DISTRIBUTION CHANNEL CHOICE OF LOCAL FOOD MARKETING FARMS IN NEW YORK STATE

A Thesis

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Master of Science

by

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ABSTRACT

Growing demand for local foods presents opportunities for producers in a variety of marketing channels. However, decisions on channel portfolio are complex. Using data from a sample of producers in New York, we examine influences of farm, manager and marketing characteristics on channel choice. Empirical results suggest that retail competition required more experience or particular production methods to improve success, while formalized business structures were more important in marketing through intermediated channels. For retail channels, larger operations increasingly used farmers' markets at the expense of farm stand/U-pick operations. Education was important to increasing internet sales, while organic products were more effectively marketed through CSAs. For intermediated channels, restaurant sales were directly associated with full-time farmers, organic production, and higher product variety, while grocery sales were associated with more experienced operators. Younger operators increasingly sold to other vendors, as did larger farms and those with more locally targeted marketing strategies.

BIOGRAPHICAL SKETCH

Haley Rowland was born and raised in Oxford, CT. As the fifth generation on her family's farm, she was an active participant in swine and equine 4-H. In addition to her yearly 4-H project animals, she raised layer hens from the time she could carry a feed bucket until the year she left for college. Haley attended the prestigious Westover School in Middlebury, CT, where she honed her work ethic and became an active participant in theater and music. While obtaining a Bachelor of Music in Sound Recording Technology from Ithaca College, Haley began managing a small herd of Jersey heifers. Upon graduating in 2012, she decided to pursue her interest in farm management and dairy production through a Master of Science in Applied Economics and Management at Cornell.

For fun, Haley enjoys oil painting, knitting, and cheese making. A trained mezzo-soprano, Haley will be studying German Lieder in Austria during the summer of 2014.

For my family, both blood and otherwise, for their unconditional support, and for Yoon, who taught me how and when to ask for help.

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TABLE OF CONTENTS

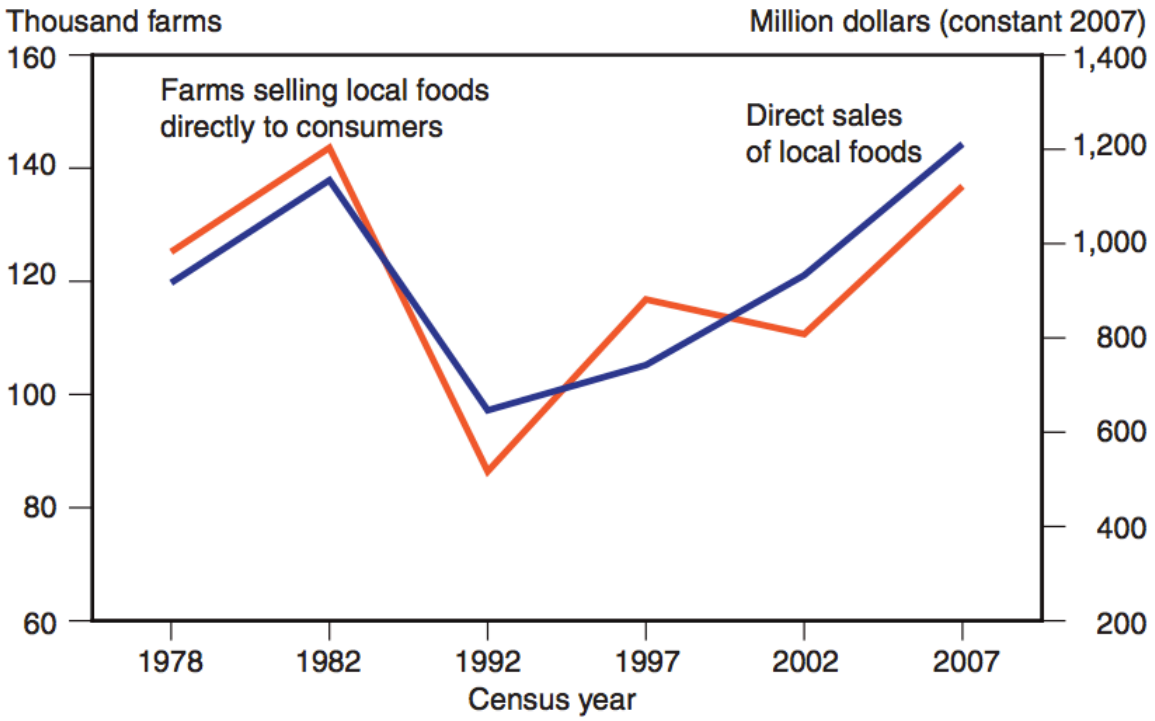
LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION AND LITERATURE SUMMARY

Growing demand by consumers for local foods has driven market expansion in a variety of marketing channels, including retail (e.g., farmers markets, CSAs, farm stands) and intermediated channels (e.g., wholesaling to restaurants, groceries, distributors, and food service customers). As shown in Figure 1, taken from Low and Vogel (2011), direct-to-consumer sales (i.e., through retail channels) have been on a steady rise since 1992. While tracking intermediated channel sales is more difficult, both King et al. (2010) and Low and Vogel (2011) acknowledge an increasing presence of both retail and wholesale buyers in local food markets.



Note: Inflation adjusted sales were calculated based on the gross domestic product implicit price deflator published by the Bureau of Economic Analysis, U.S. Department of Commerce and calibrated to 2007=100.
Source: 1978, 1982, 1992, 1997, 2002, and 2007 U.S. Censuses of Agriculture.

Figure 1. Direct-sales farms and direct sales of local foods, 1978-2007 (Low and Vogel, 2011)

Standard economic theory dictates that sales will be allocated across channels such that the marginal net returns across channels are equal. However, concerns such as product perishability and specific channel requirements (e.g., volume needs, buyer specifications) can complicate the simple profit maximizing solution. Ultimately, marketing channel decisions are a challenging part of the business and are determined by a number of different factors. Market conditions, channel incentives, and farm and producer characteristics have been shown to influence producers' choice of marketing channel use (Hinson et al., 2012; Sun et al., 2014). By identifying the relative importance of various factors, one can systematically analyze distribution channels and strategies for their effective use. Advantages and disadvantages of channel alternatives affect the ability of producers to achieve their strategy and profit objectives. A better understanding of the use of alternative market channels should contribute to better management strategies.

As detailed in Gattorna (1978) and discussed in Sun et al. (2014), several schools of thought are available to help understand the mechanics of distribution channel choices by firms. Firms may consider (1) optimization approaches considering revenues and costs, (2) institutional approaches relying on transactional and exchange economies created by intermediaries, (3) functional approaches by which intermediaries exist to serve certain functions, or (4) organizational and behavioral approaches that introduce social elements. Ultimately, the choice of distribution channels is multi-perspective and is, therefore, determined by different factors (Sun et al., 2014).

Literature Summary

There has been considerable research conducted on the evaluation of particular local food

marketing channels, such as vendor performance in local sales at farmers markets (e.g., Feenstra et al., 2003; Schmit and Gómez, 2011; Brown and Miller, 2008; Varner and Otto 2008; Hughes et al., 2008; Stephenson et al., 2008), Community Supported Agriculture (CSA) (e.g., Brown and Miller, 2008; Oberholtzer, 2004), restaurants (e.g., Schmit and Hadcock, 2012; Curtis and Cowee, 2009; Thilmany, 2004), and hospitals (Smith et al., 2013). However, limited attention has been given to evaluating a set of market channel choices concurrently. While a more limited number of studies have looked at a broader selection of marketing channels, they have been conducted exclusively through the use of case studies (e.g., Biermacher et al., 2007; Hardesty and Leff, 2009; LeRoux et al., 2010; Monson et al., 2008; Morgan and Alipoe, 2001; Stephenson and Lev, 2004; Uva, 2002).

Consideration of both retail and intermediated channel sales is important. In retail channels, the farmer sells directly to the final customer, such as through a CSA or farmers market. In intermediated channels, the farmer sells to a middleman (or intermediary agent), as is the case in sales to restaurants, groceries, or distributors. Retail, or direct-to-consumer (D2C), sales have shown strong growth; however, they still represent a relatively small proportion of total farm marketings (in aggregate). Nonetheless, for some producers, retail channels may be particularly important. Which factors affect these decisions is important to understand. In addition, Low and Vogel (2011) estimate that intermediated sales represent at least three times more sales than those marketed through D2C outlets. The inclusion of intermediated marketing channels gives a more accurate count of total local sales than a purely retail perspective, as regional distributors, grocery stores, restaurants, and other retailers are increasingly participating in local food markets (Low and Vogel, 2011). King et al. (2010) also acknowledged the growth of intermediated marketing channels as a part of local foods sales. They noted the desire by local

producers to enter mainstream markets, and found that supermarket wholesale and retail companies could potentially be effective channels for local food producers.

There is a growing desire among consumers to have a direct link to the producer and to support their local economy, but this connection can become muddled in wholesale and retail markets. In addition, barriers exist to accessing intermediated markets, as buyers generally prefer larger volumes from a few suppliers, rather than working with many farmers offering small, varied amounts of food products. That said, national supermarkets such as Walmart and Whole Foods offer locally sourced foods, as do regional chains such as Wegmans. However, in order for local producers to gain access to these more mainstream markets, efficient packaging and transportation logistics are needed (King et al., 2010).

Despite entrance to mainstream markets remaining difficult, promising opportunities exist. This is reflected in the growth of and focus on locally marketing farms. To wit, in 2008, more small and medium-sized farms that marketed locally identified farming as their primary occupation than similar sized farms that did not market locally (Low and Vogel, 2011). Furthermore, farms grossing under $50,000 annually represented more than 80% of farms claiming local sales (ARMS 2008). Smaller farms were more likely to rely on direct marketing channels, such as farmers markets and farm stands. Medium-sized farms grossing between $50,000 and $250,000 in sales represented 14% of farms with local food sales, using direct channels alone or a mix of direct and intermediated (ARMS 2008). Only 5% of farms reporting local sales had gross annual sales above $250,000 (ARMS 2008), but these large farms represented 93% of local food sales through intermediated channels (Low and Vogel, 2011). This suggests that as farm size increases, the tendency to use intermediated channels also increases. However, without controlling for other covariates, this increase is difficult to quantify.

Other farm-level decisions, such as product types marketed, may also play an important role in influencing marketing channel choice. Low and Vogel (2011) observed that vegetable, fruit, and nut farms are popular in local markets. While they only accounted for 6% of all US farms, they represented 43% of all farms with local food sales and generated $3 billion in local sales in 2008 (Low and Vogel, 2011). Vegetable, fruit, and nut farms generated 65% of total sales of locally grown food, a much larger portion of the local market than livestock and field crop farms (Low and Vogel, 2011). This may be due, in part, to the fact that vegetable, fruit, and nut farms can operate fewer acres while generating higher gross sales per acre than field crops or livestock. This also makes these farms attractive to local start-ups and farmers who appreciate the small-scale, locally marketed lifestyle (Low and Vogel, 2011).

Hinson et al. (2012) suggest that marketing channel choice is determined by channel incentives, market conditions, and grower characteristics, where channel choice is a mix of producer and consumer preferences, due to the necessity for producers to sell where consumers are willing to buy. With respect to a mature industry (in their case the ornamental plant market), they found that most consumers are already users and are shopping for replacements for products they had purchased previously; therefore, there is slower demand growth, tight price competition, and tighter margins. In this market, they found that the important variables in channel choice were region, plant groups produced, sales under contracts, and channel diversity (Hinson et al., 2012). More densely populated regions were more likely to see sales through retail channels (garden centers and mass merchandisers) than wholesale channels (landscapers and rewholesalers). Particular products such as vines and bedding plants were more likely to be sold through retail channels, while trees, shrubs, and foliage were more likely to be sold through intermediated channels. Greater total sales under contract generally implied contracts through

intermediated channels. Farms with a diversified marketing strategy were more likely to sell higher shares through retail channels.

Low and Vogel (2011) found that farm size was inversely related to sales in retail markets and directly related to sales in intermediated markets. Hardesty and Leff (2009) argued that retail channels, such as farmers markets, seem to attract new farmers because of the ease of entry as well as high premiums and a networking atmosphere. Accordingly, farmer age, or length of time the proprietor has been farming, should have similar effects on channel choice as farm size. For example, a more experienced farmer may stray from farmers markets because of price competition, wait lists for stalls, or member dues, while a new farmer may value the networking opportunities and visibility to consumers.

Sun et al. (2014) observed a similar effect in wineries; i.e., older wineries sold less through tasting rooms (a retail channel), and more through direct shipment, which can be a direct or intermediated channel depending on the customer. Winery size also mattered, whereby larger wineries sold less through tasting rooms and direct shipments and more through distributors (Sun et al, 2014). They also observed that vertical integration increased with winery age, not just channel choice. The extent of a winery's vertical integration (i.e., the share of own grapes used in wine products) appeared to be directly related to tasting room and distributor marketing channels (Sun et al, 2014).

Labor availability may also influence the selection of specific marketing channels. Selling though intermediated channels may require less marketing labor than selling through direct channels, and may therefore result in lower labor costs per unit of output (Low and Vogel, 2011). However, more specialized (and costly) labor requirements may be necessary in interacting with buyers through these channels, to which total labor costs will be more similar.

Direct channels such as farmers markets require farmers or employees to man the booth for hours, resulting in opportunity costs in the case of the farmer and wage costs in the case of an employee. Hardesty and Leff (2009) and LeRoux et al. (2010) both found that CSA marketing costs were lowest among all channels evaluated. CSAs were appealing to producers because they generated an upfront cash flow with less sales effort and lower risk. With direct and wholesale marketing diversification, a loss due to a drop in prices in one market may be absorbed in another under differing price conditions (LeRoux et al., 2010).

Expanding CSA sales, as part of an overall portfolio, has been shown to be an effective method of improving profitability (LeRoux et al., 2010). Farmers can achieve this by offering rare or not readily available products, different box sizes, and options for weekly or bi-weekly pick up, or through association with CSA affiliates that contract numerous farms. CSAs can give members more diverse offerings and provide the farmers with lower administration and transportation costs (Hardesty and Leff, 2009). Leroux et al. (2010) found that another efficient method of improvement was to augment CSA sales with wholesale outlets. Sun et al. (2013) suggested that wineries that favor tasting rooms should conduct more promotional activities. They observed that distributors became more important when a winery sought to expand, and that inter-winery collaboration could facilitate that expansion. All the studies previously mentioned also agreed on one thing: producers must measure and manage costs. They must keep proper records to account for sales, labor, and other costs. Many owner-operated farms fail to quantify the labor of the owner, and that failure can result in channel selections that reduce overall firm performance (LeRoux et al., 2010).

Research Objectives

This research extends previous work by providing a more comprehensive analysis of the farm and producer determinants of channel choice for operations participating in local food markets in New York State. In addition, we consider operations involved in retail, intermediated, and commodity channels[1] in the aggregate, and then we consider a more detailed examination of particular retail and intermediated channel decisions.

While the importance of distribution channel selection is widely understood, little empirical research exists to comprehensively identify the factors influencing the choice of particular channels in local food markets. The primary objective of this research is to promote a better understanding of the factors determining marketing channel choices by producers participating in local food markets. Doing so provides important information to systematically analyze local food producer distribution challenges and strategies to overcome them.

To address our objective, we use a unique set of primary data on the purchasing and sales activities of a random sample of agricultural producers with local food sales in an eleven-county region in New York State. We identify specific and measurable farm, operator, and marketing characteristics that are expected to influence channel choice. To assess the importance of these factors on marketing channel choice, we adapt a fractional multinomial logit model framework, as our dependent variables (shares of sales in each marketing channel) are fractions that necessarily sum to one. The results of the model estimation are then used to assess the implications for local food producers.

We continue now with a description of the conceptual model and empirical framework in studying marketing channel choice. This is followed by a description of the unique data

[1] Commodity channel sales are designated as sales of unprocessed foods (e.g. fruits, vegetables, dairy) through channels such as auctions and cooperatives.

assembled and the empirical results. We close with some summary implications and directions for future research.

CHAPTER 2

MODEL DEVELOPMENT

Conceptual Framework

Our conceptual framework follows from our hypothesis that farm, management, and marketing characteristics influence channel decisions (Figure 2). First, we argue that there are specific and measurable farm characteristics that influence the marketing channel mix: farm size, organizational structure, production methods, and product types. Larger farms may be better able to accommodate larger volume requirements in intermediated channels, while better-defined business structures may be needed to meet buyer requirements. Production methods, such as organic, may be more established in some retail channels than others. Certain types of products may be more popular or accepted in different marketing channels.

Second, we posit that management characteristics will also influence channel mix, namely owner age, education, and farm-owner status. Experience is likely to influence channel choices differently, and owner age should serve as a reasonable proxy. Skill requirements will vary by channel to which the level of owner or manager education may be particularly salient. Time requirements by channel are also likely to vary, so considering other time constraints (e.g., work off of the farm) should be important.

Finally we consider general marketing strategies that influence channel mix: spatial marketing focus and product line diversity. With respect to the former, we expect that firms with larger geographic sales scope may allow for improved intermediated market access that may be more cost prohibitive with certain channels. Also, direct consumers may appreciate more product variety than intermediated channel buyers with large (single product) volume requirements.

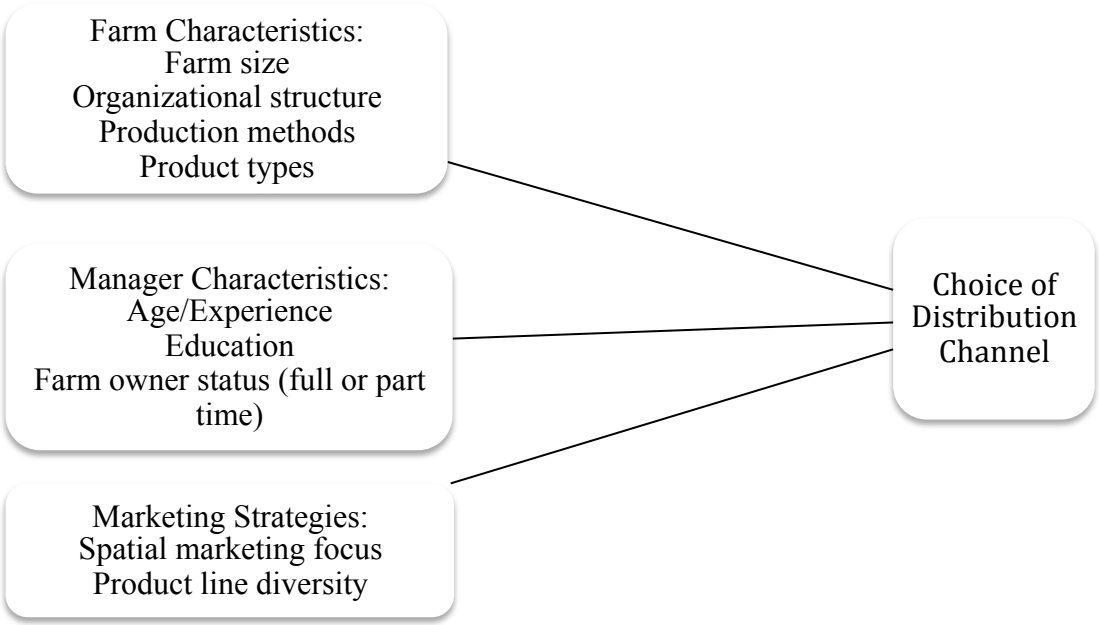


Figure 2. Conceptual Framework for Local Foods Distribution Choices

Econometric Model

Regression analysis is used to compare channel sales shares across firms, taking into account that individual sales shares are relative to other channel sales shares for each firm. To explore the relationship between farm, operator, and marketing characteristics and channel sales shares, a fractional multinomial logit model (FML) is used. Whereas the multinomial logit has a dependent variable that takes on multiple categories, the FML model has dependent variables that consist of proportions on the closed interval [0,1], and for each observation, the proportions sum to one. One or more of the proportions may take a boundary value of 0 or 1; i.e., some market channels may not be used, or sales may be entirely through one channel.

Consider a sample of $i = 1,\ldots,N$ farm observations. Each i has M outcomes for distribution channel choice. For example, in our aggregate model, $M = 3$ (retail, intermediated,

and commodity sales as fractions of total sales). Let s_{ik} equal the k^{th} outcome for observation i, and x_i be a vector of exogenous covariates. For our data:

(1) $$s_{ik} \in [0,1] \quad \text{and} \quad \sum_{k=1}^{M} s_{ik} = 1 \quad \forall\, i$$

Now let the fraction s_{ik} be a function of x_i. While one approach to analyzing fractional dependent variables is in modeling the log-odds ratio as a linear function of explanatory variables, this approach does not accommodate the situation where a particular share does not contribute to total sales (i.e., $s_{ik} = 0$ for one or more k). Following Koch (2010) and Sivakumar and Bhat (2002), we consider the FML model to accommodate this, as an extension of the bivariate version ($M = 2$) proposed by Papke and Wooldridge (1996)[2]. Consider the model as:

(2) $$\mathrm{E}[s_{ik} \mid x_i] = G_k(x_i\beta)$$

$$0 < G_k(x_i\beta) < 1$$

and

$$\sum_{m=1}^{M} G_k(x_i\beta) = 1$$

Keeping s_{ik} on the interval [0,1] can be accomplished by assuming the multinomial logit functional form for G_k using an index function β_k and x_i:

(3) $$\mathrm{E}[s_{ik} \mid x_i] = G_k(x_i\beta) = \frac{\exp(x_i\beta_k)}{\sum_{\ell=1}^{M} \exp(x_i\beta_\ell)}$$

[2] Papke and Wooldridge (2008) have extended the fractional response model to handle panel data.

The econometric model in (2) and (3) is well defined, even if s_{ik} takes the value of 0 or 1 with positive probability (Sivakumar and Bhat, 2002). Following Koch (2010), as adapted from Ye and Pendyala (2005) and Mullahy and Robert (2010), a quasi-maximum likelihood (QML) function is used to simultaneously and efficiently estimate the population equations, assuming the functional specification in (3) is correct. The function can be expressed as:

(4) $$L = \prod_{i=1}^{N} \prod_{k=1}^{M} G_k(x_i\beta)^{s_{ik}}$$

(5) $$\ln L = \sum_{i=1}^{N} \sum_{k=1}^{M} s_{ik} \ln G_k(x_i\beta)$$

$$= \sum_{i=1}^{N} \sum_{k=1}^{M} s_{ik}(x_i' - \ln \sum_{\ell=1}^{M} \exp(x_i\beta_\ell))$$

Identification of the model requires normalizing on one set of parameters, for example β_M, or

(6) $$\mathrm{E}[s_{iM} \mid x_i] = G_M(x_i\beta) = \frac{1}{1+\sum_{\ell=1}^{M-1} \exp(x_i\beta_\ell)}$$

(7) $$\mathrm{E}[s_{ik} \mid x_i] = G_M(x_i\beta) = \frac{\exp(x_i\beta_k)}{1+\sum_{\ell=1}^{M-1} \exp(x_i\beta_\ell)} \qquad \forall\, k \neq M$$

Under this identification assumption, the final quasi-likelihood function can be expressed as (Koch, 2010):

(8) $\ln L = \sum_{i=1}^{N}[-s_{i1} \cdot \ln(1 + \sum_{\ell=1}^{M-1} \exp(x_i\beta_\ell)) + \sum_{k=1}^{M-1} s_{ik}(x_i' - \ln(1 + \sum_{\ell=1}^{M-1} \exp(x_i\beta)))]$

where the estimated parameters ($\hat{\beta}$) solve the first order conditions:

(9) $$\frac{\partial \ln L}{\partial \beta_k} = \sum_{i=1}^{N} x_i'\left[s_{ik} - G_k\left(x_i\hat{\beta}\right)\right] = 0$$

Given the necessary parameter normalization that arises from the summation restriction, straightforward interpretation of the parameter point estimates or their significance is difficult and not of primary interest (Mullahy and Robert 2010). Instead the marginal effects, the effects of a change in one of the variables on the expected conditional mean of the share, are most relevant.

The derivation of the marginal effects, for both continuous and discrete variables is shown in Koch (2010).[3] The FML model ensures that the marginal effects for each variable sum to zero; i.e., the effect of a change in any variable results in different substitution patterns between channels.

Empirical Model Specification

The empirical specification follows from the conceptual framework and consists of the following vector of explanatory variables with their corresponding coefficients:

(10) $x_i\beta = \beta_0 + \beta_1 TotalSales_i + \beta_2 FullTime_i + \beta_3 OwnerAge_i + \beta_4 EdCollege_i + \beta_5 BusCorpLLC_i + \beta_6 Organic_i + \beta_7 No\_Products_i + \beta_8 Sales\_Region_i + \beta_9 Plants_i + \beta_{10} FProduce_i + \beta_{11} Dairy_i + \beta_{12} MeatAndEggs_i + \beta_{13} OtherValAdd_i$

[3] The marginal effect for discrete variables is the conditional mean estimate with the dummy variable turned on less the conditional mean estimate with the dummy variable turned off (Koch 2010).

where $TotalSales_i$ is the total sales volume (farm size) for farm *i,* $FullTime_i$ denotes full time status of the farm owner, $OwnerAge_i$ is the age of the farm owner, $EdCollege_i$ is a dummy variable for the college education of farm owner, $BusCorpLLC_i$ is a dummy variable for the farm business structure (i.e., corporation or LLC), $Organic_i$ is a dummy variable for organic production methods on the farm, $No\_Products_i$ is the number of individual product classes sold (product diversity), $Sales\_Region_i$ is the proportion of total sales sold within the 11-county region, and $Plants_i$, $FProduce_i$, $Dairy_i$, $MeatAndEggs_i$, and $OtherValAdd_i$ are the proportions of total sales of plants and nursery crops, fresh fruits and vegetables, dairy products, meat and eggs, and other value added products (e.g., baked goods, jams and jellies, honey, maple syrup, and wool), respectively.

We run three separate classes of models in our analysis. The first class is an aggregate model to determine the effects of farm, operator, and marketing characteristics on farmers' decisions to sell through aggregated retail, intermediated, and commodity channels (M=3). For the second and third model classes, we apply the same empirical model in (10) to groupings of specific retail and intermediated channels. The retail channel model is broken into four dependent variables: farmers markets, farm stands and U-pick operations, CSAs, and internet/other retail channels. The intermediated channel model is also broken into four dependent variables: restaurants, packers/distributors/processors, grocery/specialty stores, and farm vendors/other intermediated channels.

CHAPTER 3

DATA

The data for this research are taken from a 2011 survey of agricultural producers within the Capital District (CD) region in Upstate New York that marketed at least a portion of their agricultural and food products through local marketing channels.[4] The CD region is characterized by a large urbanized (metropolitan) core, surrounded by less urbanized (micropolitan) and non-urbanized areas. Generalizations of our results to other areas should be guided by the relative similarity of regional characteristics that should, in part, reflect producers' access to input and output markets.

A team of Cornell Cooperative Extension (CCE) educators in the region identified farmers in each county that directed a part of their marketing efforts to local (regional) food buyers. The CCE team identified 752 farms, a total remarkably consistent with data from the 2007 Census of Agriculture that reported 797 farms in the region with D2C sales (USDA, 2007). Due to resource limitations, a random sample of 130 producers was selected to participate in the study. The number of farms drawn from each county-list of producers was based on the distribution of all farms in the region according to farm counts from the 2007 Census of Agriculture. Participants were offered $20 for completion of the surveys, and individual survey responses were kept confidential.[5] The interviews were designed to collect information on farm and operator characteristics as well as detailed financial information on sales (by marketing channel, product category, and location), expenditures (by type and location), and marketing

[4] The Capital District region includes the following counties: Albany, Columbia, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren and Washington.
[5] The Cornell University Office of Research Integrity and Assurance exempted the project from Institutional Review Board review June 11, 2011 (Protocol ID# 1106002267).

strategies.[6] Due to the detailed nature of the data collected, in-person interviews were conducted with a trained enumerator. A total of 95 interviews (75%) were completed with full information.

Channel Shares Variables

Producer channel use is shown in Table 1. In considering aggregate channels, nearly 70% of total sales, on average, are routed through a variety of retail channels. As the survey was targeted to producers using local markets as part of their marketing plans, this relatively high use of retail channels was expected. Over 20% of sales was routed through intermediated channels, and the balance, 8%, was routed through traditional commodity channels.

As mentioned earlier, part of our focus is on channel choice of specific channels, particularly in retail and intermediated markets. Most producers sold at least part of their product through retail channels (87 out of 95), and of these nearly 63% of retail sales were through farm stands or U-pick operations (Table 1). This was followed by farmers markets (17%), internet/other retail channels (11%), and CSAs (9%). The larger share of sales through farm stands and U-pick operations is likely influenced, in part, by the particular region studied with a close approximation to a mid-sized metropolitan area (Albany), as well as an area influenced by travellers visiting from the New York City area.

Considerably fewer local food producers sold through intermediated markets (54 of 95) and, on average, were more evenly distributed amongst the individual channels. Both grocery/specialty stores and sales to other farm vendors/other had about 30% of intermediated sales, followed closely by restaurant sales (24%). Relatively limited volumes were sold to packers, distributors, or processors (16%). The relatively high standard deviations for each of the model classes suggest considerable variation in channel choices among producers.

[6] Refer to Appendix Survey A: Producer Survey for further information.

Table 1. Distribution of Sales by Marketing Channel[a]

Variable	*Variable Description*	Obs	Mean	Std. Dev.	Min	Max
All Producers – *share of total sales*						
SalesRetail	*retail channel sales share*	95	0.699	.351	0	1
SalesIntermediated	*intermediated channel sales share*	95	0.221	.310	0	1
SalesCommodity	*commodity channel sales share*	95	0.080	.242	0	1
		Sum:	1.000			
Retail Channel Producers – *share of Retail sales*						
RSales_FM	*farmers market sales share*	87	0.172	.322	0	1
RSales_FSUP	*farm stand/U-pick sales share*	87	0.628	.432	0	1
RSales_CSA	*CSA sales share*	87	0.089	.256	0	1
RSales_IMOOTH	*internet/other sales share*	87	0.111	.276	0	1
		Sum:	1.000			
Intermediated Channel Producers – *share of Intermediated sales*						
ISales_RES	*restaurant sales share*	54	0.238	.389	0	1
ISales_PDPRO	*packer/distributor/processor sales share*	54	0.157	.345	0	1
ISales_GRO	*grocery/specialty store sales share*	54	0.298	.410	0	1
ISales_VENOTH	*vendor/other sales share*	54	0.307	.437	0	1
		Sum:	1.000			

[a] Note sample size varies for the different models, as 87 farms sold through Retail channels (8 farms did not), and 54 farms sold through intermediated channels (41 farms did not)

Independent Variables

Farm size was incredibly diverse in the sample, with total annual sales (*TotalSalesThou*) ranging from $300 to $3.5 million and an average of $265,000 (Table 2).[7] The majority of farms implemented nonorganic production methods, with only 22% implementing organic methods. Some farmers implemented both organic and nonorganic production methods, and, for the

[7] The median was $58,000

purpose of this study, we defined organic farms as farms that claimed any organic production on the premises. Nearly 35% of farms were organized as corporations or LLCs.

We considered five aggregated product type sales on channel decisions. Specifically, we consider the percentages of total sales: plants, fresh produce, dairy, meat and eggs, and other and value added. Fresh produce represents both fresh fruits and fresh vegetables, and dairy represents both fresh milk and processed dairy. The other value added category combine the sales figures for baked goods, honey, maple syrup, processed fruit and vegetables, and other (e.g. wool). The categories for plants and meat and eggs are self-explanatory. As expected, fresh produce is the most common product type sold, representing nearly 40% of total sales. On average, plants and nursery products were a distant second at nearly 16%, followed by meat and egg sales and other value added at around 12%, and dairy products at 6%.

Owners were 56 years old (*AgeOwner*) on average (the range was 24 to 79) and well educated, with 79% completing at least an undergraduate college degree (*EdCollege*). Nearly 70% classified themselves as full time farmers (*FarmFT*).

No_Products served as a proxy variable for product variety. It represented the number of products marketed out of a possible sixteen original categories in the survey: fresh fruits, fresh vegetables, grains, plants, animals, meat, eggs, processed fruits, processed vegetables, fresh milk, processed dairy, honey, maple syrup, hay, baked goods, and other. Out of these sixteen possible categories, the farms in this study marketed a minimum number of products of one and a maximum of eight. The average for the sample was 2.5.

Sales_Region represented the spatial marketing focus by detailing the percentage of total sales that occurred within the Capital District region. 86% of total sales of the sample on average were confined to this region.

Table 2. Descriptive Statistics of Independent Variables

Variable	*Variable Description*	Obs	Mean	Std. Dev.	Min	Max
Farm characteristics						
TotalSalesThou	*Total farm sales ($1000)*	95	265.049	505.723	0.3	3500
Organic	*Use organic production=1, else=0*	95	0.221	0.417	0	1
BusCorpLLC	*Business incorporated or* LLC=1, else=0	95	0.347	0.479	0	1
Sales_Plants[b]	*plant sales, % of total sales*	95	15.616	32.093	0	100
Sales_FProduce	*fresh fruit or vegetables, % of total sales*	95	39.735	42.951	0	100
Sales_Dairy	*fresh or processed dairy, % of total sales*	95	6.053	22.185	0	100
Sales_MeatEgg	*meat or egg sales, % of total sales*	95	11.505	27.928	0	100
Sales_OValueAdd[c]	*other value added sales, % of total sales*	95	11.828	27.913	0	100
Operator characteristics						
AgeOwner	*age of operator*	95	56.505	12.357	24	79
EdCollege	*completed college, dummy*	95	0.789	0.410	0	1
FarmFT	*Owner farming status is full time=1, else=0*	95	0.695	0.463	0	1
Marketing characteristics						
No_Products[a]	*total number of product types sold*	95	2.453	1.616	1	8
Sales_Region	*% of total sales within 11-county region*	95	86.501	26.320	0	100

[a] Product types (16) included: fresh fruit, fresh vegetables, grains, plants, animals, meat, eggs, processed fruit, processed vegetables, baked goods, fresh milk, processed dairy, honey, maple syrup, hay, and other.
[b] Additional farm sales categories for hay, grains, and animals were excluded.
[c] Other Value Added included sales of baked goods, processed fruits and vegetables, maple syrup, honey, and other.

CHAPTER 4

EMPIRICAL RESULTS

Separate models with and without product class sales percentages are estimated for each of the aggregate, retail, and intermediated channel model categories. This is done for two reasons. First, robustness of the other estimated parameters is important to consider, as it is necessary to determine if the other farm and manager characteristics' effects are similar irrespective of the product classes marketed. Second, given the limited number of observations (particularly in the wholesale model), degrees of freedom are a statistical concern. Preferred models are evaluated based on the Akaike Information Criterion (AIC).[8] Models are estimated in Stata (version 13.1) by quasi-maximum likelihood with the fmlogit routine (Buis 2008). Marginal effects are estimated using the mfx compute command. The full code file is available from the author upon request.

Aggregate Channel Model

The aggregate regression model results are shown in Appendix Table B1 for both the full (with product category sales) and restricted models (without product category sales). Note that since the three channel sales shares sum to one, one channel (in this case the commodity channel) is dropped from the estimation to prevent singularity. Owing to this normalization, it is not straightforward to interpret the signs or magnitudes of these estimates. Rather, we evaluate the marginal effects, and we will turn to their evaluation shortly.

Before doing so, however, it is useful to examine model performance relative to its predictive ability. Comparing average predictive shares to sample averages, retail shares appear

[8] The AIC is an extension of the traditional maximum likelihood paradigm that reflects the conformity, or fit, of the model to the observed data. Smaller AIC values represent a closer fit.

slightly over-estimated for both models, largely at the expense of commodity channel shares (Table 3). Specifically, the average predicted retail share for the full (restricted) model was 0.789 (0.764) relative to the 0.699 sample average, while the commodity channel sales were 0.0001 (0.033) and 0.080, respectively. This may be due in part to aggregation problems associated with the original channel categories and will be addressed by considering the retail and intermediated models later. While the restricted model seems to perform slightly better on average from Table 3, the full model is statistically preferred by the AIC test. The marginal effects follow from this model.

Table 3. Predictive Performance of Aggregate Channel Shares

		Average Predicted Shares	
Aggregate Channel	Sample Average	Full Model	Restricted Model
Retail	0.699	0.789	0.765
Intermediated	0.221	0.211	0.202
Commodity	0.080	0.000	0.033

Marginal Effects – Aggregate Channel Model

Estimated marginal effects for the aggregate channel model are displayed in Table 4. By construction, the row sum of the marginal effects for each covariate will equal zero. Marginal effects for the commodity channel shares are all near zero, not significant, and consistent with the small average predicted share value (Table 3). Age of farm owner, business structure (corporation/LLC), production methods (organic), and product classifications all are shown to significantly affect sales shares between retail and wholesale channels.

Table 4. Marginal effects of the Aggregate Channel model, N=95 [a]

	Parameter Estimates		
	Retail	Intermediated	Commodity
TotalSalesThou	0.0001	-0.0001	0.0000
	(0.0001)	(0.0001)	(0.0000)
FarmFT[b]	-0.0183	0.0189	-0.0006
	(0.0740)	(0.0741)	(0.0012)
AgeOwner	0.0063**	-0.0063**	0.0000
	(0.0029)	(0.0029)	(0.0000)
EdCollege[b]	0.0021	-0.0024	0.0003
	(0.0785)	(0.0786)	(0.0006)
BusCorpLLC[b]	-0.2382***	0.2391***	-0.0009
	(0.0852)	(0.0849)	(0.0020)
Organic[b]	0.1279**	-0.1279**	0.0000
	(0.0641)	(0.0641)	(0.0001)
No_Products	0.0286	-0.0287	0.0001
	(0.0191)	(0.0191)	(0.0001)
Sales_Region	0.0005	-0.0005	0.0000
	(0.0016)	(0.0016)	(0.0000)
Sales_Plants	0.0003	-0.0003	-0.0000
	(0.0017)	(0.0017)	(0.0000)
Sales_FProduce	-0.0014	0.0014	-0.0000
	(0.0012)	(0.0012)	(0.0000)
Sales_Dairy	-0.0076***	0.0076***	0.0000
	(0.0021)	(0.0021)	(0.0000)
Sales_MeatEgg	-0.0011	0.0011	-0.0000
	(0.0014)	(0.0014)	(0.0000)
Sales_OValueAdded	-0.0028**	0.0028**	-0.0000
	(0.0012)	(0.0012)	(0.0000)

[a] standard errors in parentheses; *,**,*** = statistically significant at 10%, 5%, and 1% levels, respectively. [b] denotes change from 0 to 1 for dummy variables.

Interestingly, farm size (as measured by total sales) does not significantly affect channel sales allocations. It is commonly considered that intermediated channels are used more as farm size grows; however, these results indicate that may not be the case for this region, in which there seem to exist retail channels that move equivalent values of product (at least in aggregate). However, these results are conditional on our indicator of size, total sales. If retail sales are generally priced higher but at a lower volume, size effects are muted relative to a high volume of lower priced products through an intermediated market. In any event, these results seem to suggest opportunities for larger volumes through all types of (aggregate) channels. Farm owner status (full or part time), education, product variety (No_Products), and proportion of total sales within the region are also not significant.

Owner age is statistically significant. Specifically, a one-year increase in owner age increases use of retail channels by 0.62 percentage points, fully at the expense of wholesale sales. As a potential proxy for experience, this may seem counterintuitive, as retail channels, particularly farmers markets, are often considered more amenable to newer producers. Given growing retail market competition, however, experience may be becoming more important. Additionally, younger producers may be more open to dealing with intermediary buyer requirements.

Farms operating under corporate or LLC structures are considerably more likely to sell through wholesale rather than retail channels. Specifically, wholesale channel shares are 23.9 percentage points higher for farms structured as a corporation or LLC. This is likely consistent with intermediary buyer requirements necessitating a more formalized business structure in which to enact contractual party arrangements, liability coverage, etc.

As expected, producers selling organic products are more likely to use retail channels. Organic producers sell 12.8 percentage points more through retail channels (relative to other channels) compared to conventional producers. Direct marketing by organic producers may better support preferred production practices and relationships with consumers targeting these products.

Recall from earlier that farm sales are broken into several sales categories: plants/nursery, fresh produce, dairy, meat and eggs, and other value added products. While similar market access appears across channels for plants, fresh produce, and meat and eggs, it is clear that relatively higher sales volumes for dairy and other value added products occur through intermediated channels. Given that the covariates are in percentages, the magnitudes are large. Specifically, a one percentage point increase in dairy product sales (other value added) increases the use of intermediated channels by 0.76 (0.28) percentage points. For dairy, necessary infrastructure (refrigeration) is likely less available through retail channels, while increased shelf life for other value added may increase its acceptable use in intermediated channels.

Retail Channel Model

As described earlier, separate models are run considering retail sales channel allocations among farmers markets, farm stand and U-pick operations, CSAs, and internet/other retail outlets. The complete regression results for the full (with product class variables) and restricted (without product class variables) models are included in Appendix Table B2. Predictive performance of the full and restricted models is shown in Table 5. Farm stand/U-pick and farmers market shares are overestimated (on average), and CSA and internet/other shares are underestimated for both models but with a slight preference to the restricted model. Following

the AIC test (Appendix Table B2), the restricted model is statistically preferred. The discussion of the marginal effects from that specification follows.

Table 5. Predictive Performance of Retail Channel Shares

Aggregate Channel	Sample Average	Average Predicted Shares	
		Full Model	Restricted Model
FM	0.172	0.198	0.224
FSUP	0.628	0.795	0.758
CSA	0.089	0.003	0.013
IMOOTH	0.111	0.004	0.005

Marginal effects – Retail Channel Model

Estimated marginal effects for the preferred retail channel model are displayed in Table 6. Significant marginal effects occur for total retail sales (*RetailSalesThou*), operator education (*EdCollege*), production methods (*Organic*), and percentage of total sales within the region (*Sales_Region*) variables.

While it did not have a significant affect on the aggregate model, farm size (as measured by total retail sales) was shown to significantly affect retail channel choice, although the effect was relatively small. Specifically, a $1,000 increase in retail sales increases the share of sales at farmers markets by 0.02 percentage points, away from farm stands/U-pick operations. While relatively small, the result implies that there may be expanding opportunities for larger producers to sell through farmers markets in the region.

Table 6. Marginal effects of the Retail Channel model, N=87[a]

	Parameter Estimates			
	FM	CSA	FSUP	IMOOTH
SalesRetailThou	0.0002*	0.000	-0.0002*	0.000
	(0.0001)	(0.000)	(0.0001)	(0.000)
FarmFT[b]	0.021	-0.012	0.002	-0.011
	(0.105)	(0.019)	(0.109)	(0.007)
AgeOwner	-0.002	-0.001	0.003	-0.000
	(0.004)	(0.001)	(0.004)	(0.000)
EdCollege[b]	0.020	-0.003	-0.120	0.102***
	(0.115)	(0.026)	(0.112)	(0.031)
BusCorpLLC[b]	-0.087	-0.010	0.100	-0.003
	(0.093)	(0.015)	(0.096)	(0.003)
Organic[b]	0.137	0.386***	-0.520***	-0.003
	(0.116)	(0.131)	(0.116)	(0.002)
No_Products	-0.011	-0.001	0.013	-0.002
	(0.024)	(0.004)	(0.025)	(0.001)
Sales_Region	-0.006**	-0.001	0.007**	-0.0002**
	(0.003)	(0.001)	(0.003)	(0.0001)

[a] standard errors in parentheses; *,**,*** = statistically significant at 10%, 5%, and 1% levels, respectively. [b] denotes change from 0 to 1 for dummy variables.

Producers with a college education are much more likely to sell through internet/other retail channels (relative to other channels), compared with less educated producers. This is consistent with the expected higher level of skills necessary when marketing through online channels, largely coming at the expense of sales through farm stand/U-pick operations. Specifically, internet and other channel shares are 10.2 percentage points higher for operators with a college education. The result may also imply a substantial 'learning curve' for internet-style marketing relative to other channels.

When making retail channel selections for organic products, CSA channels are clearly preferred. Organic producers sell 38.6 percentage points more through CSAs (relative to other channels) compared to conventional producers. Marketing through a specific clientele interested in organic standards (via upfront investments) makes sense, relative to farm stands where a specific clientele is not distinguished upfront. Indications of selling organic products through farmers markets are also prevalent, although they are not statistically significant. Organic product sales through CSAs clearly come at the expense of sales through farm stand/U-pick operations.

The proportion of sales within the region has a negative effect on sales shares through farmers markets and internet/other retail channels and a positive effect on farm stands and U-picks. While the internet result is expected, the results also indicate that producers consider farmers markets viable when marketing outside their local region. In any event, producers considering marketing more products within their local region are likely to consider farm stand/on-site operations as useful channels to better exploit local demand where retail competition at farmers markets exists.

Farm-owner status, owner age, business type, and the number of products produced were not significant factors affecting retail channel choices. In addition, factors differentially affect aggregate versus individual channel choice. The aggregate model shows that owner age and business type affects retail sales (in aggregate), even though those variables do not appear to have differential effects within individual retail channels. Furthermore via the AIC test, it appears that individual product types (e.g., produce, dairy, etc.) are equally marketed amongst retail channels.

Intermediated Channel Model

For the intermediated model, channel allocations are considered with respect to restaurants (*RES*), packers/distributors/processors (*PDPRO*), grocery and specialty stores (*GRO*), and vendor/other intermediated channels (*VENOTH*). The regression results for the full and restricted models are included in Appendix Table B3. The AIC results in Appendix Table B3 show that the restricted model is slightly preferred to the full, so our discussion of the marginal effects is indicative of that model. Furthermore, a comparison of average predictive performance of the full and restricted models (Table 7) shows improved performance of the restricted model.

Table 7. Predictive Performance of Intermediated Channel Shares

		Average Predicted Shares	
Aggregate Channel	Sample Average	Full Model	Restricted Model
RES	0.238	0.366	0.252
PDPRO	0.157	0.047	0.193
GRO	0.298	0.465	0.343
VENOTH	0.307	0.122	0.212

Marginal Effects – Intermediated Channel Model

The marginal effects for the intermediated model are displayed in Table 8. Significant marginal effects occur for total intermediated sales (*SalesIntThou*), farm-owner status (*FarmFT*), owner age (*AgeOwner*), organic production (*Organic*), number of products (*No_Products*), and sales within the region (*Sales_Region*).

Table 8. Marginal effects of the Intermediated Channel model, N=54[a]

	Parameter Estimates			
	RES	PDPRO	GRO	VENOTH
SalesIntThou	-0.000	-0.000	-0.000	0.001**
	(0.001)	(0.000)	(0.000)	(0.000)
FarmFT[b]	0.225**	0.108	-0.343**	0.011
	(0.095)	(0.136)	(0.161)	(0.130)
AgeOwner	0.002	0.005	0.007	-0.013***
	(0.006)	(0.006)	(0.006)	(0.005)
EdCollege[b]	-0.079	-0.144	0.141	0.081
	(0.160)	(0.176)	(0.167)	(0.135)
BusCorpLLC[b]	-0.064	0.174	-0.003	-0.107
	(0.119)	(0.165)	(0.149)	(0.109)
Organic[b]	0.349***	0.038	0.047	-0.433***
	(0.130)	(0.147)	(0.131)	(0.083)
No_Products	0.073**	0.012	-0.097**	0.012
	(0.034)	(0.029)	(0.041)	(0.031)
Sales_Region	0.001	-0.004*	-0.005*	0.007**
	(0.003)	(0.002)	(0.003)	(0.003)

[a] standard errors in parentheses; *,**,*** = statistically significant at 10%, 5%, and 1% levels, respectively. [b] denotes change from 0 to 1 for dummy variables.

Larger total intermediated sales demonstrate an increase through vendor/other intermediated sales channels, although the magnitude is relatively small. Specifically, a $1,000 increase in intermediated sales increases sales share to other farm vendors by 0.1 percentage points. While small, the result presents opportunities for intermediated sales while not working directly with other institutional buyer requirements.

Full time farm owners were more likely to sell through restaurants (marginal effect=0.225) than part time producers, at the expense of sales through grocery stores (marginal

effect=-0.343). Restaurants increasingly include farm information about their local suppliers and may be more interested in full time farming operations with greater local exposure than part time or hobby operations. That said, part time farmers (controlling for size) may have off-farm skills useful for working with grocery operations. Full time farm owners may also be less likely to sell to groceries because of the time out of the workday that it takes to establish a relationship with a grocery manager. There is a lot of competition for grocery contracts, and groceries generally only need one supplier per product. Because there are few grocery contracts available to farmers, it may be easier for a full time farmer to find restaurants to sell to.

Restaurants also appear to appreciate more variety in products from individual producers relative to grocery stores. Groceries usually buy large quantities of specific products, so farms that produce a variety of products are less likely to fit a grocery manager's buying needs. In contrast, restaurants may appreciate ways to augment their menu selection by adding different products from the same supplier. The result is not minimal – an additional product offered for sale increases sales through restaurants by 7.3 percentage points. Producers involved in multiple products should likely rely less on groceries and more on restaurants.

Age of the owner has a slightly negative effect on sales to farm vendors/other intermediated channels. As a proxy for experience, the result seems intuitive in that fewer 'general' sales to other farm vendors (perhaps a residual sale) are needed with increasing experience dealing with restaurant, distributor/processor, and grocery buyers. The effect is relatively moderate where a one-year increase in owner age results in a 1.3 percentage point decrease in sales to other farm vendors.

Organic products are clearly preferred through restaurant channels, where farms selling organic products sell 34.9 percentage points more through this channel than conventional

producers. This share adjustment comes at the expense of sales to other farm vendors, which makes sense given the difficulty in aggregating similar organic products from multiple producers. Often other farm vendors are appealing to consumers who look for a variety of products available for sale, relative to specific production methods. Organic producers seeking opportunities for intermediated channel expansion should carefully consider restaurant sales.

Finally, farms concentrating on more sales within their local region use other farm vendors more, at the expense of packers/distributors/processors and grocery stores. While packers/distributors/processors and groceries are likely more amenable to source products from a greater distance, other (local) farm vendors prefer more locally sourced products. For a one percentage point increase in total sales in the region, sales through other farm vendors increase by 0.9 percentage points.

As with the retail model, different sets of factors affect aggregate versus individual channel choices. For example, while organic products are generally targeted to retail rather than intermediated channels, certain channels within the intermediated channel mix are clearly preferred (i.e. restaurants) over others (e.g. other farm vendors). In addition, while a formalized corporate or LLC structure is preferential to sales in intermediated rather than retail channels (in aggregate), business structure does not differentially affect sales within the individual intermediated channels examined.

CHAPTER 5

CONCLUSIONS

Growing demands for local foods is presenting additional opportunities for local foods producers in a variety of retail and intermediated marketing channels. However, this necessarily implies a growing set of decisions on the appropriate channel mix for producers. Using a unique data set from a sample of producers participating in local food markets in an upstate New York region, we examine the influence of various farm, manager, and marketing characteristics on channel choice. A better understanding of the use of alternative market channels should contribute to more informed management strategies.

Importantly, we consider both aggregate channel choices (i.e., determination of use in combined retail and intermediated channels), as well as specific retail and intermediated channel selections. Previous research in this area has generally been confined to case study analyses of a limited number of firms and channels, or with conclusions derived from simpler descriptive analyses that ignore the contemporaneous influences of a variety of factors.

This research extends previous work by providing a more comprehensive analysis of the farm, producer, and marketing determinants of channel choice using a fractional multinomial logit model. Such an approach directly considers channel choice as a decision among a set of alternatives where the dependent variables are sales shares of individual channels that must sum to unity for each observation.

Empirical results indicate that retail channels are increasingly used by older farm operators and farms following organic production methods. The age effect may be indicative of tighter retail competition in the region studied, requiring more marketing experience, while the organic effect is consistent with producers' expectations for establishing stronger relationships

with customers or for how their products are produced. We also show more sales through intermediated markets with farms formally structured as a business corporation or LLC, and this may be indicative of higher buyer requirements in order to access these markets. Dairy and other value added products are also increasingly marketed through intermediated, rather than retail, channels, likely representing infrastructural requirements and less product perishability. Total farm size (as measured by total sales) is not significant, which indicates that volume constraints may be less limiting than generally discussed in the literature, at least in the aggregate.

Factors affecting decisions among individual retail and wholesale channels are considerably diverse from the aggregate model and should be importantly instructive of particular channel requirements. Sales through farm stand/U-pick operations are increasingly related to total sales and organic production methods and are increasingly used with sales marketed within the local region. CSAs, and, to a lesser extent, farmers markets, are more responsive to organic products. Shares of sales through farmers markets grow with increases in farm size. This indicates that, at least in the region studied, volumes of sales through farmers markets are not a restrictive factor. Finally, a college education proves important as a larger geographic scope of sales is considered and for internet channel implementation, presumably owing to an increasing skill set required for internet channel operation.

Specific intermediary channel selection is also shown to be influenced by a number of farm, owner, and marketing characteristics. Full time farm owners, organic farms, and farms with higher product variety are more amenable to restaurant markets, largely at the expense of grocery store sales. Younger operators with larger operations also sell through other farm vendors, particularly when targeted within the local region.

The results provide important information for producer strategies for participating in markets for improved marketing success. However, these results should be considered with caution in areas sufficiently different from the region included here. To that end, incorporating a larger study area will allow one to control for other market-based factors (e.g. population demographics, food industry characteristics) when analyzing individual firm strategy. The relatively small market area (11-county region) in upstate New York precluded this type of analysis here. A larger sample size would also alleviate statistical concerns from a small sample and improve the econometric results.

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APPENDIX A

PRODUCER SURVEY (Survey number: _____)

GENERAL QUESTIONS

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

2. Please select your farming status (check one). I am a:

Full-time grower/farmer	Part-time grower/farmer	Other

3. Is there off-farm employment to supplement household income? (circle one) YES or NO

4. Please select the highest educational degree completed by farm owner or spouse/partner (check one):

Less than high school	High school	Undergraduate college degree	Graduate college degree

5. Please provide your farm's total annual product sales and operating expenses for 2010, as well as other descriptors of the size of your operation (fill in all).

Total annual sales ($)	Total operating expenses ($)	Paid employees	Volunteer employees	Acres farmed	Number of livestock

6. Do you own or rent land for production? Please provide breakdown of acres if both.

Own land?	Acres owned		Rent land?	Acres rented

7. Please indicate the age of owner and age of farm owner spouse/partner (if applicable).

Age of farm owner	Age of farm owner spouse/partner
years	years

8. How long have you owned and operated your own farm? _____ years

9. What type of business ownership is related to your farm? (check one)

Sole Proprietorship	Partnership	LLC	Corporation	Other:

10. What production methods are employed on your farm? (check all that apply)

Conventional production	Certified organic production	Non-certified organic production	Transitioning to organic production	Natural Production	Other:

OPERATING RECEIPTS AND SALES DISTRIBUTION AREAS

This part of the survey will ask you questions about the types of sales your operation has, what market channels are used, and if the sales are made within the 11-county Capital District Region, outside of the Region but within New York State (NYS), or outside of NYS. Retail sales are defined as direct sales to consumers. Wholesale sales involve selling to buyers who package or process products or re-sell fresh products directly to consumers. Commodity sales generally refer to non-differentiated product sales to traditional buyers through elevators, auctions, associations, or other markets. It may be easiest if you complete the 'Percent of sales' column first, and then complete the shaded area by channel (row) by assigning the percentage of sales that occur in each of the three geographic areas.

TOTAL (2010) OPERATING SALES FROM QUESTION 5: _____

11. Please provide percentages of total sales by market channel for 2010 as specifically as possible. Channel sales percentages should sum to 100% across all channels (i.e., the white column). Also, include the percentages of sales in each channel that occurred within the Region, within NYS but outside the Region, and out of state. Location sales percentages should sum to 100% for each channel (i.e., the three shaded cells in each channel row).

Marketing channel, sales outlet	Percent of sales	Percent of individual category sales by location; i.e., where you sold it*			
		Within region only	Within NYS, outside region	Outside NYS	TOTAL
RETAIL SALES					
R1 – Farmers market					100%
R2 – Own site (farm stand, retail store)					100%
R3 – Pick your own (u-pick)					100%
R4 – Community Supported Agric.					100%
R5 – Internet/mail order					100%
R6 – Other:					100%
WHOLESALE SALES					100%
W1 – Restaurant					100%
W2 – Packer or Distributor					100%
W3 – Grocery, Specialty Store					100%
W4 – Food processor					100%
W5 – For resale to direct sales vendors					100%
W6 – Other:					100%
COMMODITY SALES					
C1 – Grain mill/elevator					100%
C2 – Livestock/produce auction/market					100%
C3 – Cooperative/Marketing Assoc.					100%
C3 – Other:					100%
TOTAL	100%				

- Sales locations should ideally reflect where geographically your products are destined for consumption or processing; however, this is sometimes unknown. If you know the operating

location of the buying agent/firm (e.g., a food processing plant in Western NY, a grocery store in your home town, or a local food distributor in your county), use their location when answering this question. If the buyer's place of operation or residence is unknown (e.g., consumers at a farmers market, or wholesale auction barn) use the location of where the sales take place as your location reference.

OPERATING RECEIPTS AND SALES DISTRIBUTION AREAS (continued)

The next question is similar to the one preceding it, but now looks at distributions of sales based on alternative types of products rather than marketing channels. It may be easiest if you complete the 'Percent of sales' column first, and then complete the shaded area by category (row) by assigning the percentage of sales that occur in each of the three geographic areas.

TOTAL (2010) OPERATING SALES FROM QUESTION 5: _____

12. Please provide 2010 percentages of total sales by general product categories (e.g., fruits, vegetables, eggs, meat, milk, cheese, etc.) as specifically as possible. Product sales percentages should sum to 100% across all products (i.e., the white column). Also, include the percentages of sales for each product that occurred within the Region, within NYS but outside the Region, and out of state. Location sales percentages should sum to 100% for each product category (i.e., the three shaded cells in each category row). Include additional categories or edit existing as needed.

Product Category	Percent of sales	Percent of individual category sales by location; i.e., where you sold it*			
		Within region only	Within NYS, outside region	Outside NYS	TOTAL
Fresh Fruit					100%
Fresh Vegetables					100%
Whole grains and oilseeds					100%
Plants/Flowers					100%
Live animal sales					100%
Meat					100%
Eggs					100%
Processed fruit products					100%
Processed vegetable products					100%
Breads, crackers, bakery					100%
Milk – fresh					100%
Milk – processed dairy products					100%
Honey					100%
Maple Syrup					100%
Hay and or Forage					100%
Compost					100%
Other:					100%
					100%
TOTAL	100%				

* Sales locations should ideally reflect where geographically your products are destined for consumption or processing; however, this is sometimes unknown. If you know the operating location of the buying agent/firm (e.g., a food processing plant in Western NY, a grocery store in your home town, or a local food distributor in your county), use their location when answering this question. If the buyer's place of operation or residence is unknown (e.g., consumers at a farmers market, or wholesale auction barn) use the location of where the sales take place as your location reference.

OPERATING EXPENSES AND INPUT PROCUREMENT AREAS

This part of the survey will ask you questions about the types of inputs that your operation purchases and if the purchases are made within the Region, within NYS (but outside the Region) or outside the state. It may be easiest if you complete the 'Percent of expenses' column first, and then complete the shaded area by category (row) by assigning the percentage of sales that occur in each of the three geographic areas.

TOTAL (2010) OPERATING EXPENSES FROM QUESTION 4: _____

13. Please provide 2010 percentages of total operating expenses for 2010 as specifically as possible. Operating expense percentages should sum to 100% across all input and service categories (i.e., the white column). Also, include the percentages of purchases for each input category that occurred within the Region, within NYS but outside the region, and out of state. Location purchase percentages should sum to 100% for each input category (i.e., the three shaded cells in each category row). Edit or add categories as needed.

Major inputs and services	Percent of expenses	Percent of individual category purchases by location; i.e., where you bought it*			
		Within region only	Within NYS, outside region	Outside NYS	TOTAL
Hired labor					100%
Fuel, oil, grease					100%
Machinery, building repairs					100%
Machinery hire /commercial trucking					100%
Record keeping and analysis services					100%
Taxes					100%
Real estate rental/lease					100%
Insurance					100%
Utilities					100%
Livestock grain & concentrate					100%
Livestock forage and bedding					100%
Replacement livestock					100%
Veterinary & medicine					100%
Breeding					100%
Livestock professional services					100%
Other livestock expenses:					100%
Fertilizer & lime					100%
Seeds & plants					100%
Spray and other crop expenses					100%
Crop professional services					100%
Other crop expenses:					100%

All other operating expenses:					100%
TOTAL	100%				

* Purchase locations should ideally reflect where the places of business you buy the inputs or services from are located. For example, if your veterinarian is located within the Region, you would enter '100%' in the 'Within region only' cell for 'Veterinary & medicine'. If you buy one-half of your seeds and plants (in dollars) within the region and the other one-half elsewhere in NYS, you should put '50%' in the 'Within region only' cell and '50%' in the 'Within NYS, outside region' cell for 'Seeds & plants'. If the seller's place of business is unknown, use the location of where the purchases take place as your location reference.

MARKETING ACTIVITIES AND FUTURE POTENTIAL

This part of the survey gathers information on identifying any changes made in your marketing mix in selling your products within the region or state. It also asks about your intentions to expand production capacity in the next three years.

14. In the last three years, by how much have you changed the amount of product sales to buyers located within the Region, within NYS but outside the region, and outside NYS (changes can be positive, level, or negative)?

Change in Region sales? (%)	Change in NYS (outside Region) sales? (%)	Change in sales outside NYS? (%)

15. In the next three years, by how much do you expect to change the amount of product sales to buyers located within the Region, within NYS but outside the region, and outside NYS (expected changes can be positive, level, or negative)?

Expected change in Region sales? (%)	Expected change in NYS (outside Region) sales? (%)	Expected change in sales outside NYS? (%)

16. Are you looking to change your marketing channel selection? If yes please explain below:

END OF SURVEY

APPENDIX B

REGRESSION RESULTS

Table B1. Regression results of the Aggregate model, N=95[a]

	Parameter Estimates	
	With products	Without products
Variables		
Retail		
TotalSalesThou	-0.008***	-0.002***
	(0.003)	(0.001)
FarmFT[b]	2.725**	0.445
	(1.352)	(0.744)
AgeOwner	-0.027	0.012
	(0.055)	(0.019)
EdCollege[b]	-5.267***	-0.931
	(1.417)	(0.972)
BusCorpLLC[b]	6.372*	4.117***
	(3.400)	(1.192)
Organic[b]	0.111	0.522
	(0.835)	(1.089)
No_Products	-0.583	0.140
	(0.427)	(0.338)
Sales_Region	-0.006	0.003
	(0.038)	(0.009)
Sales_Plants	0.213*	
	(0.129)	
Sales_FProduce	0.099***	
	(0.019)	
Sales_Dairy	-0.022	
	(0.019)	
Sales_MeatEgg	0.083***	
	(0.021)	
Sales_OValueAdd	0.089*	
	(0.048)	
_cons	5.377	1.285
	(3.821)	(1.780)

Table B1. Regression results of the Aggregate model, N=95 (Continued)

	Parameter Estimates	
	With products	Without products
Variables		
Intermediated		
TotalSalesThou	-0.008***	-0.003***
	(0.003)	(0.001)
FarmFT[b]	2.839**	0.659
	(1.413)	(0.823)
AgeOwner	-0.064	-0.024
	(0.059)	(0.024)
EdCollege[b]	-5.281***	-1.233
	(1.438)	(1.068)
BusCorpLLC[b]	7.673**	5.302***
	(3.334)	(1.260)
Organic	[b]-0.782	-0.236
	(1.012)	(1.156)
No_Products	-0.755*	-0.027
	(0.433)	(0.352)
Sales_Region	-0.009	-0.007
	(0.035)	(0.010)
Sales_Plants	0.211	
	(0.130)	
Sales_FProduce	0.108***	
	(0.021)	
Sales_Dairy	0.024	
	(0.018)	
Sales_MeatEgg	0.090***	
	(0.023)	
Sales_OValueAdd	0.106**	
	(0.047)	
_cons	5.831	3.315
	(3.573)	(2.122)
aic	154.261	167.642

[a] standard errors in parentheses; *,**,*** = statistically significant at 10%, 5%, and 1% levels, respectively. [b] denotes change from 0 to 1 for dummy variables.

Table B2. Regression results of the Retail model, N=87[a]

Variables	Parameter Estimates: With products	Parameter Estimates: Without products
Farmers Markets		
SalesRetailThou	-0.000	-0.000
	(0.0001)	(0.001)
FarmFT[b]	1.912**	1.589**
	(0.853)	(0.763)
AgeOwner	-0.031	0.005
	(0.032)	(0.037)
EdCollege[b]	-14.807***	-15.827***
	(1.093)	(1.000)
BusCorpLLC[b]	0.001	0.250
	(0.966)	(0.867)
Organic[b]	0.573	1.604
	(1.067)	(1.041)
No_Products	0.241	0.310
	(0.233)	(0.264)
Sales_Region	0.027**	0.017
	(0.011)	(0.011)
Sales_Plants	-0.012	
	(0.020)	
Sales_FProduce	0.030*	
	(0.016)	
Sales_Dairy	0.006	
	(0.025)	
Sales_MeatEgg	0.014	
	(0.018)	
Sales_OValueAdd	0.025	
	(0.017)	
_cons	11.508***	12.561***
	(2.636)	(3.143)

Table B2. Regression results of the Retail model, N=87 (Continued)

	Parameter Estimates	
	With products	Without products
Variables		
Farm stand/U-Pick		
SalesRetailThou	-0.002*	-0.001
	(0.001)	(0.001)
FarmFT[b]	1.893***	1.497**
	(0.706)	(0.686)
AgeOwner	-0.020	0.019
	(0.028)	(0.033)
EdCollege[b]	-15.473***	-16.088***
	(0.869)	(0.695)
BusCorpLLC[b]	0.8178	0.796
	(0.891)	(0.772)
Organic[b]	-0.913	0.010
	(0.980)	(1.032)
No_Products	0.319	0.375
	(0.235)	(0.263)
Sales_Region	0.053***	0.051***
	(0.015)	(0.015)
Sales_Plants	0.012	
	(0.013)	
Sales_FProduce	0.024*	
	(0.014)	
Sales_Dairy	-0.031	
	(0.024)	
Sales_MeatEgg	0.007	
	(0.015)	
Sales_OValueAdd	0.011	
	(0.015)	
_cons	11.048***	10.483***
	(2.506)	(2.947)

Table B2. Regression results of the Retail model, N=87 (Continued)

	Parameter Estimates	
	With products	Without products
Variables		
Community Supported Agriculture		
SalesRetailThou	0.001	0.001
	(0.001)	(0.001)
FarmFT[b]	0.596	0.711
	(1.276)	(1.140)
AgeOwner	-0.084*	-0.036
	(0.045)	(0.040)
EdCollege[b]	-13.789***	-16.121***
	(3.228)	(1.913)
BusCorpLLC[b]	-0.281	-0.208
	(1.134)	(1.195)
Organic[b]	4.741***	5.558***
	(1.526)	(1.379)
No_Products	0.445	0.298
	(0.431)	(0.355)
Sales_Region	0.005	-0.005
	(0.014)	(0.015)
Sales_Plants	-0.123	
	(0.091)	
Sales_FProduce	0.005	
	(0.031)	
Sales_Dairy	-0.025	
	(0.033)	
Sales_MeatEgg	-0.020	
	(0.040)	
Sales_OValueAdd	-0.012	
	(0.028)	
_cons	14.582***	13.854***
	(3.674)	(3.585)
aic	202.548	183.654

[a] standard errors in parentheses; *,**,*** = statistically significant at 10%, 5%, and 1% levels, respectively. [b] denotes change from 0 to 1 for dummy variables.

Table B3. Regression results of the Intermediated model, N=54[a]

	Parameter Estimates	
	With products	Without products
Variables		
RES		
SalesIntThou	-0.004	-0.005
	(0.003)	(0.003)
FarmFT[b]	1.734	1.172
	(1.158)	(1.025)
AgeOwner	0.057	0.067*
	(0.049)	(0.039)
EdCollege[b]	-0.901	-0.730
	(1.431)	(1.152)
BusCorpLLC[b]	-0.228	0.272
	(1.208)	(0.905)
Organic[b]	5.540***	4.917***
	(1.494)	(1.287)
No_Products	0.445	0.232
	(0.277)	(0.225)
Sales_Region	-0.017	-0.029
	(0.026)	(0.019)
Sales_Plants	-0.008	
	(0.024)	
Sales_FProduce	0.005	
	(0.020)	
Sales_Dairy	0.165	
	(0.221)	
Sales_MeatEgg	0.036*	
	(0.020)	
Sales_OValueAdd	0.047	
	(0.031)	
_cons	-5.693	-2.759
	(4.183)	(2.820)

Table B3. Regression results of the Intermediated model, N=54 (Continued)

Variables	Parameter Estimates	
	With products	Without products
PDPRO		
SalesWholesaleThou	-0.008*	-0.005
	(0.005)	(0.003)
FarmFT[b]	1.219	0.644
	(1.564)	(1.395)
AgeOwner	0.217**	0.087**
	(0.099)	(0.042)
EdCollege[b]	-2.759*	-1.059
	(1.637)	(1.180)
BusCorpLLC[b]	3.615*	1.360
	(2.163)	(1.071)
Organic[b]	4.875***	3.931**
	(1.765)	(1.603)
No_Products	0.413	0.002
	(0.369)	(0.230)
Sales_Region	-0.066**	-0.052***
	(0.027)	(0.018)
Sales_Plants	-0.072	
	(0.052)	
Sales_FProduce	-0.040	
	(0.032)	
Sales_Dairy	0.181	
	(0.223)	
Sales_MeatEgg	0.014	
	(0.030)	
Sales_OValueAdd	-0.033	
	(0.050)	
_cons	-6.876	-0.998
	(5.297)	(3.169)

Table B3. Regression results of the Intermediated model, N=54 (Continued)

	Parameter Estimates	
	With products	Without products
Variables		
GRO		
SalesWholesaleThou	-0.005	-0.005**
	(0.004)	(0.002)
FarmFT[b]	-0.565	-0.886
	(1.192)	(0.872)
AgeOwner	0.066*	0.080**
	(0.040)	(0.032)
EdCollege[b]	-0.001	0.040
	(1.057)	(1.158)
BusCorpLLC[b]	0.144	0.531
	(1.305)	(0.831)
Organic[b]	3.955***	3.865***
	(1.457)	(1.391)
No_Products	-0.093	-0.341
	(0.274)	(0.216)
Sales_Region	-0.041*	-0.047***
	(0.025)	(0.017)
Sales_Plants	0.034	
	(0.025)	
Sales_FProduce	0.041	
	(0.027)	
Sales_Dairy	0.198	
	(0.221)	
Sales_MeatEgg	0.066**	
	(0.029)	
Sales_OValueAdd	0.073**	
	(0.032)	
_cons	-4.027	1.101
	(3.264)	(2.435)
aic	167.494	165.517

[a] standard errors in parentheses; *,**,*** = statistically significant at 10%, 5%, and 1% levels, respectively. [b] denotes change from 0 to 1 for dummy variables.