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Does proximity determine organic certification among farmers using organic practices?

Ariana P. Torres
Agricultural Economics
Purdue University
torres2@purdue.edu

Maria I. Marshall
Agricultural Economics
Purdue University
mimarsha@purdue.edu

Corinne E. Alexander
Agricultural Economics
Purdue University
cealexan@purdue.edu

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Does proximity determine organic certification?

Abstract

Organically produced products are one of the fastest growing segments of food sales in the U.S. The extent to which proximity to consumer markets influences certification among producers that farm using organic practices was estimated in this study. Data from a 2012 survey of 16 states with 36.15% response rate was used. A logit model was analyzed. Distance to markets was found to be positively associated with the decision to certify. Our results provide important information about what motivates farmers who are using organic production practices to become certified.

Introduction

Organically produced products are one of the fastest growing segments of food sales in the U.S. with a 2011 value close to \$29 billion (Constance, 2010; OTA, 2011). This growth has prompted a response by farmers to meet consumer demand, which has grown at a faster pace than supply, and offers new market opportunities for producers and retailers (Cacek and Langner, 1986; Dimitri and Greene, 2000; Greene and Kremen, 2003; Khaledi et al., 2007). Nonetheless, the data show that organic adoption by farmers remains low in the U.S. and organic foods only account for 3% of total food sales when compared to conventional agricultural products (Greene et al., 2009; USDA-ERS, 2010). Low rates of organic certification are a response of growers to the structural and institutional barriers of organic agriculture. Consequently, there are an increasing number of farmers that prefer to use organic practices but are either not interested in certification or have decertified as a response to issues and constraints related to certification (Sierra et al., 2008). These noncertified producers are substituting the use

of the USDA organic seal for labels such as “locally grown”, “sustainable”, “whole”, and “natural” and selling their products through direct market channels (Ernst and Wood, 2010).

Previous research has focused on characterizing certified and noncertified farmers according to their business characteristics (e.g. choice of market channels, most economically important market outlet) and demographics (e.g. education, gender, age) (Dimitri and Greene, 2002; Kremen et al., 2004; Parra-Lopez et al., 2007). Other studies have focused on organic markets in specific states such as California and Texas. There is less extensive literature on how farmers that use organic practices decide to adopt organic certification and especially on how that decision may differ by region.

With concerns related to the low adoption of organic certification, it is important to determine the specific constraints hindering the willingness of farmers to certify organic, especially for noncertified producers farming organically. The findings in our study will be useful to policymakers, retailers and food handlers. Policymakers can use this information to understand why producers that already farm organically decide not to certify. And they can use this information to understand the incentives these farmers may need to overcome the challenges and issues facing organic certification in order to reduce the demand/supply gap for organics. For food retailers and handlers, this information will be helpful to understand the type of marketing and production decisions needed along the supply chain to maintain supply of organic certified foods.

The objective of this study is to determine if proximity to markets influences the adoption of certification among farmers using organic farming practices. Factors contributing to organic certification in our survey are: average distance to markets, most economically important market channels, and perceptions that distance to enter organic markets is a barrier. For instance, we

want to document if farmers that are closer to their customers are able to build strong farmer-customer relationships that may substitute for the need to certify and use the USDA organic label. We seek to find the main structural and attitudinal characteristics influencing the certification decision of producers using organic practices across 16 states of the U.S.

Literature Review

Organic food and organic farming have increasingly attracted public interest over the last 40 years in the United States (OTA, 2011; Wiegel, 2009). This may be due to the increased public concerns over the intensification of livestock and crop land production, the negative effects on farm landscape, the industrialization of food production and processing systems, and fueled by political and sociological issues (Kristiansen, et al., 2006). Moreover, consumer demand for organically produced goods has shown a double-digit growth in the last decade (ERS-USDA, 2009). For example, organic food sales grew at a rate of nearly 8% during 2010, which is notably higher than total food sales with a stagnated growth of 0.6% over the same period (OTA, 2011). Results from the Organic Trade Association (OTA) 2011 Organic Industry Survey, revealed that the organic industry in the U.S. grew to over \$28.6 billion in sales in 2010, an increase of 9.7% from 2009. Within the organic food sector, fruits and vegetables have the highest growth of 39.7% of the total organic food value (OTA, 2011). The demand growth for organically produced products has made the organic market a lucrative opportunity and has provoked the entry of large, medium and small size farmers, as well as wholesalers, processors, and retailers in the U.S. food market (Constance and Choi, 2010; Greene et al., 2009). Despite the increase of domestic demand in organic markets, the organic agriculture sector only accounts for a small portion of all agricultural operations and land area. According to the USDA-ERS

(2010), organic operations represent about 0.6% of the total farmland. In an effort to reduce the gap between supply and demand of organic food products, the number of publicly funded research, policy projects, and outreach in the organic sector have increased (Wiegel, 2009).

Production, market, and profitability barriers have caused farmers to hesitate becoming certified organic even when they use organic practices (Burton et al., 1999; Dimitri and Oberholtzer, 2005). To meet the USDA requirements for organic certification, farmers generally implement management strategies such as crop rotations, crop diversification, diversifying market channels, creation of cooperatives and support networks, and gradual conversion (Hanson et al., 2004; Wolf, 2006). However, when price demand and access to organic markets are not enough to cope with organic costs, the adoption of organic certification can be perceived as a risky and confusing. For instance, in an attempt to find the barriers to organic agriculture, Constance and Choi (2010) surveyed conventional, certified, and noncertified farmers in Texas and reported that the organic certification process and requirements was weakly understood by the three categories of farmers.

Revenue is a major motivation for conventional farmers to become certified (Constance and Choi, 2010). Organic certified farmers benefit from obtaining higher prices, and potentially larger revenues. Price premiums, together with the rising consumer demand for organically certified products, have contributed to the expansion of the organic market (Dimitri and Greene, 2000). However, when growers fail to receive price premiums, the adoption of organic certification declines. For instance, interviews with organic farmers revealed that around 30% of them would switch to conventional production if premium prices decreased (Fairweather and Campbell, 1996).

Although price premiums are commonly added to certified organic products, there are certain markets where noncertified organic products are also able to obtain price premiums (Kremen et al., 2004). In farmers' markets and other direct-to-consumer market channels (DTC) noncertified growers can obtain higher prices for their products. This can be due to the fact that consumers prefer markets that offer direct contact with growers, consistent high product quality, access to specialty crop varieties, convenience, increased variety, and excellent customer service (Kremen et al., 2004; Oberholtzer et al., 2005). For example, organic farmers in farmers' markets are likely to converse with customers and share recipes, organic farming techniques and other organic related information. While organic farmers represented approximately a third of the farmers in farmers' markets, only a minority of them are certified and the majority has developed alternative eco-labels to market their products such as "natural", "local", "sustainable", etc. (Kremen et al., 2004).

Organic farmers often use the USDA certification label as a marketing tool. The use of the USDA organic label provides farmers access to higher-value and bigger volume markets in major urban areas, communities near universities, and centers for higher education, and assures consumers that the entire food product meets the USDA regulation (Kremen et al., 2004). The organic USDA label states that all organic growers, processors, and handlers of certain food products have been certified by a private or state accredited agency. This rule does not apply to farmers with gross sales less than \$5,000 per year in organically produced foods and retailers that sell and do not process organic products. These exempt farmers who follow the national organic standards can sell their products as "organic" to market their products, but cannot use the USDA organic seal. Operations that produce, resell, or sell USDA organic labeled products must meet all the requirements set by the USDA organic regulations. (USDA-AMS, 2011).

Market channels is another major factor influencing the growth of organic agriculture. Since the organic agriculture expansion, organic products have been distributed through a wide variety of marketing outlets from conventional supermarkets, natural product supermarkets, club stores, and mainstream retailers to health and natural products stores and direct markets (e.g. farmers' markets) (Dimitri and Greene, 2000; Kremen et al., 2004; Park, 2009; Constance and Choi, 2010). Numerous studies have reported that organic certified and noncertified farmers differ on their approach on how to market their products (Park, 2009; Dimitri and Greene, 2002; Park and Lohr, 2006). Organic noncertified farmers tend to use direct market outlets and alternative organic labels. (Ernst and Wood, 2010; Kremen et al., 2004). Direct market channels are preferred by farmers of small and medium-sized farms, because they can have access to a higher share of the consumer's dollar and they can grow stronger grower-customer relationships (Dimitri and Green, 2002; Park and Lohr, 2006).

On the other hand, as certified producers increase their farming experience, they move from direct markets with low sales volumes (e.g. natural food chains and farmers' markets) to wholesale channels and mass retailers with higher sales volumes (USDA-ERS, 2010; Dimitri and Greene, 2002). The Fourth National Organic Farmers' Survey reported that in 2004 about 53% of organic food sales were sold through direct-to-consumer market channels (Walz, 2004). However, by 2009, the Organic Trade Association reported that these channels only accounted for 6% of the U.S. organic food sales, while natural food stores and supermarkets comprised most of the sales volume (OTA, 2011). Park (2009) documented that certified farmers commonly tend to diversify their portfolio of channels over time. For instance, they start by selling through direct markets (e.g. farmers' markets) and are likely to switch to a more diversified market channel strategy as their businesses grow. As a consequence, conventional market outlets are

becoming a primary outlet for certified foods and may be driven by the growing interest of large food companies to offer organic products (Park and Lohr, 2006). For instance, approximately half of the purchases (\$3.9 billion) of organic foods are in conventional stores such as Kroger.

Several studies have reported that farmer's decision to farm organically is correlated with their attitudes and perceptions related to organic agriculture (Mzoughi, 2011). For instance, organic farmers are more concerned about the environment, the sustainability of the food supply chain, and the long term viability of natural resources when compared to their conventional counterparts (Burton et al., 1999; Klonsky, 2000; Walz, 2004; Sierra et al., 2008). These attitudes are commonly found in farmers with small-sized farms. Their philosophical beliefs of producers and non-financial motivations (e.g. willingness to trade off profits to contribute with environmental goals) are an important determinant in their decision to farm organically (Sierra et al., 2008).

Organic noncertified farmers are found to be on average younger, have less experience in farming, tend to be female, and generally have higher levels of education (Burton et al., 1999; Genius et al., 2006; Parra-Lopez et al., 2007). Burton et al. (1999) reported that organic farmers start agriculture at a younger age, have higher education levels, are concerned about the environment, and value networking as a source to obtain information than conventional farmers. Constance and Choi (2010) found that organic growers tend to have small farms (i.e. growers with less than \$50,000 in annual gross sales). Furthermore, organic farms are on average smaller than overall conventional farms in the U.S. (Grow and Greene, 2007). Contrarily, Klonsky and Tourte (1998) reported that organic certified farmers have on average larger farms than noncertified. Genius et al. (2006) found higher levels of education was correlated with organic farming, but Burton et al. (1999) did not find a significant correlation.

Physical distance to markets has been reported as a factor influencing the adoption of organic certification (Constance and Choi, 2010). According to Parra-Lopez et al. (2007), farm location can determine the farmer's decision to certify. Moreover, the relationship between farm location and the choice of market channel are correlated (Kremen et al., 2004). For instance, farmers closer to their markets, especially small-sized farms, may prefer the use of DTC channels.

Data

The population for this survey consisted of fruit and vegetable farmers registered in the Food Industry MarketMaker database. This database contained the addresses for 4,312 fruit and vegetable producers located in 16 states (AL, AR, DC, FL, GA, IA, IL, IN, KY, MI, MS, NE, NY, OH, PA, and SC), of which 3,015 included email address. Farmers registered in the Food Industry MarketMaker database tend to be small and medium-sized farms looking for a resource to direct market food products to consumers. We obtained 1,559 responses that yielded a response rate of 36.15%.

An online survey using a mixed-mode design was conducted. Qualtrics software was used for this study. An incentive of a two-dollar bill was included with the invitation letter that was sent by mail on January 4, 2012. Email reminders were sent on January 10, January 18, and February 1. The provision of token incentives included in advance letters has been reported to increase Internet survey participation and to even be more effective than providing rewards upon completion (Dillman, 2009). Optimum suggested time for sending reminders is between one to two weeks, depending on the population sampled (Dillman, 2009).

The survey included questions regarding percentage of farm under production practices with the choices being: conventional, certified organic, transition to become certified organic, or under organic practices but not certified. Forty-eight farmers were removed from our study because they have been previously certified but had chosen to decertify. Demographic questions included gender, level of education, number years of farming, number of years farming organically, race, and average number of hours per week worked off of the farm and on farm business.

Methodology

A logistic regression model (LOGIT) was used to describe how proximity to markets influences producers' decision to certify. The dependent variable is the decision to certify among farmers that use organic practices. Producers were grouped into two categories of organic production: 1) the certified group (CERTIFIED) comprises farmers that were USDA certified and farmers that were transitioning to certification, which are farmers with 100% of the operation under organic certification; and 2) the noncertified group (NONCERTIFIED) are farmers that are using organic practices but decided not to certify. There were a total of 468 farmers using organic practices of which 25.43% were strictly certified and 74.57% strictly noncertified.

Our binomial dependent variable (TOCERTIFY) had the value $I_j = 1$ if the individual reported to use 100% organic certified practices (CERTIFIED), and $I_j = 0$ otherwise. This clear distinction between farmers will help us to accurately differentiate farmers that use organic practices but choose to not certify at the same time we exclude farmers that have mixed farming practices. Similarly, Genius et al. (2006) grouped producers according to their level of organic

practices. He grouped strictly certified farmers along with farmers that had all their operation under the 3-year transition period to organic certification because these farmers had similar perceptions, practices, and mind sets as certified producers.

We hypothesized that proximity to final customers influences farmers' decision to certify. To determine proximity we used objective and subjective distance features. For objective distance we used a physical variable: average distance to market (DISTANCE) in miles. Questions illustrating the perceived distance to consumers were used as proxies for subjective distance: use of market channels (DTC) and the perception of distance as a barrier to entry to organic markets. We created dummies variables for distance as a barrier to entry to organic markets. For example, DISTNOBAR, DISTMOD, and DISTSEVERE had the value ($I_j = 1$) if the individual perceived distance as no-barrier, a moderate, and severe barrier, respectively, and ($I_j = 0$) if otherwise.

We categorized farmers that use strictly DTC, non-DTC, or mixed market channels. To avoid for the high correlation between distance and market channels, we included the interaction terms DTC*DISTANCE, NDTC*DISTANCE, and MIX*DISTANCE in the logit model. Interaction terms let the slope of each variable depend on the value of the other variable. We conducted a joint F-test and found that the market channels and the interaction variables were not significant and should be excluded from our model.

Attitudinal questions about organic labels and certification process had values between 1 (strongly disagree) to 5 (strongly agree). Questions related to organic labels increasing sales and organic labels giving access to price premiums were highly correlated; thus, an additive index was created for organic labels (OLABEL). A joint F-test confirmed that the interaction term should be included in the model. We also included if the farmer believed the process of organic

certification was confusing (CONFUSE), which had values between 1 (strongly disagree) to 5 (strongly agree).

Farmers were controlled for farm size and grouped based on their annual gross sales: small (<\$50,000), medium (\$50,000-\$249,999), and large (>\$250,000). Exempt farmers (<\$5,000) were included in the small farm category because although exempt farms are not required to certify by an NOP accredited certifier, they must follow the national standards for production, labeling and record keeping and are permitted to label their products as organic. Therefore, exempt farmers can use the word “organic” to market products but they cannot use the USDA organic seal. Gross sales was used as a proxy for farm size instead of number of employees or total acres because our respondents have very different crop mixes where acreage would not provide a good measure to compare farm size. In addition, gross sales was highly correlated with number of employees and total acres, validating that the proxy variable is a good measure for farm size.

Questions regarding farmers’ beliefs and perceptions about organic agriculture were included based on a 5-point Likert scale that ranged from strongly disagree to strongly agree. Questions related to their perceptions on marketing, production, and certification barriers were based on a 3-point Likert scale that ranged from not a barrier to a severe barrier. The list of explanatory variables and their expected sign are presented in Table 1.

Questions related to proximity to final customers included average distance to markets, the use of different market channels, and the perception of distance as a barrier to entry organic markets for each of the conventional, organic certified, and organic noncertified production systems. Market channels listed were classified into Direct-to-Consumer (DTC) market channels (e.g. at the farm, farmers’ markets, through CSA, via internet or mail order, through coop,

roadside, delivery, word of mouth, festivals, exchange, and friends) and non-Direct-to-Consumer (nDTC) market channels (e.g. through wholesale markets, to processors, restaurants, retailer, school, wineries, and miscellaneous). Farmers were categorized by the use of only DTC, only nDTC, or farmer that uses both types of market channels (MIXED). The use of market channels by farmer category is presented in Table 2. A high proportion of certified and noncertified farmers used direct to consumer markets, which is consistent with findings from several surveys that organic products are extensively marketed through direct markets (Dimitri and Greene, 2002).

Table 3 presents the descriptive statistics for each independent variable by producer type. We found that 49% of farmers were women. In contrast, only 22% of respondents of the Organic Farming Research Foundation (OFRF) survey were women (Walz, 2004). We found noncertified organic farmers have a higher percentage of female and non-white population. Organic farmers differ on their sources of income. For instance, more noncertified farmers rely on on- and off-farm revenues than certified (50.72% versus 36.97%). This is consistent with the OFRF survey that reported that most of organic farmers received income from off-farming activities (Walz, 2004). Certified producers have more experience farming and use a wider array of market channels than noncertified farmers. These results are consistent with Constance and Choi (2010).

To control for location effects, respondents were grouped in four geographical regions: South, Delta, Northeast, and Midwest (SOUTH, DELTA, NORTHEAST, and MIDWEST, respectively). The South region consisted of Florida, Georgia and South Carolina. The Delta region consisted of Alabama, Arkansas, Mississippi, and Louisiana. The Northeast region consisted of New York and Pennsylvania. The Midwest region consisted of Iowa, Illinois, Indiana, Michigan, Nebraska, Ohio, and Kentucky.

The model used to analyze if proximity to markets influences adoption of organic certification is given by:

$$Y_{tocertify} = \beta_0 + \beta_1 female + \beta_2 college + \beta_3 postgrad + \beta_4 nowhite + \beta_5 dual \\ + \beta_6 medium + \beta_7 large + \beta_8 distmod + \beta_9 distsevere + \beta_{10} distance \\ + \beta_{11} olabel + \beta_{12} confuse + \beta_{13} yearo + \beta_{14} nummkt + \beta_{15} south \\ + \beta_{16} delta + \beta_{17} northeast + \varepsilon$$

The dependent variable (TOCERTIFY) was regressed on the list of explanatory variables using Stata® software. The marginal effects were obtained by setting the binomial explanatory variables at value 1. Consequently, we present the results and provide conclusions.

Results and Discussion

The producer's decision to be USDA certified organic was modeled based on producer demographics, farm characteristics, attitudinal variables, and marketing practices. Table 4 reports the logit results and marginal effects. As hypothesized, distance influences the decision to certify among farmers using organic practices. For example, for every 100 miles traveled to customer markets farmers are 0.01% more likely to be certified.

Human capital attributes, such as education, positively influence farmers' decision to certify. For instance, farmers with a college and postgraduate education are 3.30% and 6.03% more likely to be certified than farmers with a high school education, respectively. According to D'Souza et al. (1993), the higher the level of education the more likely farmers are willing to adopt new sustainable technologies.

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Farmers with medium and large farms are more likely to be certified than farmers with small farms. This is consistent with findings from Dimitri (2012), who also reported that larger farms are able to establish commercial interaction with wholesalers and have a wider range of distribution.

Interestingly, most farmers using organic practices (i.e. certified and noncertified) do not perceive distance as a barrier to entry to organic markets. In contrast, Constance and Choi (2010) reported that approximately 81% of organic producers perceive distance to markets as a barrier. Producers that perceived distance as a moderate barrier to entry organic markets were 40% more likely to be certified than farmers that do not consider this as a barrier.

Among producers farming organically, noncertified farms tend to be smaller (gross annual sales <\$50,000) when compared to certified farms. Moreover, medium sized (gross annual sales between \$50,000 and \$249,999) and large sized farms (gross sales equal or larger than \$250,000) are 0.80% and 1.41% more likely to be certified, respectively.

Perceptions related to organic certification are highly significant in our model ($P < 0.01$). While certified farmers agreed that organic labels are beneficial for increasing their sales and give them access to price premiums, noncertified farmers were uncertain about the benefits of organic labels. These results are consistent with Constance and Choi (2010), who reported that organic farmers tend to have positive perceptions towards organic certification. Farmers that agreed that organic labels increase sales or access to premiums were 0.25% more likely to be certified than farmers believed otherwise. Moreover, when farmers have negative perceptions about the transition to organic, then the probability to be certified decreased by 0.23%.

Conclusions

The major contribution of this paper is that farmers that use organic practices differ in their decision to certify organic; and this depends on their location, demographics, and attitudinal characteristics. We found that the probability to certify organic increases as farmers move away from their markets. In other words, farmers located farther away from their markets may not be able to build strong grower-consumer relationships; thus certified labels would assure access to these markets.

Noncertified farmers tend to have small farms (78.51%), college education or beyond (92.24%), use direct market channels (84.75%), and market to closer distances. Interestingly, most noncertified farmers do not consider distance as a barrier to entry into organic markets, and this perception does not have any influence on their decision to certify. This supports the idea that noncertified farmers are able to build a strong grower-customer relationship that allows them to find available markets near their operations. Although there is an increasing demand for organic products, consumers may want to connect with their food and people who grow by substituting local organic but noncertified foods for labeled certified organic products. This might be a consequence of USDA programs promoting the development and strengthening of local and regional food systems (e.g. “know your farmer know your food”) through the production and marketing of local foods (USDA, 2013). These programs acknowledge the multiplier effect of circulating money within a community by farmers obtaining a higher portion of the local food expenditure.

Among the farmers perceiving distance as a barrier to organic markets, only farmers considering distance as a moderate constraint are more likely to certify. This supports the idea

that when organic farmers are moderately farther they may feel the need for organic labels to be able to market their products.

Farm location is statistically significant in the farmer's decision to certify. Producers in the Northeast region are 0.58% more likely to certify than producers located in the Midwest. This might be due to the fact that producers in the Northeast (e.g. New York and Pennsylvania) have on average higher proportion of farmers certified (e.g. 44.35%). The fact that cities in Northeast region have major urban centers, where consumers demand higher volume of organic foods, may influence organic farmers to adopt certification to gain access to these markets.

Local and direct channels are important outlets for organic food products. However, we found that the perceived distance to consumers (i.e. subjective distance) measured by the use of direct markets was not influential in farmers' decision to certify. This might be due to the fact that our sampled farmers (i.e. organic certified and noncertified) have a similar use of direct and non-direct market channels. Using direct markets allows farmers to capture a much higher share of consumers' expenditure in organic food products. Previous studies have reported that using direct channels can offer organic farmers up to twice the amount of gross returns when compared to revenues from wholesaling (Abel et al., 1999). This might be because in our study over 80% of both organic certified and noncertified farmers market their products through direct market channels, especially since our sampled farmers from MarketMaker tend to have small and medium-sized farms.

Organic labeling assures producers, handlers, and consumers that their products are produced, processed, and distributed following the USDA standards for certified products. When organic noncertified farmers use "local" labels they convey information about the distance that the product travels to get to consumers. There is a widespread debate about increasing number of

consumers that prefer to purchase products that are local rather than labeled organic. This is supported by reports from the USDA-AMS (2013) on the increasing number of farmers markets, community supported agriculture operations, and higher demand of local and regional foods.

Organic labels had a positive influence on the adoption of certification among farmers using organic practices. To efficiently close the gap between domestic demand and supply of organic foods, government and wholesalers/retailers should be able to convey economic benefits of using the USDA organic label. This is especially true if the number of noncertified organic farmers remains higher than their certified counterparts.

This study provides a useful framework for policy makers that want to increase the domestic supply of organic certified products. Moreover, this information can help them understand the main motivations of farmers that already use organic practices and the incentives that may be needed for them to become certified. This study documents the main factors associated with organic farmers' adoption of certification. For instance, farmers that already use organic practices but are not certified can become the target for policymakers. To accomplish this, incentives should be focused on increasing government support to improve farmers' perceptions of organic certification, which will increase the rate of certification.

The study has several limitations. Our study is limited by its convenient sample of small and medium-sized farmers from the MarketMaker database which is a limited representative sample of fruit and vegetable farmers. The study only included farmers from 16 states which could be extended to other states, such as California, to include other factors that might influence farmers in other geographical areas.

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Table 1. Explanatory variable description, abbreviation, and expected effect on the decision to certify organic.

Variable	Description	Expected Sign
FEMALE	1 = female	-
HSCHOOL	1 = high school (Reference Group)	?
COLLEGE	1 = college	+
POSTGRAD	1 = post graduate	+
NOWHITE	1 = no white race	-
DUAL	1 = off-farm and on-farm source of income	-
SINGLE	1 = on-farm source of income (Reference Group)	+
SMALL	1 = gross sales between \$5,000-\$49,999 (Reference Group)	-
MEDIUM	1 = gross sales between \$50,000-\$249,999	+
LARGE	1 = gross sales larger than \$250,000	+
MIDWEST	1 = in Iowa, Illinois, Indiana, Michigan, Nebraska, Ohio, and Kentucky (Reference Group)	
SOUTH	1 = in Florida, Georgia, South Carolina	?
DELTA	1 = in Alabama, Arkansas, Mississippi, Louisiana	?
NORTHEAST	1 = in New York and Pennsylvania	?
DISTNOBAR	1 = distance not a barrier to entry organic markets (Reference Group)	+
DISTSEVERE	1 = distance is a moderate barrier to entry organic markets	-
DISTANCE	Average distance to markets in miles	-
OLABEL ^A	Additive index variable for “Organic labels increase my sales” and “Organic labels give me a price premium”	+
CONFUSE ^A	“The process of organic certification is confusing”	-
YEARO	Number of years farming organically	+
NUMMKT	Number of market channels used	+

^AIndicates 5-point Likert Scale- Strongly Disagree, Somewhat Disagree, Neither, Somewhat Agree, Strongly Agree.

Table 2. Use of market channels.

	Certified (n=119)		Noncertified (n=349)		Full sample (n=468)	
	Freq	%	Freq	%	Freq	%
DTC	104	83.87	300	84.75	421	84.03
NDTC	19	15.32	43	12.15	67	13.37
MIXED	1	0.81	11	3.11	13	2.59

Table 3. Descriptive Statistics for Model of Decision to Certify.

	Certified (n=119)		Noncertified (n=349)		Full sample (n=468)	
	Freq	%	Freq	%	Freq	%
FEMALE	52	43.70	175	50.43	227	48.71
HSCHOOL	1	0.84	27	7.76	28	6.00
COLLEGE	74	62.18	218	62.64	292	62.53
POSTGRAD	44	36.97	103	29.60	147	31.48
NOWHITE	8	6.84	34	9.80	42	9.05
DUAL	44	36.97	177	50.72	221	47.22
SINGLE	75	63.03	172	49.28	247	52.78
SMALL	56	47.06	274	78.51	330	70.51
MEDIUM	47	39.50	65	18.62	112	23.93
LARGE	16	13.45	10	2.87	26	5.56
SOUTH	17	19.32	71	80.68	88	18.80
DELTA	6	20.69	23	79.31	29	6.20
NORTHEAST	55	44.35	69	55.65	124	26.50
MIDWEST	41	18.14	185	81.86	226	48.29
DISTNOBAR	56	47.86	192	57.31	248	54.87
DISTMOD	48	41.03	101	30.15	149	32.96
DISTSEVERE	13	11.11	42	12.54	55	12.17
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev
DISTANCE	34.20	46.90	20.41	28.11	27.93	66.30
OLABEL ^a	4.04	0.83	3.35	1.01	3.19	1.07
CONFUSE ^a	2.68	1.21	3.64	1.10	3.56	1.09
YEARO	15.36	10.70	12.14	11.62	11.08	11.47
NUMMKT	3.19	1.45	2.62	1.34	2.96	1.82

^aIndicates 5-point Likert Scale- Strongly Disagree, Somewhat Disagree, Neither, Somewhat Agree, Strongly Agree.

Table 4. Logit Regression Results on Decision to Certify

	Coefficient	Std. Err.	Marginal Effects	Std. Err.
FEMALE	-0.2091	0.3027	-0.0007	0.17
COLLEGE	2.3093*	1.2173	0.0330*	4.68
POSTGRAD	2.8936**	1.2335	0.0603**	8.03
NOWHITE	-0.5978	0.6308	-0.0017	0.39
DUAL	0.0898	0.3292	0.0004	0.14
MEDIUM	1.1480***	0.3536	0.0080***	1.49
LARGE	1.5681***	0.5717	0.0141***	2.44
SOUTH	0.1293	0.4399	0.0005	0.20
DELTA	0.7008	0.6498	0.0038	0.71
NORTHEAST	0.9359***	0.3401	0.0058***	1.10
DISTMOD	0.7295**	0.3275	0.0040**	0.76
DISTSEVERE	0.3655	0.5178	0.0017	0.36
DISTANCE	0.0076*	0.0045	0.0001*	0.01
OLABEL	0.6606***	0.1745	0.0025***	0.49
CONFUSE	-0.6027***	0.1329	-0.0023***	0.45
YEARO	0.0139	0.0129	0.0001	0.01
NUMMKT	0.1019	0.1117	0.0004	0.09
INTERCEPT	-5.5028***	1.5396		
Log Likelihood	-150.30351			
Total N = 334 observations				
Pseudo R2 = 0.28				
*p<0.10 **p<0.05 ***p<0.01				