difficult to say, at this stage, whether or how much market power any of the supply chain actors in the Ftl supply chain actually have, and therefore whether any markup charged by a supply chain actor accrues as profit to that actor or is simply a reflection of the transaction costs incurred by that actor. However, this concept is included because it:

- a) Provides terminology to differentiate between gradations of long or short supply chains
- b) Highlights a major question that must be asked in future research in order to determine the long term viability of Ftl supply chains.

It is also important to note that in Ftl supply chains, market power could be exercised to achieve non-economic, values-based outcomes (Izumi, et al., 2010).

A low degree of markup, or “3rd degree marginalization”, indicates that the product has changed hands at least twice – once from the farmer to the food service provider, and once from the food service provider to the final consumer (what is referred to as “direct sales” in much of the literature). A medium degree of markup, or “4th degree marginalization”, indicates that the product has changed hands three times – from the farmer to a distributor, and from the distributor to the food service provider, and then from the food service provider to the consumer. A high degree of markup, or “5th degree marginalization” indicates that the product has changed hands at least four times – from the farmer to a processor, from the processor to a distributor, from the distributor to the food service provider, and then from the food service provider to the consumer. Note that in each of these cases, an additional transaction may occur when an upstream farmer-aggregator aggregates product from a number of different farmers prior to selling it downstream. This happens more frequently as the volume of product required by a downstream purchaser increases.

The products that move through the 3rd and 4th degree marginalization marketing channels may either be completely unprocessed, fresh produce when they are delivered to the food service provider, or they may be products that undergo some primary processing. For example, whole, unpeeled carrots without the greens are considered non-value added products, while peeled, coin-cut carrots are considered to have gone through some primary processing. In Massachusetts, some farms have primary processing equipment on site; often these farmers will act as aggregators and purchase unprocessed produce from other farmers, perform some primary processing on the product, and then sell the product to the downstream actor.

Unique to Massachusetts, at the time of this writing, is an operational extended-season processing facility that has the capacity to freeze or can large quantities

of product for sales in the off-season. This marketing channel is 5th degree marginalized.

Direct-to-consumer sales referred to in much of the literature would be characterized as 2nd degree marginalization, from the farmer directly to the consumer. This is clearly not likely in the institutional wholesale supply chain.

### ***Supply Chain Actors***

This section defines and describes the people, businesses, and organizations that move food between farmers and institutions in Massachusetts.

#### *Farms*

Farms that participate in FtI are generally small to mid - sized farms, with revenues between \$50,000 and \$250,000 (Low & Vogel, 2011). Some of these farmers play the role of aggregator. They aggregate product from other farmers to sell downstream (Diamond & Barham, 2012). Some of these farmers conduct Primary Processing.

#### *Aggregators*

Aggregators need not be farmers – they can also be private firms or co-operatives of farmers who operate an aggregation business collectively. Aggregators source product from a number of different farmers for sale downstream, often in order to meet the volume required by the downstream producer. Farmers may aggregate and then conduct Primary Processing.

#### *Secondary Processors*

Secondary Processors, as described in this supply chain, transform freshly harvested product from a farmer or aggregator into a value-added product by changing its physical state (USDA, Value Added Producer Grant, 2012). Processors may include farm operations, aggregators, and processing facilities. Primary processing refers to the first (and often only) round of processing, peeling or chopping freshly harvested vegetables, for example. In some supply chains, primary processing is performed by food service providers, which we will refer to as on-site processing. Depending on the supply chain actor and their institutional capacities, this processing may be

performed manually or by large, specialized machinery. Secondary processing preserves the product and allows it to be served in institutions out of season – for example, freezing or canning. Specialized facilities with large capacities are generally required to perform secondary processing efficiently and according to food safety requirements. These products are referred to as extended season products.

#### *Broadline Distribution Companies*

Broadline Distribution Companies source and stock a wide range of food and food service products, and offer these products to institutional purchasers. Distributors purchase product from the farmer or processor, at times process the product, and then sell the product to institutions. Distributors source and provide access to a wide variety of perishable and non-perishable goods, and perform a number of services in institutional food service markets (Izumi, et al., 2006). Broadline distribution companies may require food businesses to meet packaging and labeling requirements, which provide important information for tracking and rotating stock (Audile et al., 2012).

#### *Regional Produce Distribution Companies*

Regional Produce Distribution Companies source, store, and deliver usually fresh produce to institutional purchasers. These companies may offer a more limited range of specialized products. Some regional distributors adopt a “we don’t own it” policy, where the services contracted may include brokerage and transportation, but the distributor never takes ownership over the product, even when the product is in physical possession of the distributor.

#### *Food Service Providers*

Food Service Providers may receive freshly harvested product (not value-added), value-added product, or extended season product. If they receive non-value added products they may need to process the product in some way (peel or chop carrots, e.g.). Food service providers prepare meals and sell these meals to consumers, which in this example are students. To sell the product to students, food service providers engage in a number of supply chain

activities. They also plan meals, source product, meet federal and state nutrition guidelines, hire and train food service staff, receive, bill and invoice suppliers, etc.

#### *Institutions*

Institutions such as schools, hospitals, group homes, and nursing homes either have in-house food service staff, or contract with a food service management company. Many of these institutions are funded from government sources, operate as bidders on publicly funded contracts, or receive remittances from government sources. This funding goes hand in hand with requirements to provide meals that meet nutritional standards. In addition, certain kinds of funds (notably for schools with students who qualify for free and reduced meals) correspond with the availability of very low cost food from the USDA.

Food service companies that pursue procurement of locally grown foods will likely have more market power than individual in-house food service operations, because they may be able to aggregate demand from many different institutions. A very large institution, such as a university or urban school district that operates without a food service management company may also wield market power because of the ability to aggregate demand. The mix of public funds and à la carte payments for meals can impact an institution’s ability to purchase specialty items, such as regionally or locally produced food. Paradoxically, schools with lower à la carte sales and higher free and reduced lunch percentages receive larger and more regular quantities of USDA foods, which allow them more flexibility in their procurement budgets. This counterintuitive result arises because the comparatively low cost of USDA foods frees up purchasing dollars in the food budget for other purchases.

Smaller institutions, institutions in agricultural regions and/or in communities that advocate for regional procurement, may have additional flexibility in their procurement options (King, et al., 2010). Some states or localities have passed ordinances that allow schools to bypass low-bid offers for a certain

percentage of regional purchases. In some cases, the proximity of regional farms and community-based relationships pave the way for regional procurement (King, et al., 2010). Some of the incompatibilities between a farm operation and an institution can be mitigated by institutional infrastructure that has not been “updated” and therefore de-equipped, i.e., for institutional kitchens that still have ovens, stovetops, blenders and choppers, instead of only microwaves and steam heat trays.

### *Support entities*

Support entities include a wide range of organizations that provide some level of market support to any of the supply chain actors in FtI programs. Often these entities are considered to be outside of the market, and are not modeled as supply chain actors, but as they have historically served and continue to serve certain key market roles, we include them in the model. The Massachusetts Department of Agricultural Resources funds assistance to introduce the market to both farmers and institutions. Non-profit organizations such as MFTSP and SEMAP act as modified brokers, in the sense that they collect information regarding different supply chain actors’ preferences and capacities, and link and encourage relationships between these actors. These organizations, along with others such as Community Involved in Sustaining Agriculture (CISA) and national organizations like the National Farm to School Network offer tools for both farmers and institutions to use as they navigate these new markets, including how-to’s, sample procurement forms, best practices, and workshops. In the extended season supply chain, the Franklin County Community Development Corporation (FCCDC) has a pure market role as processor, including negotiating prices and contracts and taking ownership of product. Non-profits also provide marketing services, and develop marketing tools to communicate the value of the differentiated product (i.e., “local food”) – some examples include posters, calendars, trading cards, and events, such as the Massachusetts Harvest for Schools Week, which takes place each September. These entities have worked to change the political and regulatory

landscape regarding local, state, and federal levels with successes that range from new nutrition guidelines to new preferential purchasing agreements. Finally, the continued involvement of these entities has served the critical role of verifying the characteristics of the regionally differentiated product, and communicating that the product meets the requirement of credibility to both upstream and downstream actors.

### *Consumers*

Consumers in the supply chain examples are students who purchase meals from food service providers and, in some cases, their parents.

## **Information, Regulation, and Contracts**

End consumers and institutional purchasers may find it challenging to confirm information about a “local” product. As discussed above, a “local” product implies a number of product attributes. Some of these attributes relate to the product itself – it is presumed to be fresher, and therefore have better taste and texture, and perhaps an improved nutrient profile. Some of the attributes relate to the process that has produced the product; for example, consumers presume that the product was grown with fewer chemical inputs, it traveled fewer food miles than comparable products, it was grown within a certain distance from its purchase, or farmers and farm workers earned a living wage in its production. Process attributes may also relate to the food safety associated with the product – because it is grown locally, farmers may be compelled to ensure that the product is not spoiled or contaminated. Finally, some of these attributes relate to the presumed implications of purchasing the product: that purchasing the product keeps productive farmland in use; that money earned is used in the community and has a multiplier effect that benefits the entire community and that is greater than the multiplier for non-“local” food. Some of the attempts to verify whether these presumed attributes are accurate are addressed above. To reiterate, there is no industry-accepted standard to date that offers, labels, or

enforces whether the “local” product does exhibit any of these product attributes.

The supply chain modeled in Figure 5 shows where the ownership of the product and/or the physical possession of the product are transferred. But each of these points also shows where product information is transferred, as well as where market supports may be offered, transaction costs may be incurred, or economic profits may be captured. Product attribute information may be explicitly communicated – a farmer may tell an institutional buyer that the product was grown without pesticides and harvested that morning, or a farmer may label a box of peppers with the farm name and address. The product attribute information may also be implicitly communicated – the product is labeled as “local” on a distributor’s price list, or a market support entity has recommended a farmer to a purchaser, but they do not exchange specific product information outside of price and quantity ordered.

Contracts in this market can range from a “handshake” agreement, to standard arms-length contracts, to extensive site visits and requirements to become an “approved vendor,” to contract farming. The nature of specific contracts and the transfer of product information will be described below for each supply chain example.

While the contractual arrangements vary, food service management companies that pursue local food increasingly require certification that the food purchased meets stringent food safety requirements. Farmers can be required to obtain Good Agricultural Practices (GAP) certification and purchase additional Food Safety Liability Insurance (FSLI). Processors are required to create and follow Hazard and Critical Control Point (HACCP) plans and Good Manufacturing Plans (GMP), as well as meet local, state, and federal requirements for sanitation of processing equipment and facilities, and train employees in food safety. Each of these food safety regulations, while indispensable for ensuring the safety of the food supply, can add considerable fixed costs to a farm operation that sells to institutions.

In addition to regulating food safety, some laws serve to advance the purchase of local foods, under the same presumptions about the social and economic impacts of product attributes mentioned above. Massachusetts General Laws, Chapter 7, Sections 23B contains a preferential purchasing policy for state agencies to “give preference to food products grown or produced in Massachusetts” (Leib, 2012). This law “requires state agencies to purchase food products grown in Massachusetts, unless the price is more than 10% higher than the price of out-of-state products” (Leib, 2012). While the regulations are “required,” they do not appear to be legally binding (Leib, 2012). An additional regulation, Chapter 30B, Section 20, however, does allow state agencies some latitude to justify and make individual in-state purchases up to \$25,000 without seeking quotes (Leib, 2012). This regulation applies to all public schools.

The roles of information, contracts, and regulations carry a heavier burden, and are significantly less codified in the regional wholesale Ftl market than in other wholesale markets. Because the product does not pass directly from farmer to consumer, the “relationship-based” verification of product information relies upon not one, but a series of relationships. Individual consumers prefer certain “local” product attributes over others, and without either a total convergence of every intermediary buyer and sellers’ preferences for “local” or a clear line of explicit information, it is unlikely that each consumers’ presumed menu of “local” product attributes is achieved in this market.

### ***Supply Chain Examples***

Figure 5 models five different supply chain examples for Massachusetts Ftl markets. These five chains illustrate the variety of supply chains within the marketing channels observed in Massachusetts. This section describes each individual supply chain, and identifies which supply chain actors absorb transaction costs, which supply chain actors make transaction costs explicit, how information flows, and what kinds of contracts are common.



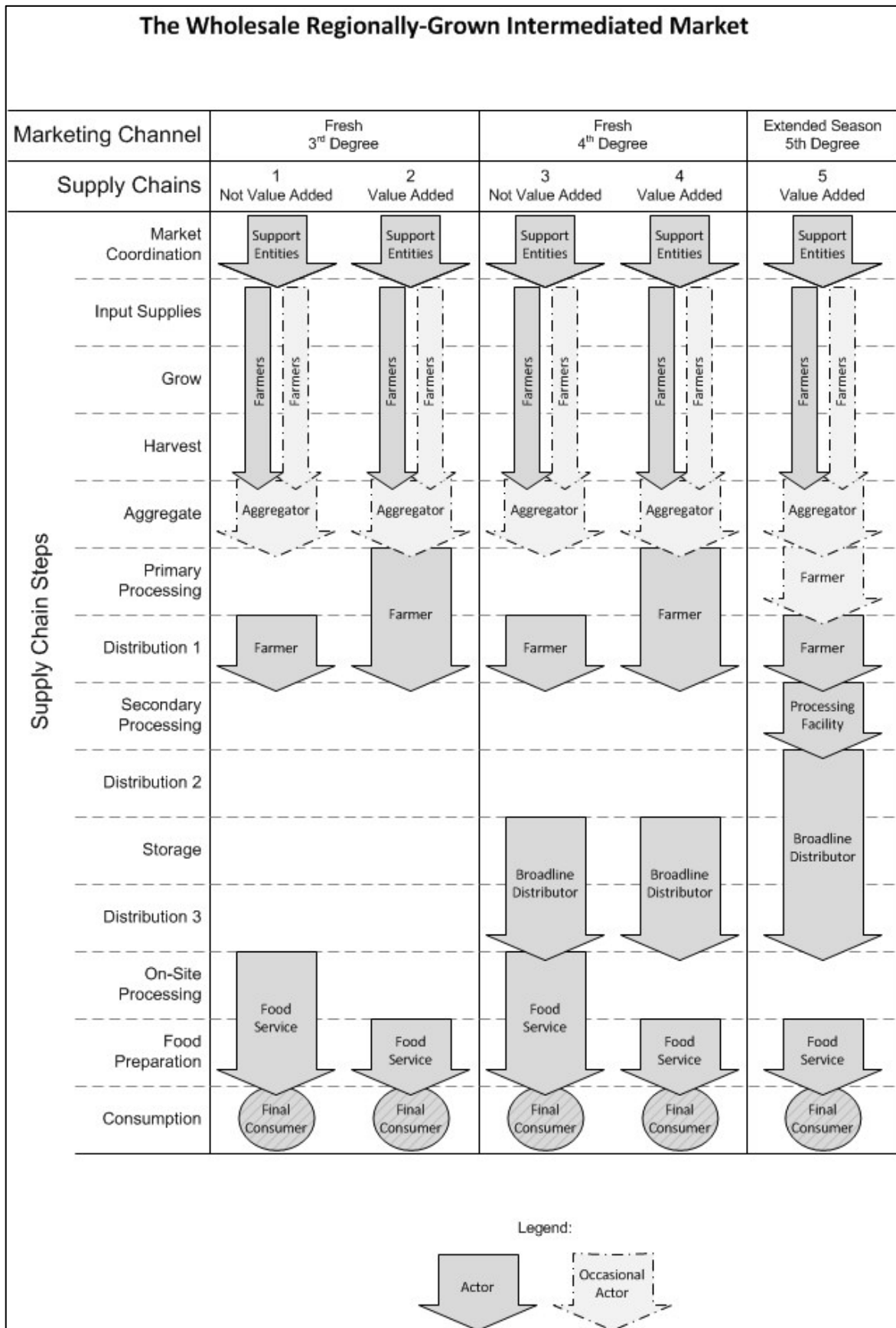


Figure 5. Regionally Grown Intermediated Ftl Market

**Supply Chain #1**

Support entities introduce the market relationship concept of Ftl to both farmers and schools. The support entities may assist or provide tools for farmers and schools to use to begin a market

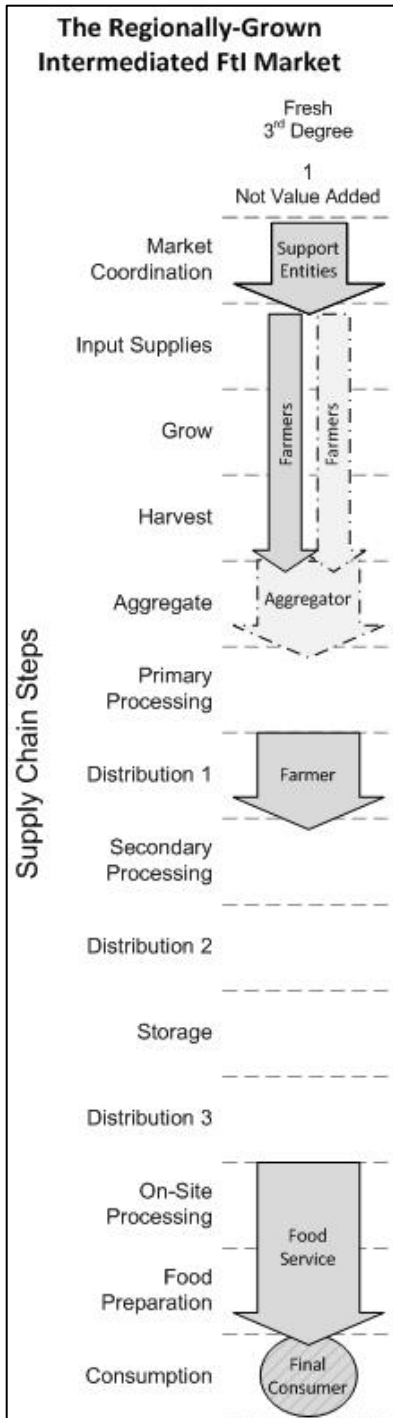


Figure 6. Regionally Grown Intermediated Ftl Supply Chain #1

relationship, including sets of questions and expectations for each supply chain actor to consider. Questions and expectations might address choice of crops, seasonality, price, quantity, quality and specifications, ordering, packaging, delivery, billing, and marketing (MFTSP, 2012). Some support entities work with farmers to determine how entering this market might impact their farm business, and some entities work with institutions to determine how to best incorporate Ftl purchases into their menus and school wellness plans, including how to train food service staff. This work is sometimes referred to as

“building relationships.” Relationships or networks resulting from relationships can also be framed in terms of market interactions: providing assistance in market development and establishing the veracity of information and product attributes. Despite this initial assistance, after a market relationship between farmers and purchasers is established, contracts are generally standard arms – length transactions.

The farmer plans the crop, purchases inputs such as seed and fertilizer, grows and harvests the product. The farmer contacts the food service provider to schedule delivery, delivers the product, usually along with a handwritten invoice. The food service company receives and inspects the product, and

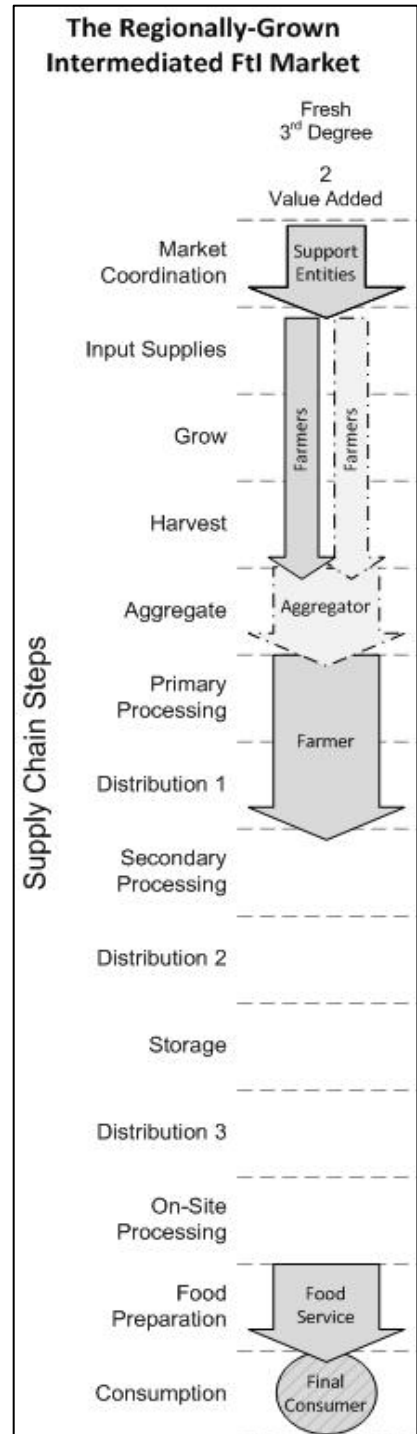


Figure 7. Regionally-Grown, Intermediated Ftl Supply Chain #2

upon approval submits the invoice to the billing department for payment. The food service provider plans meals and menus that include the product. The food service company performs any needed on-site processing, prepares the meal, sells, and serves the

product to the consumer.

In this supply chain, the institution conducts the On-Site primary processing. The institution absorbs nearly all of the transaction costs associated with this market – from the added cost of time spent planning with the farmer, to developing and implementing non-standard food procurement and payment protocols, to cleaning and chopping produce that staff would not otherwise need to process, and to marketing and selling the product to the end consumer.

The farmer also absorbs transaction costs, but these are few compared to other Ftl supply chains.

This supply chain offers the fewest supply chain steps and the fewest intermediaries, and as a result should come the nearest to generating a relatively high margin for the farmer with relatively few external transaction costs.

Over time, the food service provider’s role may evolve to help the farmer plan which and how many crops to plant, quality control, food safety, marketing, and additional value-added activities such as farm tours, or including farmers in institutional activities. These overlaps have some characteristics that are similar to vertically restricted supply chains present in contract farming, where the downstream purchaser begins to have more control over upstream activities (Carmeli, et.al, 2007).

**Supply Chain #2**

This supply chain is nearly identical to Supply Chain #1 described in detail above. Information transfer, contracting, and most transaction cost responsibility remain the same.

The distinction between Supply Chains #1 and #2 is that the Primary Processing supply chain step is moved from the food service company’s role to the farmer’s role. The farmer has primary processing capacities on-farm, and creates a value-added product to sell to the institution. The food service providers no longer need to perform primary processing on-site.

While some institutions may be willing and able to pay a premium for this product, as intended by the characterization of “value-added,” this product will generally transfer some, if not most, of the transaction costs described above as accruing to the institution, to the farmer, instead.

**Supply Chain #3**

This supply chain builds on Supply Chain #1, and adds the supply chain steps of Distribution and Storage, undertaken by a broadline or regional distributor downstream of the farmer or aggregator. The distributor picks up fresh produce that is not value-added from the farmer. In some cases, a distributor

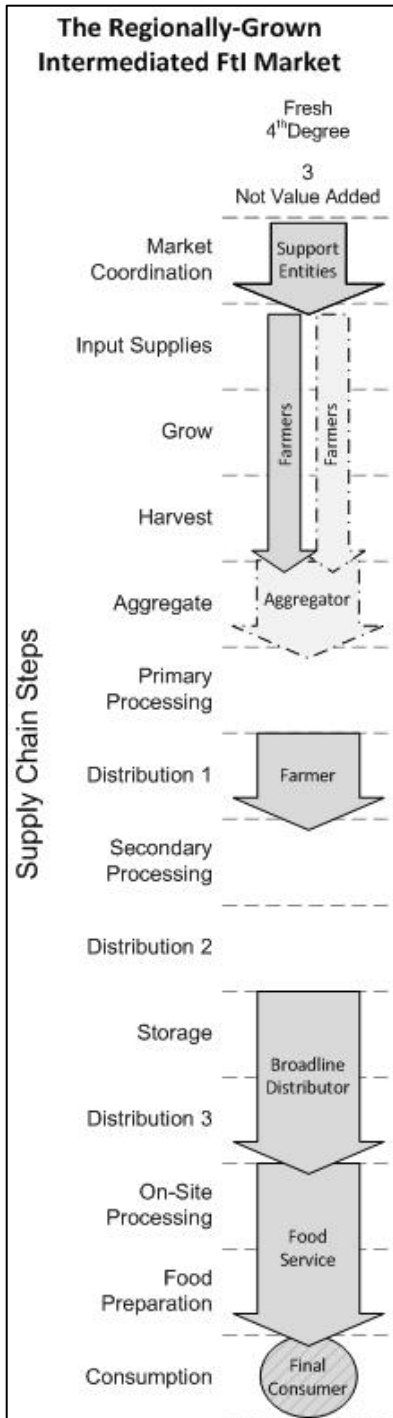


Figure 8. Regionally Grown, Intermediated Ftl Supply Chain #3

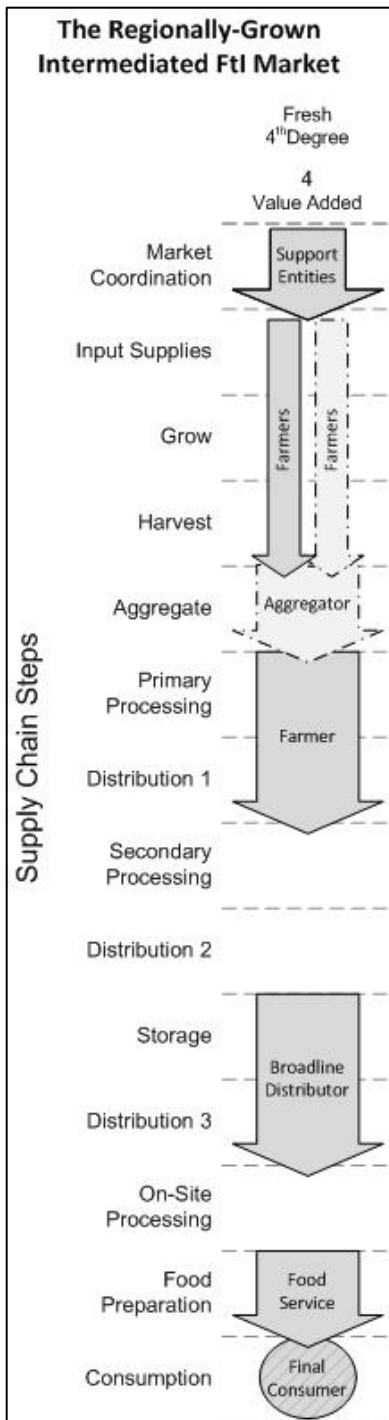


Figure 9. Regionally Grown, Intermediated Ftl Supply Chain #4

may deliver the product directly to the institution, but usually the product is brought to a centralized storage facility and either aggregated or divided for delivery to an institution.

As Ftl programs have become more prevalent, the lack of operational compatibility between farmers and institutions has increasingly become a barrier to the success of many programs, particularly when the institutions are relatively large, or are far away from the farmers. Supply chains that include distributors which aggregate product and provide delivery and billing services removes these barriers by

transferring the transaction costs to the

intermediary, but may correspondingly lower the price paid to the farmer.

Most distributors take ownership of the product when they pick it up from a farmer. Distributors,

therefore, are cautious about the quality and safety of the product that they distribute. Distributors can require farmers to purchase FSLI, get GAP certification, to use particular kinds of containers or on-farm storage facilities to control for heat and humidity. Farmers who work with a distributor may have to make up-front investments (and incur explicit transaction costs) in order to be in compliance with distributors' requirements.

Contracts in these supply chains can vary, but many of these transactions are conducted as arms-length transactions. The transfer of farm- and product-specific information can vary widely with the distribution company.

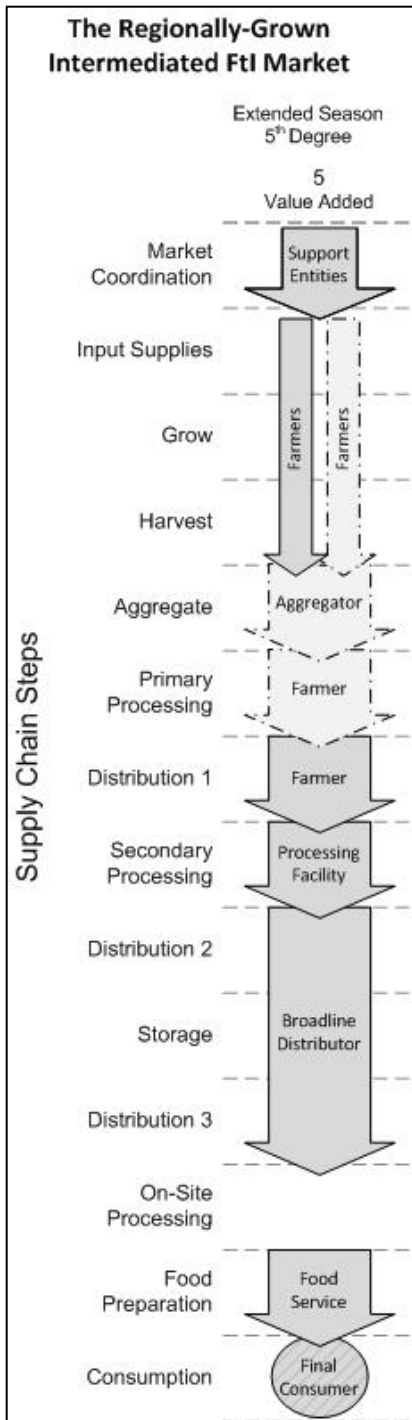
#### Supply Chain #4

This supply chain is like Supply Chain #2 in that the farmer conducts primary processing. It is like Supply Chain #3 in that it includes distribution. In this supply chain, the farmer adds value to the product, but then relies on distribution. Like Supply Chain #3, distribution can resolve operational incompatibilities between farmers and institutions through aggregation, billing services and distribution, but can add up front transaction costs for farmers and can compromise the transfer of farm- and product-specific information.

#### Supply Chain #5

This supply chain builds upon #4 above, but adds a supply chain step downstream of the farmer and upstream of the distributor. This step, Secondary Processing, creates another change in physical state, where the product is frozen or canned for sale in the off season. This extended season product is then picked up by a distributor and delivered to a storage facility before it is delivered to the food service provider. Secondary Processing allows Massachusetts farm products that are locally grown to satisfy markets that were previously inaccessible due to seasonality. In this value chain, the processing facility conducts primary processing.

Transactions costs in this supply chain are primarily absorbed by the processor. Federal, state and local regulations require the processor to maintain strict facility and employee food safety



certifications and protocols. In some cases, distributors or large food service management companies may impose additional food safety requirements, and contracts between food service companies, distributors, and processors will provide for these requirements. Transaction costs for the farmer in this supply chain can vary. For the most part, these costs are similar to those in Supply Chain #4, although the processor's need for a large delivery at a particular time and day adds labor, transportation, and storage costs.

Figure 10. Regionally Grown, Intermediated FtI Supply Chain #5

## Part III: Summary and Future Research

Massachusetts' farm to institution programs have steadily increased in number and volume of product bought and sold over the last fifteen years. There are many inherently attractive aspects to Farm to Institution projects – it is uncommon that a relatively simple idea has the power to link such a wide variety of social problems with an enterprise-based and culturally inspiring solution. Can this simple idea actually deliver the hoped-for benefits to all actors in a way that satisfies all of the constraints? Can the large scale of institutional purchasing of Massachusetts grown food by Massachusetts institutions improve health outcomes, provide farmers with improved farm viability and contribute to economic development? If Ftl sales do not contribute to farm viability, is it possible to achieve the nutrition, environmental, and economic development related goals?

The answers to these questions are unclear. While a significant amount of work and thought has been devoted to the promotion and assessment of individual programs, there is very little evidence available to show whether or not these goals are being, or can be, met on a regional scale. This paper has offered a framework by which farmer viability in Ftl markets can be analyzed.

The Ftl market is an interesting subset of the “local foods” trend. The product itself is differentiated by process and product attributes, most of which are credence attributes. Some of these attributes relate to the product itself, but some relate to the perceived impact of the product. Additionally, product attributes are impacted by process attributes that depend on the marketing channel and supply chains through which the product flows. Because of this, the market for regionally produced goods and its ability to preserve a premium price that passes through to a farmer may depend on market structure, the market power of the supply

chain actors, and by whom the transaction costs are absorbed.

The market for the differentiated product may flow through different market channels. These market channels can have different opportunities for markup.

The supply of and demand for these products is difficult to quantify, other than to say that both appear to be growing. That supply and demand are growing implies that the market will continue to grow, though it will have boundaries in the natural capacity of productive farmland in the area.

The role of information in much of this market is currently very informal, and this lack of formality is reflected in the preponderance of arms-length contracts between supply chain actors. Regulation in this market is generally pursued by private companies which aim to ensure food safety in supply chains with higher degrees of marginalization. These companies do not emphasize the role of explicit product information; larger distribution and food service companies appear to be slow to decide that detailed product information beyond the label “local” may be valuable.

If demand for this product continues to grow, there are a number of factors that will need to be considered to determine whether the purported goals are being, or can be, achieved. These considerations are offered as possible future research areas.

The first consideration, particularly given the relative scarcity and high opportunity cost of productive farmland in the Commonwealth, is whether Ftl programs should focus on state-specific procurement or on regional procurement. Massachusetts has the highest population density in New England. New England, as a relatively small region, shares existing food system infrastructure between Connecticut, Maine, Massachusetts, New Hampshire, Vermont and Rhode Island. The New England states' productive farmland is much greater than Massachusetts' alone. To connect potential

supply to potential demand, many Ftl programs in New England, including Massachusetts, are pursuing regional markets.

The second consideration is whether the end consumers of institutional food prefer “local” enough to pay a premium price for it. If so, will that premium be enough to cover the additional transaction costs associated with the relative supply chain? Will that premium price generate a return to the farmer comparable to that returned through direct marketing, or through wholesale marketing?

Finally, is this market perfectly competitive or do some supply chain actors exert market power? Are all of the supply chain actors price-takers, or do some supply chain actors, in particular distribution and food service companies, have enough market power to extract economic profit, in addition to covering their transaction costs?

## References

- Adams, Melissa. “The Impact of Institutional Sales on Farm Income in Massachusetts: 2010 Farmer Survey Results.” Massachusetts Farm to School Project. Unpublished report. 13 August 2011.
- Anderson, Molly D. 2009. The Case for Local and Regional Food Marketing. *Farm and Food Policy Project issue brief. Northeast-Midwest Institute, Washington, DC.*
- Bowell, Ben, Cris Coffin, Mike Eley, and Doris Mittasch. 2008. *Farms for the Future Massachusetts’ Investments in Farmland Conservation* American Farmland Trust.
- Briefel, Ronette R., Mary K. Crepinsek, Charlotte Cabili, Ander Wilson, and Philip M. Gleason. 2009. School Food Environments and Practices Affect Dietary Behaviors of US Public School Children. *Journal of the American Dietetic Association* 109, no. 2, Supplement (2) : S91-S107.
- Brown, J. P., S. J. Goetz, and D. A. Fleming. 2012. Multifunctional agriculture and farm viability in the united states. In *2012 Annual Meeting, August 12-14, 2012, Seattle, Washington.* Agricultural and Applied Economics Association.
- Carlton, Dennis W., and Jeffrey M. Perloff. 1994. *Modern industrial organization, 2005.* Boston: Addison Wesley.
- Cembalo, L., A. Lombardi, S. Pascucci, D. Dentoni, G. Migliore, F. Verneau, and G. Schifani. 2012. The beauty of the commons? consumers’ participation in food community networks. In *2012 AAEE/EAAE food environment symposium, May 30-31, Boston, MA* Agricultural and Applied Economics Association.
- Cho, Hyunyi, Michelle Zbell Nadow. 2004. Understanding barriers to implementing quality lunch and nutrition education. *Journal of Community Health*, 29, no. 5: 421.
- Clark, Melissa A., Mary K. Fox. 2009. Nutritional quality of the diets of US public school children and the role of the school meal programs. *Journal of the American Dietetic Association* 109, no. 2: S44-S56.
- Cohen, Juliana F. W., Liesbeth A. Smit, Ellen Parker, S. B. Austin, A. L. Frazier, Christina D. Economos, and Eric B. Rimm. 2012. Long-Term Impact of a Chef on School Lunch Consumption: Findings from a 2-Year Pilot Study in Boston Middle Schools. *Journal of the Academy of Nutrition and Dietetics* 112, no. 6 (6) : 927-933.
- Community Food Security Coalition. 2012. *Strengthening Farm to School Programs.*
- Community Food Security Coalition, School Food FOCUS, and National Farm to School Network. 2010. *Nourishing the Nation One Tray at a Time.*
- Conner, D. S., B. T. Izumi, T. Liquori, and M. W. Hamm. 2012. Sustainable School Food Procurement in Large K-12 Districts: Prospects for Value Chain Partnerships. *Agricultural and Resource Economics Review* 41, no. 1: 100.
- Darby, K., M. T. Batte, S. Ernst, and B. Roe. 2008. Decomposing local: a conjoint analysis of locally produced foods. *American Journal of Agricultural Economics* 90, no. 2: 476-486.
- Dentoni, D., G. T. Tonsor, R. J. Calantone, and H. C. Peterson. 2012. The Direct and Indirect Effects of ‘Locally Grown’ on Consumers’ Attitudes towards Agri-Food Products. *Agricultural and Resource Economics Review* 38, no. 3.
- Diamond, Adam, James Barham. 2012. Moving Food Along the Value Chain: Innovations in Regional Food Distribution. *US Department of Agriculture, Agricultural Marketing Service, Market Services Division* 53.
- Erwin, K. 2013. Interview with Massachusetts Farm To School Project Executive Director.
- Erwin, K. 2012. Interview with Massachusetts Farm To School Project Executive Director.
- Faith, Myles S., Kevin R. Fontaine, Monica L. Baskin, and David B. Allison. 2007. Toward the reduction of population obesity: Macro level environmental approaches to the problems of food, eating, and obesity. *Psychological bulletin* 133, no. 2: 205-226.
- Feenstra, G., P. Allen, SD Hardesty, J. Ohmart, and J. Perez. 2011. Using a Supply Chain Analysis to Assess the Sustainability of Farm to Institution Programs. *Journal of Agriculture, Food Systems, and Community Development* 1, no. 4: 69-85.
- Fitzsimmons, Jill A. 2011. *Freezing Regional Produce for Western New England.* MA: CISA.
- Food and Nutrition Service. August, 2012. *National School Lunch Program Fact Sheet.* USDA Food and Nutrition Service.
- Food and Nutrition Service. *National School Lunch Program, 2011.* National School Lunch Fact Sheet.
- Food and Nutrition Service, March 2000. *Small Farms/ School Meals Initiative: Town hall meetings.* USDA Food and Nutrition Service FNS- 316.
- Fox, Mary K., Elizabeth Condon, Mary K. Crepinsek, Katherine Niland, Denise Mercury, Sarah Forrestal, Charlotte Cabili, Vanessa Oddo,

- Anne Gordon, and Nathan Wozny. 2012. *School Nutrition Dietary Assessment Study IV: School Foodservice Operations, School Environments, and Meals Offered and Served*. Cambridge, MA: Mathematica Policy Research .
- Gordon, Anne, Mary K. Fox. 2007. *School nutrition dietary assessment study-III: Summary of findings* .
- Gordon, Anne R., Mary K. Crepinsek, Ronette R. Briefel, Melissa A. Clark, and Mary K. Fox. 2009. The Third School Nutrition Dietary Assessment Study: Summary and Implications. *Journal of the American Dietetic Association* 109, no. 2, Supplement (2) : S129-S135.
- Graham, H., G. Feenstra, A. Evans, and S. Zidenberg-Cherr. 2004. Davis school program supports life-long healthy eating habits in children. *California Agriculture* 58, no. 4: 200.
- Gunter, Allie. 2011. Rebuilding local food systems: Marketing and economic implications for communities. Ph.D. diss., University of Colorado.
- Hilchey, Duncan. 2013. Food systems research priorities: Blueprints for the next 5 years.
- Izumi, B. T., O. S. Rostant, M. J. Moss, and M. W. Hamm. 2006. Results from the 2004 Michigan Farm-to-School Survey. *Journal of School Health* 76, no. 5 (05) : 169-174.
- Izumi, Betty T., D. Wynne Wright, and Michael W. Hamm. 2010. Market diversification and social benefits: Motivations of farmers participating in farm to school programs. *Journal of Rural Studies* 26, no. 4 (10) : 374-382.
- Joshi, Anupama, Marion Kalb, and Moira Beery. 2006. *Going Local: Paths to Success for Farm to School Programs*. Los Angeles, CA: Center for Food & Justice.
- Just, David R., Brian Wansink, Lisa Mancino, and Joanne Guthrie. December, 2008. *Behavioral Economic Concepts To Encourage Healthy Eating in School Cafeterias*. USDA Economic Research Service.
- King, Robert P., Michael S. Hand, Gigi DiGiacomo, Kate Clancy, Miguel I. Gómez, Shermain D. Hardesty, Larry Lev, and Edward W. McLaughlin. 2010. *Comparing the Structure, Size, and Performance of Local and Mainstream Food Supply Chains*. USDA Economic Research Service.
- Leib, Emily B. 2012. *Increasing local food procurement by Massachusetts state colleges & universities*. Cambridge, MA: Harvard Food Law and Policy Center.
- Low, S., S. Vogel. 2011. Direct and intermediated marketing of local foods in the United States. *USDA-ERS Economic Research Report* , no. 128.
- Lusk, Jayson L., Jason Brown, Tyler Mark, Idir Proseku, Rachel Thompson, and Jody Welsh. 2006. Consumer Behavior, Public Policy, and Country-of-Origin Labeling. *Applied Economic Perspectives and Policy* 28, no. 2 (June 20) : 284-292.
- Martinez, Steve. 2010. Local food systems : Concepts, impacts, and issues / steve martinez ... [et al.]. In *Economic research report ; no. 97*. Edited by Anonymous [Washington, D.C. ] : U.S. Dept. of Agriculture, Economic Research Service, 2010.
- MFTSP. *Massachusetts Farm To School Project*. 2012. Available from <[www.massfarmtoschool.org/](http://www.massfarmtoschool.org/)>. [February 16, 2013].
- Nanney, Marilyn S., Marlene B. Schwartz, and Mary Story. 2009. Schools and Obesity Prevention: Creating School Environments and Policies to Promote Healthy Eating and Physical Activity. *The Milbank quarterly* 87 (03; 2012/8) : 71.
- National Farm to School Network. 2012. Available from <<http://www.farmtoschool.org/>>. [September 22, 2012].
- Food and Nutrition Service. *National School Lunch Program, 2011*. National School Lunch Fact Sheet.
- Otto, D., T. Varner. 2005. *Consumers, vendors, and the economic importance of Iowa farmers' markets: An economic impact survey analysis*. Leopold Center for Sustainable Agriculture and its Regional Food Systems Working Group: Iowa State University.
- Sexton, R. J. 2012. Market Power, Misconceptions, and Modern Agricultural Markets. *American Journal of Agricultural Economics* .
- Swenson, Dave. 2011. The regional economic development potential and constraints to local foods development in the Midwest. In Iowa State University Department of Economics.
- Swenson, Dave. 2010. *Selected Measures of the Economic Values of Increased Fruit and Vegetable Production and Consumption in the Upper Midwest*. Iowa: Leopold Center for Sustainable Agriculture.
- Thilmany, Dawn, Craig A. Bond, and Jennifer K. Bond. 2008. Going local: Exploring consumer behavior and motivations for direct food purchases. *American Journal of Agricultural Economics* 90, no. 5: 1303-1309.
- Toong, Ken. *Statement from Ken Toong, Director of Dining Services*. May 13, 2010. Available from <<http://oncampussustainability.com/Resources/toong.htm>>. [September 24, 2012].
- Tuck, Brigid, Monica Haynes, Robert King, and Ryan Pesch. June 2010. *The Economic Impact of Farm- to - School Lunch Programs: A Central Minnesota Example*. University of Minnesota Extension.
- USDA, Agricultural Census, 2007.
- USDA, Real Estate Value of Land. 2013.
- Waldman, Don E., and Elizabeth J. Jensen. 2001. *Industrial organization: Theory and practice*. Addison Wesley Longman.
- Wirth, F. F., J. L. Stanton, and J. B. Wiley. 2012. The relative importance of search versus credence product attributes: Organic and Locally Grown. *Agricultural and Resource Economics Review* 40, no. 1.



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