Adoption of E-Marketing by Direct Market Farms in the Northeastern U.S.

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Abstract: Many farms have begun operating websites in order to promote their businesses. This study used data from a survey of farms in the northeastern U.S. for the year 2004 in order to identify characteristics of farmers, farms, and farm businesses associated with website adoption. Following a technology adoption framework, a Probit model of website adoption was estimated to identify significant relationships. Some sales locations and product types, advertising diversity, high speed Internet connections, and gross farm sales were found to be significantly related to website adoption.

Key Words: direct marketing, e-marketing, probit, technology adoption, website

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Computer technologies have drastically changed society and business in recent years. In the 1980s and 90s, microcomputers emerged as a new technology that promised to change every aspect of our lives. As computer technology has advanced, the Internet has become a dominant aspect of computer use by individuals and businesses worldwide. Individuals use the Internet for several different reasons including social interaction, obtaining information, and purchasing goods and services. Over fifty-four percent of U.S. households now have access to the Internet (Day, Janus, and Davis, 2005). This has increased from around fifty percent in 2001, forty-one percent in 2000, and twenty-six percent in 1998 (Day, Janus, and Davis, 2005). Currently, seventy-eight percent of Internet users utilize the Internet to get information on products or services, and over fifty-four percent purchased products or services online in 2003 (Day, Janus, and Davis, 2005). As the Internet's technologies have advanced, businesses have adopted it as a sales and marketing medium. The Internet can be used by businesses to reduce transaction costs associated with conducting business, such as providing information about products and services. In addition, companies can use the worldwide web to offer a wider variety of products to a larger audience at lower prices compared to products found in a physical setting (Couclelis, 2004).

Specific to the agricultural sector, a majority of farms have reported using computer technologies, including the Internet, for personal use and as a business tool. In 2005, fifty-eight percent of farms in the U.S. had access to computers and fifty-one percent had Internet access, an increase of five percent since 2001 (NASS, 2005). In the northeastern U.S., 55 percent of farms have access to the Internet (NASS, 2005). Many farms use the Internet to obtain weather reports, production information, and marketing information such as prices and trends. Nine percent of farms nationwide report using the Internet for gathering information and marketing their

products (NASS, 2005). E-marketing strategies ("the strategic process of creating, distributing, promoting, and pricing goods and services to a target market over the Internet or through digital tools") have become an established presence in the agricultural sector (Hooker, Heilig and Ernst, 2001, p.4). In the Northeast, eleven percent of farms report using the Internet to conduct agricultural marketing activities (NASS, 2005), however, very little is known about how farms are using the Internet for direct marketing. Ball and Duval (2001) surveyed farms using the Internet for direct marketing, focusing on the attributes of the farm business and farmers which led to Internet marketing being judged a success. Their study only examined those farms already using some form of e-marketing and provides no details regarding the characteristics of these early adopters relative to those farms which have yet to include e-marketing as part of their marketing strategy. Understanding the characteristics of these innovators provides important information on who is most likely to adopt this technology as well as who stands to benefit the most from e-marketing.

This study is based on a 2005 survey of direct market farms in the northeastern U.S. and uses the presence of a website for the farm business as a proxy for e-marketing adoption. Incorporation of e-marketing into the marketing mix of direct market farms indicates that the benefits of a website (better serving current customers, attracting new customers, increasing sales) are greater than the costs (knowledge of computer and Internet applications, time and money spent designing and updating websites, gaining Internet access). The objective of this paper is to determine the farmer, farm, and farm business characteristics which lead to website use by direct marketing farms in the northeastern U.S.

Computer, Internet, and E-Commerce Adoption in Agriculture

Overall technological changes in the last century have drastically altered agriculture. A large volume of literature exists which examines farmer adoption of agricultural innovations (Sunding and Zilberman, 2000). Rogers (1995) categorizes innovations as hardware and software, where hardware innovations provide different levels or forms of material objects and software innovations refer to the informational aspects of the new technology. E-marketing represents a unique form of technology adoption for agriculture. On one hand, e-marketing resembles a software innovation by providing farms with a new means of delivering information, communicating with customers about the farm business and its products and enhancing customer relations. On the other hand, e-marketing could be considered a hardware innovation which provides another advertising and sales medium that expands the scope of the farm operation.

Computer technology adoption studies in agriculture have generally described the demographic and structural characteristics of adopting farmers compared to non-adopters, following a threshold model of adoption. Innovations such as computer use, Internet use, and e-commerce use have been analyzed using this framework. Characteristics such as farmer age, education, and off-farm employment, farm size, and type of products sold have all been investigated in relation to agricultural adoption of these technological innovations over several different populations in North America.

Computer and Internet adoption studies have analyzed certain regions of the U.S. and Canada since the mid-1980s. Sabuhoro and Wunsch (2003) examined the use of computers and the Internet in Canadian farm businesses with 2001 Canadian Census of Agriculture data. They found that the type of farm operation was most important in explaining the adoption of computer and Internet use by Canadian farms. Smith et al. (2004) examined the Great Plains region of the

U.S. regarding use of computers, general use of the Internet, and use of the Internet for the farm business, using data collected in 2001. They discovered that specific education related to computers and employment off the farm had the greatest impact on computer technology usage. Hoag, Ascough, and Frasier (1999) also examined Great Plains farmers in 1995 in terms of computer adoption. They found that most of the conventional measures for computer adoption (farm size, farmer experience, and farm type) were significant. Batte (2003) and Batte, Jones, and Schnitkey (1990) looked at commercial Ohio farms using data from 2003 and 1987, respectively. Batte (2003) identified off-farm full-time employment and having more than a high school education were most important in determining computer adoption. Batte, Jones, and Schnitkey (1990) explained that farmers which utilized farm records in managing their farms and who had higher education levels were more likely to use computers, while farms that produced grain crops were less likely, compared to farms producing livestock, to use a computer. Gloy and Akridge (2000) examined large farms in the U.S. for 1998. Their results showed that higher education was the most important indicator in computer adoption, and younger and more educated farmers were more likely to use the Internet. North Carolina commercial farms were the subject of a study by Amponsah (1995) who used 1991 data and explained that farm size and farmer education were the most important indicators of computer adoption. Jarvis (1990) found that Texas rice producers had a multitude of characteristics that affect the adoption of computers such as high income, farms growing cotton, stable farm size, and exposure to others that used computers for their businesses. Lastly, Putler and Zilberman (1988) examined computer adoption in Tulare County, California using 1986 data that showed that bachelors and graduate degrees had the greatest impact on computer adoption.

E-commerce adoption studies have looked at farmers in the Midwest, Great Plains, and southern U.S., and most considered improvements in supply chain management and purchases of farm-business inputs. McFarlane, Chembezi, and Befecadu (2003) examined agribusiness firms in Alabama with data collected in 2002. They found that the scope of the agribusiness was the largest indicator of Internet and e-commerce adoption. Using 2000 data, Ernst and Tucker (2001, 2002) examined fruit and vegetable producers in Ohio. Their 2001 study showed that a measure of economic optimism about IT (information technologies) was higher for farms that adopted IT. Their 2002 study also found that attitudinal measures of optimism in the role of IT were more important in determining e-commerce activity compared to their measure of age. Agribusiness manufacturers, dealers, and distributors were the subject of a study by Henderson, Dooley, and Akridge (2000). They found that size and scope of the business were the most important determinants of the use of e-commerce strategies for those firms.

Modeling Website Adoption

Following traditional technology adoption literature, this paper utilizes the threshold model of adoption to identify the heterogeneous characteristics leading to website use. The threshold model of adoption focuses on the decision of the individual farmer to adopt a technology, assuming maximizing or satisficing behavior (Sunding and Zilberman, 2000). This model assumes individuals experience different levels of benefits and costs from adoption of a particular technology (Dierden et al., 2004; Sunding and Zilberman, 2000) depending on the characteristics of the farmer or the farm business. Once the net benefits reach some critical level or threshold, the farmer will adopt the technology. The net benefits, *B*, for farmer *i* are a function of the farm and farmer characteristics, X_i, such that $B_i = \beta_1 + \beta_2 X_i$, where the β's are parameters of the model. The probability that the farmer will adopt a website increases as B_i

increases, but adoption only occurs after the threshold level of net benefits, B_i^*, is reached, when $B_i \geq B_i^*$. The threshold level of net benefits is not observable only the final choice of whether or not to adopt. Thus, the adoption decision, *Y*, can only take two values, and $Y = 1$ if a website is adopted, and $Y = 0$ if a website is not adopted. Assuming the net benefits are normally distributed, the probability that B_i^* is less than or equal to B_i can be given as:

(1) $$P_i = P(Y = 1 \mid X) = P(B_i^* \leq B_i) = P(Z_i \leq \beta_1 + \beta_2 X_i) = F(\beta_1 + \beta_2 X_i),$$

where $P(Y = 1 \mid X)$ is the probability that a website is adopted given the values of the explanatory variables, *X*, Z_i is the standard normal variable such that $Z_i \sim N(0, \sigma^2)$, and *F* is the standard normal cumulative distribution function (CDF) (Gujarati, 2003). The CDF in this case will be:

(2) $$F(B_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{B_i} e^{-z^2/2} dz \quad \text{or} \quad F(B_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_1 + \beta_2 X_i} e^{-z^2/2} dz.$$

Based on an assumption of a standard normal distribution of the net benefits from website adoption, this study uses a binomial probit model to empirically examine relationships between website (e-marketing) adoption and farmer, farm, and farm business characteristics.

The marginal effect on website adoption of any explanatory variable is found by taking the derivative of the probit equation with respect to that specific independent variable,

(3) $$\frac{dP_i}{dX_i} = f(\beta_1 + \beta_2 X_i)\beta_2,$$

where $f(\beta_1 + \beta_2 X_i)$ is the standard normal probability density function (Gujarati, 2003). This marginal effect will depend on the value at which it is calculated, which usually involves setting all explanatory variables equal to their means, as is done in this study. Fortunately, what would be a tedious calculation to determine the marginal impacts of the explanatory variables, as indicated in equation (3), is performed by the LIMDEP software used to estimate the probit

model in this study (Greene, 2002). In the case of categorical (dummy) explanatory variables, the marginal effect is calculated by finding the difference between the probability of adopting a website when that category is present and when it is not (Amemiya, 1981).

Data for Empirical Analysis

This study used a survey of direct marketing farms in 12 states in the Northeast[1] to collect data on their adoption of e-marketing. In early 2005, 5,392 requests for participation were sent to direct marketing farms whose names and addresses were gathered from localharvest.com, state departments of agriculture, and specialty/trade association websites. Of the total requests mailed, 987 farmers agreed to participate in the survey, either through the mail or online; 404 surveys were mailed and 583 individuals were e-mailed links and access codes for the Internet survey. Of these, 300 mail surveys (74%) were returned, and 346 Internet surveys (59%) were completed. A total of 517 complete observations were used in the econometric estimation of which 229 farms had websites, representing 44.3% of the sample. Table 1 presents descriptive statistics for the variables used in the model.

Based on the computer technologies adoption literature as age increases adoption is expected to decline. Survey respondents (both with and without a website) had a mean and median age of about 53 years, thus, this is a slightly younger group compared to the national average farmer age of 55.3. The 2002 Census of Agriculture also found the average age of farm operators in the Northeast to be slightly younger than the national average in 9 of the 12 states (Allen and Harris, 2005). Education was measured with an ordinal ranking from one to seven for reported education levels which ranged from less than 9th grade to a graduate or professional degree. The average education of the sample farms was between some college attendance and a

[1] The 12 Northeast states are as defined by the Northeast SARE region (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia).

bachelor's degree, which is more education than the national average of a high school education for farmers (Mishra, 2006). Education is expected to have a positive influence on the adoption of a website by farmers.

In general, the technology adoption literature found evidence of a positive relationship between farm size and adoption. For this analysis, farm size is represented by gross farm sales, following the work of Smith et al. (2004), Sabuhoro and Wunsch (2003), Batte (2003), and Gloy and Akridge (2000). According to Rogers (1995), adopters of innovations have a larger scale of units, regardless of the actual form of measurement (acres, gross farm sales, or gross farm income). Using Chi-square tests, there was no significant difference between adoption categories when acreage was considered; there was a significant difference when using gross farm sales for 2004. Therefore, gross farm sales level is used as a measure of farm size in the empirical estimation. Eleven gross farm sales levels were condensed into three categories based on the results of the Chi-square tests: (1) Low Sales of less than $5,000, (2) Midrange Sales between $5,000 and $100,000, and (3) High Sales above $100,000.

Land ownership was found to play a positive role in technology adoption in a study of conservation practice adoption by U.S. corn producers (Soule, Tegene, and Weibe, 2000). Three categories of farmland ownership are used in this analysis: owning all of the land used for farming, renting all of the land used for farming, and other land arrangements.

To account for the effect of product type on website adoption, three broad categories of products are included in the analysis: produce, ornamentals, and meat, dairy, and eggs. In addition, several specific products that were reported in a miscellaneous category are incorporated in the model: wool or hair products, honey, cider, baked goods, wine, and maple syrup. Chi-square tests showed that roadside stands, farmers' markets, and home delivery were

used more often by farms without websites, and you-pick operations, on-farm stands or stores, and mail order sales were more likely to be used by farms with websites. Explanatory variables for sales location or method included in the econometric estimation are roadside stand or tailgate, farmers' market, pick-your-own, Community Supported Agriculture (CSA), on-farm stand or store, flea market, home delivery, and sales to restaurants, grocery stores, and wholesalers or brokers.

Chi-square tests found a significant difference for farms with websites which reported higher levels of advertising expenses and use of more types of advertising methods compared to farms without websites. An advertising diversity variable was created which measures the number of advertising methods that farms reported using for their business in 2004. Its values ranged from a minimum of 1 to a maximum of 14 methods.

Malecki (2001) stated that broadband (high speed) Internet access is an important tool in using the Internet for business activities. A dummy variable equal to one if the farm had a high speed Internet connection and zero if Internet access was by dialup is therefore included in the website adoption model. Fiber optic, wireless, and satellite Internet connections were combined with DSL and cable connections into one high speed Internet access variable (34% of farms).

The empirical model used for econometric estimation is specified as:

$$\begin{aligned} P_i = {} & \beta_0 + \beta_1 Age + \beta_2 Education + \beta_{3-4} Gross\ Sales + \beta_{5-6} Land\ Ownership \\ & + \beta_{7-15} Products + \beta_{16-25} Sales\ Locations + \beta_{26} Advertising\ Diversity \\ & + \beta_{27} High\ Speed\ Internet\ Connection \end{aligned} \tag{4}$$

where P_i, the probability of website adoption, is equal to one if the farmer used a website for the farm business in 2004, and the other variables and variable categories are as defined above.

Website Adoption Model Results

Measures of fit for the probit model of website adoption are presented in Table 2 and generally show that the model performs well. The pseudo R^2 statistic of 0.336 is consistent with what the technology adoption literature has generally reported. In addition, this model correctly predicted 80.3 percent of the observations. Table 2 reports the results of the probit model of website adoption with significant coefficients (p-value of ≤ 0.10) in bold.

While it was expected that age would have a negative effect on website adoption, there was no evidence of a significant impact of farmer age. This is consistent with the early literature on computer adoption and more recent studies of Internet and e-commerce adoption (Amponsah, 1995; Jarvis, 1990; Putler and Zilberman, 1988) which found no relationship with age. The insignificance of age on website adoption could also be the result of farmers hiring professionals to construct and maintain their websites. Nearly seventy-four percent of farms that reported operating a website in 2004 had their website developed by someone other than themselves, with 31% hiring a professional web developer.

Farmer education level was also not found to have a significant effect on adoption of a website, although the coefficient did show the expected sign. Jarvis (1990) also found that education was not a significant determinant of computer adoption. Contrary to these findings, Batte (2003), Gloy and Akridge (2000), Amponsah (1995), Batte, Jones, and Schnitkey (1990), and Putler and Zilberman (1988) all found that education played a positive role in computer adoption. The insignificance of education in this study could indicate that education does not play a role in determining website adoption because farmers do not design their own websites, as was noted in the discussion regarding farmer age. In addition, it may be that specific skills related to web development and maintenance are not related to overall education level. This

result could also be attributed to the different role that websites play for a farm compared to general farm computer use. Computer adoption studies examined the role of computers in record-keeping and information processing, while websites have played a role in advertising the farm business or marketing its products, which may require less computer use by the farmer.

The low gross farm sales category was not statistically significant for website adoption when compared to farms with midrange sales, the base category. On the other hand, the high sales category was positive and significant. Marginal effects presented in Table 3 show that farms with 2004 sales greater than $100,000 were 18.9% more likely to adopt a website than farms with midrange sales. This reinforces the belief that larger farms see more of a benefit from having a website than smaller farms. It could also indicate that the expense of developing and maintaining a website is a smaller proportion of the budgets of larger farms compared to smaller farms. This result is consistent with the relationship that the computer technology adoption literature has found between size of an operation measured by gross farm sales and adoption of that technology (Gloy and Akridge, 2000; Hoag, Ascough, and Frasier, 1999; Putler and Zilberman, 1988). Henderson, Dooley, and Akridge (2000) also established a positive relationship between e-commerce activities of agribusinesses and gross sales.

Neither of the land tenure categories (renting or other) has a significant impact on website adoption, when compared to the base category of owning all of the land being farmed. Sunding and Zilberman (2000) provide a possible explanation for this result. They stated that some technology characteristics may lead to differences in property arrangements, while other technologies may have no relationship to land ownership. Websites make up a smaller investment compared to production equipment, and could be altered relatively easily to account for changes in the location of a farm depending on new rental contracts. The structure of

websites and level of expense of development and maintenance may allow the farmer to consider abandoning websites without representing a large loss to the farm.

It would be expected that farmers selling products with different characteristics would make different choices on using a website for their business. Products that are branded and/or processed were expected to have a positive influence on the adoption of a website since these products may possess characteristics that are easily differentiated by visual inspection, such as a picture on a website. Product choices were not limited to a single selection; so many operations reported selling products from several categories.

The model found a negative relationship between farms growing produce and website adoption, with the probability of adopting a website 14.8% lower for farms selling produce. The negative relationship of produce production with website adoption could be due to an inability of these farms to differentiate their products over an extended period of time due to the seasonal nature of produce production and the perishability of these products. This negative relationship could also indicate that farmers are spending so much time growing and selling their products that they are too busy to design and update a website. Only one differentiated product, cider, was slightly significant, showing a positive relationship with website adoption. Cider sales may have a positive impact on website adoption due to the characteristics of cider, as it is a branded, processed product. Farms that sold cider have a 22.3% higher probability of website adoption.

The insignificance of meat, dairy, or eggs regarding website adoption was similar to results found in the literature, even though those studies did not consider direct market sales of these products. In their studies of computer adoption by farms, Gloy and Akridge (2000) and Putler and Zilberman (1988) found cattle and dairy operations had an insignificant impact on adoption. Gloy and Akridge (2000) also discovered a similar result in their analysis of Internet

use. The insignificant impact of animal product sales on website adoption could be due to farmer perceptions regarding the role that websites can play if they are only considering websites as a tool for online sales. The ornamentals coefficient has the expected positive relationship with website adoption, although the variable was insignificant. The seasonal nature of selling ornamental goods, which included bedding plants and nursery products, Christmas trees, and cut flowers, may have limited the use of a website since some of these businesses may be operated for only a portion of the year and might not want the additional expense of a website. Other farms selling ornamental products may stay open all year leading to their use of websites in 2004, however this may be only a small proportion of farms. The National Christmas Tree Association (2005) reported that the top 5% of farms sold 61% of the trees produced in the year 2002. This indicates that a few farms each sell a very large amount of Christmas trees, while many other farms sell a small amount of trees, which provides evidence to the differential role that Christmas tree sales, and perhaps other ornamental products, can play in a farm business. In addition, wool or hair products, wine, and maple syrup were not significant predictors of website adoption. The lack of significance of specialty goods could be due to the small proportion of observations representing these products in the sample, ranging from 2.1% for wine to 13.9% for honey. Another explanation for the insignificance of specialty goods could be that small farms without websites see the benefits of advertising or selling these goods over the Internet, but are already selling all of the products they make; consequently, they might not believe they could handle the additional demand for their products that a website might create.

Selling at a roadside stand or tailgate and selling at an on-farm stand or store both had a negative and significant relationship with website adoption. When a roadside stand or tailgate is used by a farm business, there is a 21.4% lower probability of website adoption. This could be

due to the informal location of roadside stands, which are generally situated at locations that are conducive to spontaneous purchases by consumers who are driving by. Contrary to prior expectations, selling via an on-farm stand or store, results in an 11.8% lower probability of website adoption. This could be true if the majority of farmers operating on-farm stands are small operations which lack specific hours of operation and also cater to mostly drive-by consumers. A distinction in the data could not be made between on-farm stands and stores, which as bigger, more professional operations were expected to have a website.

None of the other sales locations/methods (farmers' market, pick-your-own, CSA, flea market, home delivery, and sales to restaurants, grocery stores, and wholesalers or brokers) had a significant relationship with website adoption. The lack of significance of these other sales location variables could be attributed to the number of observations used in the analysis since many of the sales locations had low levels reported (ranging from 1.7% selling at flea markets to 32% at farmers' markets).

The advertising diversity variable has a positive and significant relationship with website adoption. The results indicate that use of an additional advertising method leads to an increase of 16.7% in the probability of adopting a website; at the mean value of advertising diversity (approximately 5 forms of advertising). This indicates that farmers use websites as an additional type of advertising which augments their other advertising formats, and those farmers who regularly advertised in 2004 also recognize the value of an additional advertising method, whereas farmers without websites likely depend mainly on word of mouth for advertising their farm businesses.

As expected the relationship between high speed Internet access and website adoption was positive and significant. High speed Internet access increases the probability of adopting a

website by 14.7%. This is supported by Malecki (2001) who stated that broadband access is becoming an essential aspect of Internet access in relation to online business activities.

Limitations and Future Research

This research was limited to the Northeast region of the United States for the year 2004. The farms used in this study were direct marketing farms, which may exhibit different characteristics from farm operations that do not directly market their products to consumers. While the location of the farms was available by zip code, tests for spatial dependence or heterogeneity were not conducted, so spatial variability was assumed to have no impact in the model. Omitted variables could be a problem, due to the impossibility of including all relevant characteristics when using limited data gathered from a survey. A larger number of observations might make it possible to show more relationships between some types of specialty goods that are sold by farms, either confirming that only a small proportion of farmers sell these goods or that there are real differences between farms that own websites and those that do not in terms of selling specialty goods.

Several avenues could be followed to expand this research. Identifying the impact of having a website on the structure of a direct marketing farm, such as gross farm sales and percentage of household income from the farm business, is planned for future research. Additional research could identify the characteristics of farms that sell products online, compared to farms that use websites only as a form of advertising, to determine if there are important differences between these two groups. Spatial analysis methods could be used to identify any locational patterns of diffusion of website use. Lastly, studying the demographics of consumers using farm websites would provide essential information to farms designing and using a website as part of their marketing plan.

Summary and Conclusions

Following the advances in computer technologies in the last few decades and increased use of direct sales to improve farm income, there has been a need to research the characteristics of direct marketing farms in the Northeast that use the Internet for marketing. This study attempted to classify farmers according to the characteristics of their farms and products, as well as their investment in human capital. The study determined which characteristics significantly influence website adoption by direct marketing farms in the Northeast for the year 2004, using a probit model for econometric estimation. Marginal impacts of the significant variables were also examined. The analyzed farmer and farm characteristics included variables previously identified in computer, Internet, and e-commerce adoption studies and variables specifically related to direct marketing farms.

The significance of high gross farm sales shows that the size of a farm business has an effect on website adoption, indicating that the scale of the costs of a website may cause larger farms to use websites more often than smaller farms. Processed and branded goods appear to have a slightly positive influence on website adoption, compared to a negative impact for produce. The negative impact of significant sales location variables (roadside stand or tailgate and on-farm stand or store) shows that farmers who sold at less organized and time constrained locations were less likely to adopt a website. The results also indicate that farmers who advertise in more ways are more likely to adopt websites. The data does not suggest that education, land ownership status, or age are important in determining website adoption.

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Table 1. Descriptive Statistics of Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Website	0.446	0.497	0	1
Age	52.542	10.783	24	87
Education	5.513	1.361	1	7
Low Sales	0.228	0.420	0	1
Midrange Sales	0.530	0.500	0	1
High Sales	0.242	0.429	0	1
Own All Land Farmed	0.638	0.481	0	1
Rent All Land Farmed	0.052	0.223	0	1
Other Land Arrangement	0.309	0.463	0	1
Produce	0.584	0.493	0	1
Ornamentals	0.267	0.443	0	1
Meat, Dairy, or Eggs	0.478	0.499	0	1
Wool or Hair Products	0.139	0.347	0	1
Honey	0.114	0.318	0	1
Cider	0.060	0.238	0	1
Baked Goods	0.114	0.318	0	1
Wine	0.021	0.144	0	1
Maple Syrup & Products	0.103	0.304	0	1
Roadside Stand or Tailgate	0.161	0.367	0	1
Farmers' Market	0.319	0.467	0	1
Pick-your-own	0.230	0.421	0	1
CSA	0.116	0.321	0	1
Farm Stand or Store	0.513	0.500	0	1
Flea Market	0.017	0.131	0	1
Home Delivery	0.159	0.366	0	1
Restaurants	0.168	0.374	0	1
Grocery Stores	0.224	0.418	0	1
Wholesaler or Broker	0.221	0.415	0	1
Advertising Diversity	4.884	2.561	1	14
High Speed Internet Connection	0.344	0.476	0	1

Table 2. Website Adoption Probit Results

Variable	Coefficient	Asymptotic t-statistic	p-Value	Mean
Constant	**-2.2750**	**-2.885**	**0.0039**	**-**
Age	0.0037	0.530	0.5959	52.542
Education	0.0487	0.915	0.3603	5.513
Low Sales	-0.1254	-0.678	0.4981	0.228
High Sales	**0.4788**	**2.434**	**0.0150**	**0.242**
Rent All Land Farmed	0.4992	1.513	0.1304	0.052
Other Land Arrangement	-0.1893	-1.045	0.2522	0.309
Produce	**-0.3749**	**-2.245**	**0.0247**	**0.584**
Ornamentals	0.0403	0.240	0.8102	0.267
Meat, Dairy, or Eggs	-0.1632	-0.998	0.3183	0.462
Wool or Hair Products	0.2723	1.262	0.2069	0.139
Honey	-0.0109	-0.045	0.9640	0.114
Cider	**0.5678**	**1.638**	**0.1013**	**0.060**
Baked Goods	-0.4155	-1.562	0.1184	0.114
Wine	0.5277	0.849	0.3960	0.021
Maple Syrup & Products	0.0523	0.220	0.8261	0.103
Roadside Stand or Tailgate	**-0.5773**	**-2.685**	**0.0073**	**0.161**
Farmers' Market	-0.0041	-0.025	0.9804	0.319
Pick-your-own	-0.0197	-0.106	0.9157	0.230
CSA	-0.2728	-1.175	0.2401	0.116
Farm Stand or Store	**-0.2992**	**-2.017**	**0.0437**	**0.513**
Flea Market	-0.1043	-0.256	0.8759	0.017
Home Delivery	-0.2656	-1.318	0.1875	0.159
Restaurants	0.0860	0.430	0.6668	0.168
Grocery Stores	-0.1307	-0.723	0.4694	0.224
Wholesaler or Broker	-0.0372	-0.198	0.8428	0.221
Advertising Diversity	**0.4229**	**10.558**	**0.0000**	**4.884**
High Speed Internet Connection	**0.3718**	**2.521**	**0.0117**	**0.344**
Measures of fit				
Log likelihood ratio	-224.29	p-value ≤ 0.0001		
Pseudo R^2	0.336			
Percentage of correct predictions	80.3			

Bold indicates significance for variable at p-value ≤10%.

Table 3. Marginal Effects of Significant Variables

Variable	Marginal Effect	p-Value
High Sales	0.1891	0.0135
Produce	-0.1476	0.0236
Cider	0.2226	0.0849
Roadside Stand or Tailgate	-0.2138	0.0031
Farm Stand or Store	-0.1176	0.0423
Advertising Diversity	0.1667	0.0000
High Speed Internet Connection	0.1467	0.0112