

IMPLEMENTATION OF AN EVALUATION FRAMEWORK FOR THE MARKETMAKER NATIONAL NETWORK FY 2010

The overall goal of the project was to evaluate the impact of MarketMaker (MM) websites on agricultural producers and farmers markets using a framework developed under a previously funded FSMIP project. Surveys were developed to explore users' experiences with MM, their perceptions regarding the impact of MM on their businesses, and their willingness to pay for the services provided by MM. Participants from all states using MM at the time were surveyed.

Producers estimated an average annual increase in sales of about \$152 due to MM, although 75 percent of them indicated the increase in annual sales was \$25 or less. Farmer's market managers estimated that the average annual increase in sales due to participation in MM was about 3.6 percent, although 43 percent of the participants have not yet experienced any increase in annual sales. On average, producers indicated a willingness to pay \$47.02 annually for the services they receive from MM. The following elements were found to influence farmers' willingness to pay: registration type, time registered on MM, time devoted to the website, type of user, the number of marketing contacts received and firm total annual sales. A similar analysis for farmers markets revealed that the market managers are willing to pay an average of \$41.19 annually for services provided by MM. These findings establish a track record and demonstrate MM's potential among more successful users as well as some of the factors needed for the program to succeed.

FINAL REPORT

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**IMPLEMENTATION OF AN EVALUATION FRAMEWORK FOR THE
MARKETMAKER NATIONAL NETWORK**

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and Samuel Zapata¹**

Final Report

to

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USDA

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Executive Summary

The **overall goal** of this project was to evaluate the impact of MarketMaker websites on two key groups of users: agricultural producers (farmers, ranchers and fisherman) and Farmers' Markets. The evaluation was carried out using the framework developed in a previously funded FSMIP project (Lamie et al., 2011).

The first stage of the project focused on developing survey instruments for producers and Farmers' Markets. Core questions included in the surveys focused on users' experiences with MarketMaker, participants' perceptions regarding the impact of MarketMaker on their business and willingness to pay (WTP) questions for the services provided by the MarketMaker. Since some state representatives declined to include the WTP questions in their state's surveys, we developed two core survey instruments for each user group: a full version including the WTP question and a brief version without it. Participating states were given an opportunity to select the survey instrument they preferred as well as include additional state-specific questions in the survey.

The second stage of this project involved survey implementation during April-June 2011 and January-March 2012. We obtained an overall response rate of about 18 percent for producer survey and 10.2 percent for Farmers Market managers' survey. Both surveys were distributed in all participating (as of 2010) states: Arkansas, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Michigan, Mississippi, Nebraska, New York, Ohio, South Carolina, and Washington D.C.

The third stage of this project concentrated on survey data analysis. The impact of MarketMaker on producers and Farmers' Markets was measured on several levels. First, we identified the perceived impact of MM based on summary statistics of survey responses. Second, we analyzed the relationship between the long term expected MarketMaker outcomes of users, including the WTP values, with medium and short term outcomes (e.g., farmer level of activity in MM) and the characteristics of the users.

The fourth and final stage of the project focused on Development of Outreach Materials and Dissemination of Results.

Overall, as the result of this project, we were able to identify the perceived impacts of MarketMaker on producers and Farmers' Markets as well as their willingness to pay for the website, which can be used as a measure of its economic impact. Our findings indicate that, on average, producers are willing to pay \$47.02 annually for the services they receive from MarketMaker. Our analysis demonstrated that registration type, time registered on MarketMaker, time devoted to the website, type of user, the number of marketing contacts received and firm total annual sales have a significant effect on producers' WTP for the services provided by MarketMaker. A similar analysis for farmers' markets revealed that farmers' market managers are willing to pay an average of \$41.19 annually for the services provided by MarketMaker. Given MarketMaker's relative infancy, our findings establish a track record and demonstrate its potential among the more successful users of the program as well as the factors needed for the program to succeed.

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Introduction and Overview

MarketMaker (MM) is an interactive web-based resource that provides geocoded food marketing information to food entrepreneurs and customers. The site was created in 2000 by a team of University of Illinois Extension researchers with the intention of building an electronic infrastructure that would help connect Illinois food producing farmers with economically viable new markets and aid in the development of quality driven food supply chains. The original project was funded by the Illinois Council on Food and Agricultural Research (C-FAR) and the Illinois Department of Agriculture.

Since market systems are rarely defined by state boundaries, a logical progression for this state-level project was to expand to other states. In June of 2004 MarketMaker was presented at the National Value Added (Agriculture) Conference generating considerable interest among states in attendance. Iowa and New York stepped up to join Illinois in advancing the concept of a national MarketMaker network. In 2005, a multi-state partnership of Land Grant Institutions and agriculturally focused organizations was formed to build a national network of interconnected MarketMaker sites. By December 2012, nineteen states and the District of Columbia became part of the national network (Table 1). The site included nearly 660,000 profiles of food related enterprises including 8,618 producers and experienced about 1 million hits per month from over 85,000 food industry entrepreneurs and consumers. As the MarketMaker network grows and develops a historical track record so does the need to formally track its financial,

economic, and other impacts on participants. However, due to the relatively new state of the network, its impact has not been thoroughly measured and documented.

Table 1. Number of business profiles listed in MM by state and category, as of December 2012.^a

State	Type of Business				Total
	Farmers/ Producers	Non-Farm ^b	Farmers' Markets	Wineries	
Alabama	50	19,197	14	0	19,261
Arkansas	100	10,805	53	8	10,966
Colorado	556	23,973	105	83	24,717
Florida	259	76,112	163	18	76,552
Georgia	521	40,092	144	20	40,777
Illinois	1,098	53,204	299	62	54,663
Indiana	374	12,533	123	15	13,045
Iowa	421	14,331	238	34	15,024
Kentucky	461	14,275	174	16	14,926
Louisiana	229	20,125	157	5	20,516
Michigan	447	32,994	156	48	33,645
Mississippi	226	12,104	73	1	12,404
Nebraska	700	7,527	80	9	8,316
New York	1,578	95,158	547	208	97,491
Ohio	480	43,946	194	89	44,709
Pennsylvania	258	53,271	58	19	53,606
South Carolina	427	20,773	97	3	21,300
Texas	414	86,363	201	47	87,025
Wyoming	9	2,458	45	0	2,512
Washington, DC	10	3,500	28	0	3,538
Total	8,618	642,741	2,949	685	654,993

^aBusinesses are not limited to one profile, and therefore may be counted multiple times (once for each profile).

^bThis category includes agritourism, buyers, processors, wholesalers, food retailers and eating and drinking places.

The *overall goal* of this project was to evaluate the impact of MarketMaker websites on two key groups of users: agricultural producers (farmers, ranchers and fisherman) and farmers' markets. The evaluation was carried out using the

evaluation framework developed in a previously funded FSMIP project (Lamie et al., 2011). Specific objectives of this study were to:

- 1. Provide baseline information for a longitudinal study on the long term economic impact of this medium for users registered in the website.*
- 2. Estimate users perceived current impact of MarketMaker for the success of their business.*
- 3. Analyze the relationship between the long term expected MarketMaker outcomes of users' participation in MarketMaker (e.g., increase in the operation profitability in the case of farmers) with medium and short term outcomes (e.g., farmers' level of activity in the site) as well as the characteristics of the users.*
- 4. Assess the costs and benefits of MarketMaker in each partner state.*

Literature Review

Agricultural producers' use of computers and the Internet has increased in recent years. In 2009, 59 percent of U.S. farms had Internet access and 64 percent had access to a computer, compared to 29 percent and 47 percent in 1999, respectively (USDA-NASS, 2009). One of the potential applications of computers and the Internet in agriculture is e-commerce, which refers to the use of the Internet to market, buy and sell goods and services, exchange information via Internet, and create and maintain web-based relationships between participant entities (Fruhling and Digman, 2000).

E-commerce has been argued to have the potential to both increase sales, as well as to significantly decrease costs through greater efficiencies of operation. Gains in efficiency could result from the reduction of inventory levels, transportation costs, information costs, and order and delivery times (Batte and

Ernst, 2007; and Montealegre, Thompson and Eales, 2007). Moreover, the creation of electronic markets that are expected to be more transparent and competitive than physical markets may attract more consumers and, thus, increase demand and improve the firm's strategic position with customers seeking specific niche products or having geographical restrictions (Batte and Ernst, 2007; and Montealegre, Thompson and Eales, 2007).

In spite of the touted potential of e-commerce to improve profits in businesses, the literature on the economic impact of e-commerce is very limited. The majority of studies evaluating e-commerce platforms have focused on assessing user-perceived quality of websites based on their design, usability, and performance rather than on the economic impacts that the e-Commerce Platforms generate for their users. For example, Agarwal and Venkatesh (2002) developed a method for measuring and rating specific components of e-commerce website usability from user's perspective such as content quality and design, ease of use and tailoring of a website to fit particular user's needs. Aladwani and Palvia (2001) in addition to website usability also considered the quality of website's technical components including security, availability, interactivity, speed of page loading and customer services. More comprehensive studies have highlighted the importance of other dimensions of perceived web quality beyond those related to the interaction with the e-commerce site. For example, Petre et al. (2006) developed an evaluation instrument that measures both purchase and post-purchase web capabilities. Post-purchase components include delivery of products, post-sales support and quality of products and services. The above evaluation methodologies were used to measure

the quality of different e-commerce websites including banks, bookstores, car manufactures, electronic retailers and travel-related services.

One of the few studies evaluating economic impacts of e-commerce platforms was conducted by Ubramaniam and Shaw (2002). The authors estimated the cost savings of a heavy-equipment manufacturer associated to the procurement of indirect inputs through Electronic Trade Platforms. Specifically, the implementation of an electronic business to business collaboration system resulted in procurement cost saving between 33 and 68 percent.

Impact of E-Commerce and Agricultural Markets

Studies evaluating the effectiveness of agricultural e-commerce platforms such as MarketMaker are very limited. We are only aware of two state level efforts that examined the impact of MarketMaker on agribusiness operations. Fox (2009) developed and implemented a survey of various representatives of Ohio's food chain including producers, processors, wineries, farmers' markets and distributors. One of the objectives of the project was to explore changes in marketing practices and market access that resulted from the use of MarketMaker. The survey asked Ohio registered producers if they believed that the MarketMaker site was helping keep more food dollars in the regional economy. Sixty-three percent of producers agreed with the statement. Cho and Tobias (2009) conducted a survey of New York farmers registered on MarketMaker. Survey results indicated that the average increase in annual sales attributed to MarketMaker was between \$225 and \$790. Additionally, about 12 percent of the respondents reported receiving marketing contacts through

MarketMaker and using the MarketMaker directory to contact food industry business partners.

In short, the evaluation of e-commerce platforms has mainly focused on human-computer interactions rather than on the economic impacts associated with participation in e-commerce activities. Very little is known about the economic impact of agricultural e-commerce platforms.

Project and Report Overview

This project included four stages: 1) Development of Survey Instruments Adapted to the Needs of each Partner State, 2) Survey of Users Registered on the MM website, 3) Survey Data Analysis; and 4) Development of Outreach Materials and Dissemination of Results. In the section below we discuss in detail the activities related to each stage of the project.

Stage 1. Development of Survey Instruments Adapted to the Needs of each Partner State

This stage focused on developing survey instruments for producers and farmers' markets. The survey instruments contained common questions for all states (core questions) based on logic models developed by Lamie et al. (2011). Core questions included in the surveys focused on users' experiences with MarketMaker (e.g., time registered on the site) and participants' perceptions regarding the impact of MarketMaker on their business (e.g., increase in sales due to MarketMaker). Another core question considered during the survey development phase was a willingness to pay (WTP) question for the services provided by the

MarketMaker. This question was included in order to estimate the economic value of the site since its services are currently provided to users at no cost. If there was a user fee established for MarketMaker users, then we would have a direct estimate of the value of the site to users. The WTP approach is a commonly used method to estimate this value in such situations. However, since some state representatives declined to include the WTP in their state's surveys, we developed two core survey instruments for each user group: a full version including the WTP question and a brief version without it (see Appendix A).

Each partner state was given an opportunity to review the survey instruments, select the version that they preferred for their state, and add some state specific questions that allowed them to address the particular situations of the users in each participating state (state-level questions). Final survey instruments were approved by MarketMaker National Evaluation Committee and the MarketMaker Policy Advisory Committee. More details about the structure of the surveys are discussed in Chapters 1, 2 and 3 of this report. All the versions of the survey instruments are presented in Appendix A. The states that chose to use the full survey version included Arkansas, Florida, Georgia, Indiana, Iowa, Mississippi, and South Carolina. The short survey version without the WTP question was selected by Colorado, Illinois, Louisiana, Michigan, Nebraska, New York, Ohio and the District of Columbia.

Stage 2. Survey of Users Registered on the MM website

The second stage of this project involved survey implementation. During April-June 2011 the producers' survey instrument was distributed by Email to

4,264 producers registered on MarketMaker. The overall response rate of the Email survey was 7.1 percent. In order to obtain a larger sample, a second round of surveys was sent to 2,030 producers. Differently from the first round, these surveys were distributed via postal mail during January-March 2012. We obtained an overall response rate of about 18 percent. The farmers' market managers' survey was distributed by Email to 1,295 managers registered on MarketMaker websites (May – June 2011). The overall response rate of the survey was 10.2 percent and it generated 132 usable observations. Both surveys were distributed in all the participating (as of 2010) states: Arkansas, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Michigan, Mississippi, Nebraska, New York, Ohio, South Carolina, and Washington D.C.

Stage 3. Survey Data Analysis

The third stage of this project concentrated on survey data analysis. The impact of MarketMaker on producers and farmers' markets was measured on several levels. First, we identified the perceived impact of MM based on summary statistics of survey responses. Second, we analyzed the relationship between the long term expected MarketMaker outcomes of users, including the WTP values, with medium and short term outcomes (e.g., farmer level of activity in MM) and the characteristics of the users. Results and discussion of the survey data analyses are presented in Chapter 1 to 3 of this report.

Chapter 1 focuses on producers' perceived impacts of MarketMaker on their businesses. This chapter updates the results presented in the paper "Do Internet-Based Promotion Efforts Work? Evaluating MarketMaker." by Zapata, S.D., C.E.

Carpio, O. Isengildina-Massa, and R.D. Lamie published in the *Journal of Agribusiness* in 2011 which was based only on the responses to the Email version of the producers' survey. Chapter 1 includes data from both the Email survey as well as the postal mail survey which was implemented after the Zapata et al. (2011) paper was published.

Chapter 2 of the report presents and discusses the results of producers' WTP analysis. As discussed, in Chapter 2, the WTP value represents the increase in profits attributed to the adoption of MarketMaker. Chapter 3 presents and discusses the summary statistics results of the farmers' markets managers' survey as well as the analysis of the relationship between the perceived increase in sales due to MarketMaker and website usage and farmers' markets characteristics. Furthermore, the WTP analysis describes the impact of MarketMaker on farmers' markets profits.

The final report section contains a summary, conclusions, and implications of the study findings. Among the implications discussed in the section we provide a preliminary assessment of the costs and benefits of a representative MarketMaker state partner.¹ The assessment of benefits uses the results from the willingness to pay analyses of producers and farmers' markets. Costs estimates were obtained through a short survey of the partner state representatives. Both current as well as projected benefits and cost estimates are provided.

¹We had initially planned to conduct both national and state level cost-benefit assessments; however, the low level of responses from MarketMaker users' surveys precluded us from conducting individual state analyses.

Stage 4. Development of Outreach Materials and Dissemination of Results

A preliminary version of a white paper summarizing this project's main findings was sent to MarketMaker Policy Advisory Committee (PAC) in advance of the National MarketMaker Annual Partnership Meeting which took place on October 29 and 30, 2012 in Charleston, South Carolina. In addition, time was set aside at this meeting to accomplish some strategic planning, and to incorporate the learning from the findings of this study where appropriate. The PAC discussed our findings within a session devoted to "Setting MarketMaker Priorities for the Next 3-5 Years: Input from PAC Strategic Planning Session.", facilitated by two members of the PAC. The most important outcomes of the session were focused on the development of spin-off sites that would focus on the more specific needs of identifiable user groups for the site and the development of more coherent and meaningful partnerships. These two outcomes are interconnected as closer connections with potential user group partners will portend the development of specialize portals targeted to their specific needs. Finally, we have also prepared another white paper written for a non-economist audience that summarizes our project's main findings.

Copies of academic journal publications, presentations at scientific conferences and two white papers summarizing this project's main findings are attached in Appendix B of this report.

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Chapter 1.

Measuring the Impact of MarketMaker on Agricultural Producers

The main goal of this chapter is to summarize the results and implications of the survey assessing the current and potential benefits obtained by agricultural producers² using MarketMaker. Parametric and nonparametric methods were proposed to estimate the mean of a variable when its actual value is observed to take a particular value (usually zero) or to fall in a certain interval on a continuous scale. These procedures were necessary since several of the variables in the survey were collected using a discrete number of categories in order to simplify the respondent's task and to encourage response.

Survey Description

To study the impact of MarketMaker, agricultural producers previously registered on the site were surveyed using both online and mail paper instruments during the months of May 2011 and February 2012. The survey instrument was based on logic models³ developed by Lamie et al. (2011). Survey development efforts were led by a Clemson University team of researchers working closely with MarketMaker administrators in each state. Final survey instruments were approved

² Agricultural producers include both farmers and fishermen.

³ Logic models are graphical depictions of the linkages among a project inputs and outputs. Logic models are used as planning and evaluation tools. A detailed description of logic models development and use can be found in W.K. Kellogg Foundation (2004). Applications of logic models in the academic literature are found in areas such as agricultural technology transfer (Framst, 1995), research and development (Jordan and Mortensen 1997), and industrial modernization (Torvatn, 1999).

by the MarketMaker National Evaluation Committee and the MarketMaker Policy Advisory Committee. The survey was initially distributed by Email to 4,264 producers⁴ registered on MarketMaker websites in 15 participating states: Illinois, Iowa, Nebraska, New York, Georgia, Michigan, Mississippi, Ohio, Indiana, South Carolina, Colorado, Arkansas, Florida, Louisiana, and Washington, D.C. In February 2012, a second round of surveys was mailed to a subsample of 2,030 producers with the purpose of increasing the number of responses. Traditional mail was used in the final round of surveys to capture the responses of those producers who may be less familiar with using computers and the Internet.

The questionnaire was divided into four sections. The first section focused on users' experiences with MarketMaker. Section 2 concentrated on participants' perceptions regarding the impact of MarketMaker on their business. The third section asked respondents about their demographic characteristics, as well as business characteristics. Finally, Section 4, which was only applied to producers participating in direct-marketing channels, focused on the impact of MarketMaker on direct marketing.

An invitation Email containing a brief description of the project and the link to the questionnaire was sent to all agricultural producers from the participating states. The invitation Email clearly reflected the support of the local MarketMaker leaders and administrators. Two reminder Emails (one and two weeks after the initial Email) were sent to those individuals who had not responded to the survey. To further encourage participation in the survey, respondents were offered the

⁴ Ninety-seven percent of producers registered on the website are farmers, 1% are fishermen, and 2% are both farmers and fishermen.

opportunity to enter a drawing to win \$100. Typical completion time of the questionnaire was 5-10 minutes.

The overall response rate of the Email survey was 8.7 percent and it generated 397 usable observations. As found in Hamilton (2003) meta-study of 199 online surveys, online survey response rates tend to be low (13.4 percent average response rate in their study). With the aim to increase the number of responses, a mail survey and two reminder letters were sent to a random sample of about 50 percent of those producers who did not respond the Email survey. The mail survey generated 417 additional responses and had an overall response rate of 20.6 percent. The aggregated response rate of the study was 17.7 percent with 814 usable observations. The sample frame size, number of respondents, and response rate by MarketMaker participant state is shown in Table 1.1. The states with the highest response rates were Arkansas (28.9 percent) and Florida (23.8 percent), and those with the lowest response rates were the District of Columbia (0.0 percent)⁵ and Nebraska (11.9 percent).

Estimation of the Means

In order to simplify the respondent's task and to encourage a response, most of the demographic and business information, as well as outcome measures (e.g., number of new contacts found through MarketMaker) were collected using a discrete number of categories, hence the calculation of the mean value of these variables required the use of special statistical techniques (Bhat, 1994; Carpio,

⁵ The frame size in Washington DC only includes six producers.

Wohlgenant, and Safley, 2008; and Stewart, 1983). In addition to serving as a summary statistic of the variables, mean values of the outcome measures were required, for example, for the calculation of the economic impact of the MarketMaker website at the aggregate level (state and national).

In this section, we present two alternative approaches used for the estimation of the mean values: a parametric and nonparametric approach. The parametric approach was adapted from the literature on the estimation of equations using data in which the dependent variable is only observed to fall in a certain interval (Stewart, 1983; and Bhat, 1994). The nonparametric procedure was adapted from the survival statistical literature (Turnbull, 1976) and the contingent valuation literature (Day, 2007).

We denote the true (but unobserved) variable of interest for the i^{th} individual is y_i . The probability that y_i is in the k^{th} interval⁶ with boundary values of $A_{(k-1)}$ and A_k , is given by:

$$(1.1) \quad P\left(A_{(k-1)} \leq y_i \leq A_k\right) = F(A_k) - F(A_{(k-1)}) \quad i = 1, 2, \dots, N,$$

where $F(\cdot)$ is the underlying probability distribution of variable y (Day 2007; and Turnbull 1976).

The probability of observing a particular set of responses in a random sample of N individuals from the population of interest is then given by the likelihood function:

⁶ In both parametric and nonparametric procedures, when necessary, the upper bound for the last interval was set to be equal to twice the value of its lower bound. Overall, the mean estimates were robust to the choice of “reasonable” upper bound values.

$$(1.2) \quad L = \prod_{i=1}^n F(A_k) - F(A_{(k-1)}).$$

In order to express the likelihood function in terms of all interval options available to the respondent, we create a dummy variable d_{ik} which indicates whether an individual chooses the k^{th} interval among K options. Using this indicator variable and the generic likelihood function in (1.2), the resulting log-likelihood function is:

$$(1.3) \quad \ln L = \sum_{i=1}^N \ln \sum_{k=1}^{K+1} d_{ik} [F(A_k) - F(A_{(k-1)})].$$

Parametric Procedure

The parametric procedure used for the estimation of the mean of y assumes that the variable follows a normal distribution with mean μ and variance σ^2 .

Consequently, the log-likelihood function can be written as:

$$(1.4) \quad \ln L = \sum_{i=1}^N \ln \sum_{k=1}^{K+1} d_{ik} \left[\Phi \left(\frac{A_k - \mu}{\sigma} \right) - \Phi \left(\frac{A_{(k-1)} - \mu}{\sigma} \right) \right],$$

where $F(\cdot)$ in equation (1.3) has been replaced by the cumulative standard normal $\Phi(\cdot)$. Parameter estimates for μ and σ can then be obtained by using the maximum likelihood estimation procedures. Since in some of the cases the first “interval” option offered to the respondents was zero, the term $\ln \sum_{k=1}^{K+1} d_{ik} \left[\Phi \left(\frac{A_k - \mu}{\sigma} \right) - \Phi \left(\frac{A_{(k-1)} - \mu}{\sigma} \right) \right]$ needs to be replaced by $\ln \phi \left(\frac{\mu}{\sigma} \right)$ for those respondents who selected this interval option (e.g., number of contacts in Table 1.4).

Parameter estimates obtained in equation (1.4) can also be used to estimate the conditional mean of the unobserved y_i 's using (Stewart, 1983):

$$(1.5) \quad E(y_i | y_i \in \text{kth interval}) = \mu + \sigma \left[\frac{\Phi \left(\frac{A_{(k-1)} - \mu}{\sigma} \right) - \Phi \left(\frac{A_k - \mu}{\sigma} \right)}{\Phi \left(\frac{A_k - \mu}{\sigma} \right) - \Phi \left(\frac{A_{(k-1)} - \mu}{\sigma} \right)} \right] \quad i = 1, 2, \dots, N.$$

Notice that the previous literature using data in which a variable is only observed to fall in a certain interval has focused on two main issues: 1) the imputation of the values of the unobserved variable for each respondent, and 2) the analysis of the effect of explanatory variables on the conditional mean of the unobserved variable. In contrast, the objective of our analysis is the estimation of the mean of the marginal distribution of the variable of interest.

Nonparametric Procedure

Estimation of the mean of the variables of interest was also carried out using the nonparametric approach for interval-censored data proposed by Turnbull (1976). This technique does not impose ad hoc assumptions about the probability distribution of the variable of interest y . This is important since several of the variables analyzed in this study are likely not normally distributed and it is unknown to what extent the normal approximation is appropriate.

Given that the probability distribution of y (F) is unknown, Turnbull's procedure considers each $F_k = F(A_k)$ as a parameter to be estimated. Moreover, in order to ensure that the likelihood estimates define a valid cumulative distribution function, the estimation algorithm needs to be expressed as a constrained maximization problem of the form:

$$(1.6) \quad \text{Max}_F \ln L(F|d) = \sum_{i=1}^N \ln \sum_{k=1}^{K+1} d_{ik}(F_k - F_{(k-1)})$$

$$\text{Subject to: } 0 = F_0 \leq F_1 \dots \leq F_{K+1} = 1.$$

Since (1.6) is strictly concave, the F_k estimates are unique. Estimation is then carried out using Turnbull's self-consistent algorithm (Day, 2007; Gomez, Calle, and Oller, 2004; and Turnbull, 1976). The expected value of y can thus be written as

(Haab and McConnell, 1997):

$$(1.7) \quad E(y) = \int_0^{A_K} y dF(y) = \sum_{j=1}^M \int_{A_{k-1}}^{A_k} y dF(y).$$

Replacing y by the lower or upper bound of each interval, it can be shown that the lower (LB) and upper bound (UB) estimates of the expected value of y ($E(y)$) are:

$$(1.8) \quad E(y_{LB}) = \sum_{k=1}^{K+1} A_{k-1} (F_{(k-1)} - F_k)$$

$$(1.9) \quad E(y_{UB}) = \sum_{k=1}^{K+1} A_k (F_{(k-1)} - F_k).$$

Hence, the drawback of using the nonparametric procedure is that it generates upper and lower bounds of the mean of the distribution rather than a unique point estimate. Maximization of the log-likelihood functions was performed using the computing software Matrix Laboratory (MATLAB).

Results

The results section includes summary statistics for respondent characteristics, summary statistics concerning MarketMaker registration and use, as well as producer perceptions about the impact of MarketMaker. This section also includes a brief discussion about the relationships between MarketMaker outcomes and some characteristics of the use of the MarketMaker website by producers. For the categorical variables, we mainly used the estimated parametric mean in the discussion of results. A short discussion about the difference between the parametric and nonparametric means estimates is presented at the end of the section.

Characteristics of Respondents

Survey results indicate that nearly 96 percent of the respondents were the owners or the managers of the business. This finding gives more credibility to their answers concerning the characteristics of the operation and the impact of MarketMaker on their business performance. Forty-six percent of respondents were female. This percentage is higher than that reported by operators interviewed in the 2007 Census of Agriculture which possibly has to do with the fact that women are the dominant users of computers on family farms (Mackrell, 2006). On the other hand, the average age of the survey respondents was 55 years which is consistent with the U.S. Census of Agriculture data (54.9 years) (USDA-NASS, 2009).

Regarding characteristics of the business, survey respondents indicated that their operations generate, on average, about \$138,663 in total annual sales (versus \$134,806 for the U.S. census), and that income from their business activities represents 39.4 percent of the individual's total family income compared to 28 percent for the average U.S. farmer (USDA-NASS, 2009). Table 1.2 presents a complete description of the key variables describing respondent and business characteristics.

MarketMaker Registration and Use

Most of the agricultural producers responding to the survey (68 percent) indicated they had registered on the site by themselves, 8 percent indicated they were registered by someone else, and 24 percent did not know how they became enrolled in MarketMaker. This finding may be explained by the fact that, in some

states, sometimes producer lists provided by state departments of agriculture were used to initially populate their MarketMaker databases.

On average, respondents have been registered on the site for 23 months. About 21 percent of respondents have been registered for less than 12 months, 38 percent have been registered between 12 and 24 months, and 41 percent have been registered for more than 24 months (Table 1.2). Producers reported various degrees of intensity with respect to the use of MarketMaker features (see Table 1.3). The features that were most commonly used (sometimes and frequently) are the “log on to check or update profile” (19 percent of users), “search for products” (18 percent), and “search for buyers and sales opportunities” (19 percent). Less commonly used features included “search for business partnerships” which was used sometimes or frequently by about 12 percent of users; “use the buy/sell Forum,” a relatively new feature introduced in 2010 (11 percent); and “find target market for your products” (12 percent). This table also stands to imply that about 58 percent of registered producers could be considered as non-users of MarketMaker, 28 percent were passive users, 12 percent average users and only 1 percent were active users. Thus, efforts should be made to encourage more active use of the website by registered producers.

In relation to the time devoted to the website, producers registered on MarketMaker spend about 21 minutes per month managing their account, with nearly 85 percent of the producers devoting less than 30 minutes per month on MarketMaker-related activities (Table 1.2). Producers were also asked about the type of customers they intended to reach with MarketMaker. Survey results indicate

that 85 percent of agricultural producers use the MarketMaker website to reach individual consumers, 30 percent to connect with business buyers, and 12 percent to contact other producers. Hence, even though a lot of effort by the MarketMaker administrators has been devoted to promote business-to-business activities on the site (Lamie et al., 2011), producers still perceived MarketMaker mainly as a tool to reach individual consumers.

Producers' Perceptions about Impact of MarketMaker

Survey questions related to the impact of MarketMaker asked respondents about its perceived impact on the total number of contacts received due to their participation in the site, total number of new customers gained, and the increase in annual sales since producers registered in the website (Table 1.4). Producers indicated that, as a result of their participation with MarketMaker, they have been contacted, on average, about 2.9 times by customers, input suppliers, and other producers. At the same time, nearly 64 percent of producers in the sample had not received any contacts due to MarketMaker. However, the proportion of producers who had received marketing contacts through MarketMaker in our sample (36 percent) is greater than the 12 percent reported by registered New York producers (Cho and Tobias, 2009).

In terms of the number of new customers gained, respondents indicated that their participation has helped them obtain an average of 1.6 new customers even though 70 percent of the respondents indicated that they have gained no new customers through the site.

Lastly, survey respondents' perceived average annual increase in sales due to MarketMaker was estimated at about \$152, with 75 percent of the participants indicating the increase in annual sales was \$25 or less. The overall increase in annual sales due to MarketMaker in the sample was lower than that found by Cho and Tobias (2009) where the average increase in annual sales assisted by MarketMaker reported by New York producers was between \$225 and \$790. This finding may be due to the fact that our sample combined producers from different states that may have had MarketMaker presence for a shorter period of time than New York or it could reflect the success of New York MarketMaker administrators' marketing and training programs.

Since the statistics discussed previously are values across producers with different characteristics, we also present the values of the perceived impacts of MarketMaker across different types of users.⁷ Figures 1.1 to 1.3 display the perceived number of additional contacts, new customers, and increases in annual sales for groups of users differentiated by the type of registration (Figure 1.1), time registered in MarketMaker (Figure 1.2), and time spent on the site (Figure 1.3). As indicated in the figures, all of the business outcome measures seem to be positively related to self-registration in MarketMaker, the amount of time since registering on the site, and the amount of time users spend on MarketMaker activities. In fact, producers who registered themselves on the MarketMaker website have received, on average, almost twice as many additional contacts and customers than those who were registered by someone. This finding suggests that more education and

⁷ The number of additional contacts, new customers and increase in annual sales for groups of users in Figures 1.1 to 1.3 were calculated using equation (5).

promotion of MarketMaker are needed to encourage self-registration. Moreover, as Figure 1.3 suggests, producers who reported spending between 30 and 60 minutes per month on the MarketMaker website had an average annual sales increase of \$279 compared to only \$51 for those users who spent less than 30 minutes a month on MarketMaker-related activities. This finding suggests that MarketMaker state and national leaders should encourage producers to become more active users of MarketMaker to achieve the desired benefits from participation.

MarketMaker Impact on Direct Sales

The optional section for those producers participating in direct marketing channels—to consumers or wholesale buyers—was completed by 707 agricultural producers which corresponds to about 87 percent of the total respondents. Fifty-one percent of this group of respondents participated in direct marketing to individual consumers, 8 percent in direct marketing to wholesale buyers, and 41 percent participated in direct marketing to both individual consumers and wholesale buyers.

Survey respondents indicated that, as a result of their participation with MarketMaker, they have received, on average, a total of 1.9 additional marketing contacts seeking information about their direct market activities, but the majority of surveyed producers (66 percent) indicated that they have not received any additional marketing contacts through MarketMaker. Average annual increases in direct sales to individual consumers and wholesalers due to participation in MarketMaker was 1.1 percent (76 percent of the sample experienced no increase in this type of sales) and 0.8 percent (88 percent of the sample experienced no

increase in this type of sales), respectively. Therefore, as in the case of the overall impact of MarketMaker on all business activities, the impact of the site on direct marketing activities seems to be perceived by producers as relatively modest so far. A detailed description of the impact of MarketMaker on participants' direct marketing channels is shown in Table 1.5.

Parametric vs. Nonparametric Mean Estimation

Two important points need to be noted regarding the estimation of the parametric and nonparametric means of the variables elicited and reported in intervals. First, the parametric estimate of the mean of every categorical variable was contained in the interval formed by the lower and upper nonparametric estimates of the mean (see Tables 1.2, 1.4, and 1.5). Second, results of the nonparametric analysis indicated that the estimated \hat{F}_k values could be calculated using the "raw" proportions of observations belonging to each category. For example, for the variable total annual sales in Table 1.2, $\hat{F}_1=34.94$ and $\hat{F}_2=34.94+25.32=60.25$. Hence, this result suggests that the nonparametric upper and lower bound of the mean of the distribution can be estimated simply using the raw proportions of the summary data without having to optimize equation (1.6). However, more research is needed to formally prove this empirical finding.

Summary and Conclusions

Although e-commerce is expected to improve agricultural profits, literature on the potential economic impact of e-commerce is very limited. In this study, we present the results of a survey that investigated the impact of the MarketMaker

website on the business performance of agricultural producers. This paper also introduces econometric modeling innovations for the use of parametric and nonparametric procedures for the estimation of the distribution mean of a variable (continuous or discrete) that is only observed to fall in a certain interval. In our context, the calculation of the mean values of the distribution was important for the estimation of aggregate impacts across all site users.

MarketMaker intends to provide marketing information to both producers and consumers in order to facilitate their market interactions. However, survey results indicate that the perceived impact of MarketMaker on various business outcomes—sales, new customers, and marketing contacts—are presently relatively modest. The results of this study also show that the effectiveness of MarketMaker is strongly linked with how it is used by producers. For example, producers who registered themselves on the MarketMaker website have received, on average, almost twice as many additional contacts and customers than those who were registered by someone else. Hence, the best approach to "sell" the site is to actively promote it directly to producers instead of adding names from previously constructed producer lists. Another interesting finding is the positive relation between the amount of time spent on the site and the perceived impact of MarketMaker. The challenge is that only about 13 percent of producers seem to be average or active users of MarketMaker. On average, producers don't spend enough time on activities associated with MarketMaker (21.3 minutes per month) to gain its full benefits. Therefore, the average impact of the website has been moderate so far.

As a result of their participation with MarketMaker, producers have received an average of 2.9 marketing contacts, and have gained an average of 1.6 new customers. Additionally, MarketMaker has assisted farmers and fishermen in increasing their annual sales by an average of \$152. Individual consumers are the main type of customers targeted through MarketMaker activities.

Nearly 87 percent of producers registered on MarketMaker participate in direct marketing to individual consumers and wholesale buyers. MarketMaker has helped these producers receive an average of 2.9 marketing contacts seeking information about their direct-market activities. Also, due to participation in MarketMaker, producers have increased their annual direct sales to individual consumers by 1.1 percent and to wholesale buyers by 0.8 percent on average.

Since these findings are based on the survey questions that only reflect perceived impacts, it is not certain to what extent these perceptions reflect reality. For example, MarketMaker does not currently allow buying and selling of products through the website, thus the only approach to obtain sales data is through producer surveys. In any case, producer support for the site will likely be based on its perceived impact on their businesses; hence, it is recommended that MarketMaker state and national leaders more actively seek to improve their visibility and perceived impact. For instance, MarketMaker could encourage customers—maybe through using coupons—to mention the website in their interaction with producers.

As the logic models developed by Lamie et al. (2011) indicate, the development of the MarketMaker website is a necessary, but not sufficient condition

for the success of MarketMaker. Marketing, promotion, and training that integrate MarketMaker into a broader strategic decision-making context for users is also needed. As states consider the adoption of MarketMaker, they should consider providing dedicated resources not only for site development and maintenance, but also for programmatic development and delivery. This will require some combination of state-level reallocation of existing resources or identification of new resources to deliver more directed training and promotion.

In addition, MarketMaker website development should focus on encouraging initial registration by users themselves and on providing good reasons for users to return to the site to benefit from the additional features that MarketMaker offers. Focus groups conducted with MarketMaker users suggest that the current site could benefit from efforts to package carefully selected elements of the current MarketMaker site to specific user groups to make it more “user-friendly” (Lamie et al., 2011). The current configuration of the site is, perhaps, most useful to user groups that can devote time to the effort. Therein lies a conundrum because household consumers and other direct marketing targets are the least likely to invest time in learning how to use the site, yet producers overwhelmingly hope to use MarketMaker to reach them.

Future work with this dataset will also involve an analysis of the relationship between short-term, medium-term (e.g., time spent on the site and use of futures) and long-term outcomes (e.g., increases in sales) using multivariate statistical techniques. The information obtained from this analysis can be useful in identifying the MarketMaker features that are more likely to result in positive, long-term

outcomes for producers. Additionally, a willingness to pay (WTP) study was conducted to obtain an estimate of the overall economic value that registered producers place on the services received from MarketMaker (see Zapata 2012 for details). We believe that the WTP measure incorporates the value of other benefits of MarketMaker beyond those measured by the metrics presented in this study.

Future work evaluating MarketMaker should compare the results of this study, which uses cross-sectional data, with analyses using longitudinal or panel data in order to better capture the dynamics of MarketMaker users' behaviors (in addition to potential gains in the precision in estimations). In fact, the information generated in this survey can be used as baseline information for these types of future studies.

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Table 1.1. Survey Sample Frame Size, Number of Respondents, and Response Rate by State.

State	Sample Frame Size		Number of Respondents			Response Rate		
	Email	Mail	Email	Mail	Total	Email	Mail	Total
Arkansas	45	25	3	10	13	6.67	40.00	28.89
Colorado	485	219	32	31	63	6.60	14.16	12.99
District of Columbia	6	3	0	0	0	0.00	0.00	0.00
Florida	143	51	28	6	34	19.58	11.76	23.78
Georgia	260	107	22	23	45	8.46	21.50	17.31
Illinois	737	333	61	71	132	8.28	21.32	17.91
Indiana	323	129	40	36	76	12.38	27.91	23.53
Iowa	326	130	32	29	61	9.82	22.31	18.71
Louisiana	148	61	21	13	34	14.19	21.31	22.97
Michigan	326	156	24	33	57	7.36	21.15	17.48
Mississippi	93	34	8	8	16	8.60	23.53	17.20
Nebraska	328	150	13	26	39	3.96	17.33	11.89
New York	753	354	53	67	120	7.04	18.93	15.94
Ohio	361	162	38	38	76	10.53	23.46	21.05
South Carolina	256	116	22	26	48	8.59	22.41	18.75
Total	4590	2030	397	417	814	8.65	20.54	17.73

Table 1.2. Description and Summary Statistics of Respondents Characteristics.

Variable Name (Units)	Category	Category Proportion			Mean		Std. Dev.
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric	
Relationship with the business	Owner	84.93	94.42	89.99			
	Manager	8.99	3.30	5.96			
	Employee	4.06	0.76	2.30			
	Other	2.03	1.52	1.76			
Gender	1=Female	0.49	0.44	0.46		0.46	0.50
	0=Male	0.51	0.56	0.54			
Age						55.05 ^a	12.93
Total annual sales (\$1,000)	Less than \$10	36.80	33.24	34.94	(96.59, 195.29)	138.66	244.93
	\$10 to \$50	21.36	28.92	25.32			
	\$50 to \$100	14.24	12.43	13.30			
	\$100 to \$250	11.28	12.16	11.74			
	\$250 to \$500	6.23	4.05	5.09			
	\$500 to \$1,000	3.86	9.19	6.65			
	Over \$1,000	6.23	0.00	2.97			
Share of total family income from farming (%)	Less than 10	34.90	32.04	33.39	(34.85, 43.99)	39.42	36.30
	10 to 20	13.42	14.07	13.77			
	21 to 30	7.72	8.38	8.07			
	31 to 40	4.70	5.09	4.91			
	41 to 50	6.38	5.39	5.85			
	51 to 60	3.02	2.69	2.85			
	61 to 70	2.68	1.50	2.06			
	71 to 80	4.70	3.29	3.96			
	81 to 90	6.04	5.09	5.54			
91 to 100	16.44	22.46	19.62				
Time registered on MarketMaker (Months)	Less than 1	2.20	1.48	1.81	(18.35, 29.59)	23.48	13.72
	1 to 6	13.66	2.59	7.65			
	7 to 12	18.50	5.93	11.67			
	12 to 24	37.44	38.15	37.83			
	24 to 36	16.74	25.93	21.73			
	36 to 48	7.49	17.41	12.88			
	More than 48	3.96	8.52	6.44			

Table 1.2. Description and Summary Statistics of Respondents Characteristics.
(Continued)

Variable Name (Units)	Category	Category Proportion			Mean		Std. Dev.
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric	
Time spent on MarketMaker activities (Minutes/month)	Less than 30	81.30	88.29	84.60	(8.52, 42.33)	21.30	17.95
	30 to 60	13.91	8.29	11.26			
	61 to 120	1.74	2.93	2.30			
	121 to 300	2.61	0.00	1.38			
	121 to 300	0.00	0.49	0.23			
More than 600	0.43	0.00	0.23				

^aThe average age of the Email and mail survey respondents was 52.91 years and 57.08 years, respectively.

Table 1.3. MarketMaker Features and their Rate of Use by Producers.

Feature	Never	Rarely	Sometimes	Frequently
Log on to Check or Update Profile (such as adding new information, photos, social media links, business contacts, alerts, etc.)	0.38	0.44	0.17	0.02
Search for Products	0.50	0.31	0.16	0.02
Search for Business Partnerships (e.g., to find other companies to sell products)	0.60	0.28	0.11	0.01
Search for Buyers and Sales Opportunities	0.50	0.31	0.17	0.02
Find a Target Market for Your Products (e.g., using demographic data, food consumption data)	0.59	0.29	0.11	0.02
Use the Buy/Sell Forum	0.65	0.24	0.09	0.02
Other	0.85	0.11	0.02	0.01

Table 1.4. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales as a Result of Participating in MarketMaker.

Variable Name (Units)	Category	Category Proportion			Mean		Std. Dev.
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric	
Marketing contacts	0	63.53	64.86	64.17	(1.41, 4.47)	2.90	5.79
	1 to 9	29.48	27.16	28.35			
	10 to 20	4.86	5.43	5.14			
	21 to 30	2.13	0.96	1.56			
	31 to 40	0.00	0.96	0.47			
	41 to 50	0.00	0.32	0.16			
	More than 50	0.00	0.32	0.16			
New customers	0	71.20	69.08	70.15	(1.00, 2.40)	1.62	3.39
	1 to 5	20.06	19.74	19.90			
	6 to 10	7.12	7.89	7.50			
	11 to 20	0.97	2.30	1.63			
	More than 20	0.65	0.99	0.82			
Annual sales	Under \$25	74.64	74.43	74.54	(81.94, 258.18)	151.65	732.11
	\$25 to \$50	6.79	6.11	6.46			
	\$51 to \$75	2.50	2.29	2.40			
	\$76 to \$99	5.36	2.67	4.06			
	\$100 to \$499	7.14	8.40	7.75			
	\$500 to \$999	2.14	3.05	2.58			
	\$1,000 to \$4,999	1.07	2.67	1.85			
	\$5,000 to \$9,999	0.00	0.00	0.00			
More than \$10,000	0.36	0.38	0.37				

Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Table 1.5. Perceived MarketMaker Impact on Direct Marketing Activities.

Variable Name (Units)	Category	Category Proportion			Mean		Std. Dev.
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric	
Marketing contacts	0	62.79	68.52	65.57	(1.22, 2.78)	1.89	3.79
	1 to 5	23.84	17.90	20.96			
	6 to 10	8.72	11.11	9.88			
	11 to 20	2.91	1.85	2.40			
	More than 20	1.74	0.62	1.20			
Increase in annual direct sales to individual consumers	0%	76.19	78.03	77.16	(0.63, 1.71)	1.14	3.33
	1% to 5%	17.58	18.36	17.99			
	6% to 10%	3.66	2.95	3.29			
	11% to 20%	1.47	0.66	1.04			
	21% to 40%	0.73	0.00	0.35			
	Over 40%	0.37	0.00	0.17			
Increase in annual direct sales to wholesalers	0%	84.11	90.40	88.30	(0.54, 1.16)	0.80	3.22
	1% to 5%	8.61	5.30	6.40			
	6% to 10%	4.64	3.64	3.97			
	11% to 20%	1.32	0.66	0.88			
	21% to 40%	0.66	0.00	0.22			
	Over 40%	0.66	0.00	0.22			

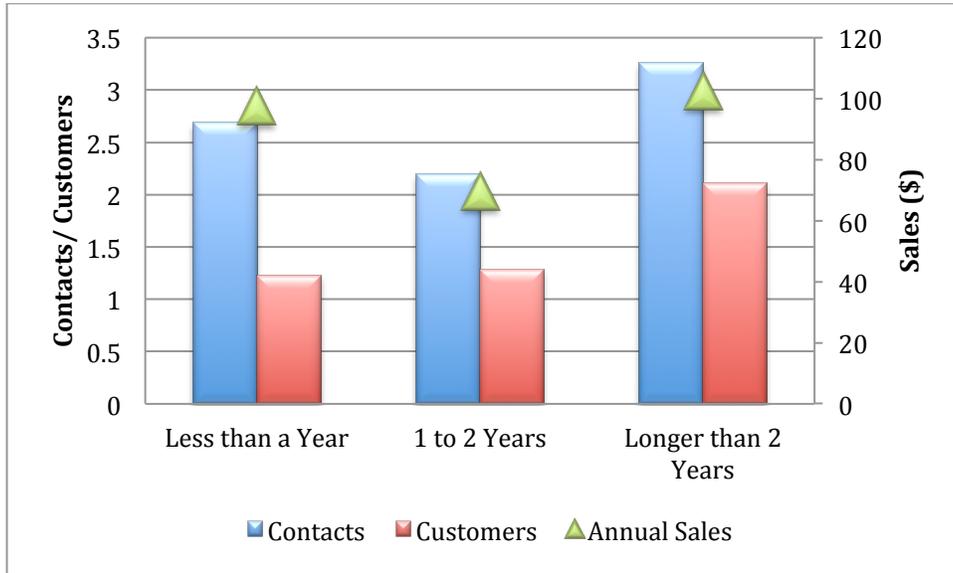
Note: Marketing contacts refers to the total contacts gained since the producer became registered on the MarketMaker website.

Figure 1.1. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Registration Type.



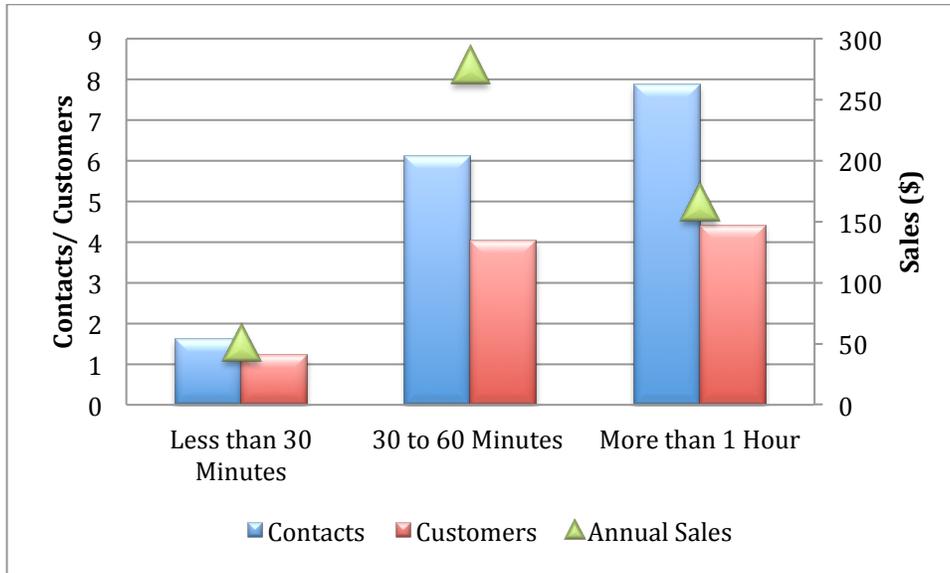
Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Figure 1.2. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Time Registered in MarketMaker.



Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Figure 1.3. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Time Spent (Monthly) on Activities Associated with MarketMaker.



Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Chapter 2.

Producers' Willingness to Pay for the Services Provided by an Electronic Trade Platform: The Case of MarketMaker

The main objective of this chapter is to assess the economic benefits of an Electronic Trade Platform⁸ (i.e., MarketMaker) on agricultural producers. Specifically, contingent valuation methods are employed to estimate the economic value (i.e., willingness to pay, WTP) that producers⁹ registered in MarketMaker place on the services received from this trade platform. We also evaluate the effect of producers' characteristics and perceptions on producers' economic valuation of the site.

Methods and Procedures

Since the main goal of this study is to estimate the economic benefits of MarketMaker for registered producers and since registration is free (except for the value of time spent on the site), we employed contingent valuation methods for the estimation of these non-priced benefits. Contingent valuation methods can be used to estimate the economic value of a novel input or a non-market input such as the services provided by MarketMaker because the amount of money a producer is willing to pay for an improvement in the quality of a production factor represents

⁸ Electronic Trade Platforms are electronic systems that support the marketing, selling, buying, and servicing of products by matching vendors and buyers, providing intermediate trading transactions up to contract conclusion, and/or by providing the legal and technical institutional infrastructure and environment that facilitates these interchanges (Fritz et al., 2005).

⁹ Agricultural producers include both farmers and fishermen.

the difference in profits before and after the improvement (Zapata 2012a). Moreover, the WTP measure has the potential to incorporate other benefits attributed to the use of MarketMaker beyond the increase in profits due to the improvement of the marketing input such as the value of networking and collaboration between participants. For example, MarketMaker can be used as a tool to facilitate business to business (B2B) collaboration that can take on many forms. It can also be used to facilitate competitor analysis or to target new markets through its market research features.

The use of contingent valuation techniques to estimate the economic value of non-market goods and services is well known. Through the years, contingent valuation has been widely used in the assessment of individuals' WTP for environmental services for which market prices are not well defined (Carson et al., 1995; Boyle, 2003; Carson and Hanemann, 2005; Zapata et al., 2012). More recently, contingent valuation methods have been used in health economics (Diener et al., 1998; Krupnick et al., 2002), real estate appraising (Breffle et al., 1998; Banfi et al., 2008; Lipscomb, 2011), art valuation (Thompson et al., 2002), agricultural extension services (Whitehead et al., 2001, Budak et al., 2010), and agribusiness (Patrick, 1988; Kenkel and Norris, 1995; Hudson and Hite, 2003).

In the following sections we present the theoretical underpinning of producers' WTP for the services provided by MarketMaker. We also describe the survey instrument used to capture producers' characteristics and perceptions regarding the economic impact of the site on their business performance, as well as the WTP questions and elicitation methodology employed. The econometric

methods used to estimate the covariates mean values and to model the producers' WTP measure are presented at the end of this section.

Theoretical Framework

The WTP model presented here is developed within the context of the neoclassical theories of utility maximization and profit maximization as shown in Hanemann et al. (1991) and in Zapata (2012a). More specifically, the variation function or producers' WTP for non-market inputs or technologies is derived using the individual's indirect utility function in combination with the firm's profit function.

In the context of this study, the adoption of MarketMaker can be thought of as an improvement in the quality of an aggregate marketing input. In fact, a recent study by Zapata et al. (2011) found that the majority of producers registered in MarketMaker used the MarketMaker website to reach individual consumers (rather than facilitating effective B2B communication). Other justification to conceive the adoption of MarketMaker as an upgrading in the quality of an aggregate marketing input and not as an additional input is based on the theoretical properties of the production function. Specifically, under the strict essentiality property, production requires the utilization of positive amounts of all inputs (Chambers, 1988 , p.9), thus from the theoretical standpoint the adoption of a novel input (i.e., MarketMaker) cannot be thought as the inclusion of the novel input as a separate input in the production process.

Suppose that the individual maximizes utility $U(\mathbf{Z})$, where \mathbf{Z} is a vector of goods consumed, subject to income constraint. It is further assumed that part of her

income (i.e., non-labor income) comes from the profits she generates in a production process independent of individual preferences. The solution to the problem yields the indirect utility function $V \left[\bar{m} \left(\Pi(p_y, \mathbf{r}, \mathbf{q}) \right), L, \mathbf{P}_z \right]$, where \bar{m} and L are individual's non-labor and labor income, respectively, $\Pi(\cdot)$ is the profit function, p_y is the price of produced output, \mathbf{r} is a vector of input prices, \mathbf{q} is a vector of exogenous input quality levels, and \mathbf{P}_z is the vector price of the goods or services consumed. Now consider a change in the input quality level \mathbf{q} from \mathbf{q}^0 to \mathbf{q}^1 . In this context, the producers' WTP is the amount of money that makes the following condition to hold: $V \left[\bar{m} \left(\Pi(p_y, \mathbf{r}, \mathbf{q}^0) \right), L, \mathbf{P}_z \right] = V \left[\bar{m} \left(\Pi(p_y, \mathbf{r}, \mathbf{q}^1) \right) - WTP, L, \mathbf{P}_z \right]$.

If non-labor income (\bar{m}) is a linear function of profits (Π) then the producers' WTP is also a linear function of the difference in profits and can be simplified to:

$$(2.1) \quad WTP = \Pi(p_y, \mathbf{r}, \mathbf{q}^1) - \Pi(p_y, \mathbf{r}, \mathbf{q}^0).$$

Consequently, the maximum amount of money a producer is WTP for improvements in the input quality levels reduces to the difference between the *ex post* (after adopting the new input) and *ex ante* (before adopting the new input) firm's profit levels. The next section explains the survey design and implementation strategies used to collect data from MarketMaker-using producers.

Survey Description

Survey design and implementation for the producers' survey is explained in detail in Chapter 1 of this report. However, it is important to mention that the analyses in this Chapter only use survey data collected from the states that agreed to use the full survey instrument (see Appendix A) which included the WTP questions.

The full survey instrument was initially distributed by email to 1,446 producers¹⁰ registered on MarketMaker websites in Arkansas, Florida, Georgia, Indiana, Iowa, Mississippi, and South Carolina. In February 2012, a second round of surveys was mailed to a subsample of 592 producers with the purpose of increasing the number of responses. Traditional mail was used in the final round of surveys to capture the responses of those producers who may be less familiar with using computers and the Internet.

As explained in Chapter 1, the questionnaire was divided in 4 sections. Producers' WTP questions were included at the end of the third section of the full version of the survey instruments as shown in Appendix A.

The overall response rate of the email survey was 8.9 percent and it generated 129 usable observations. The mail survey generated 98 additional responses and had an overall response rate of 16.6 percent. The aggregated response rate of the study was 15.7 percent with 227 usable observations. The sample frame size, number of respondents and response rate by MarketMaker participant state and survey type are shown in Table 2.1. The states with the highest response rate were Arkansas (24.5 percent) and Florida (21.0 percent), and those with the lowest response rate were Mississippi (11.8 percent) and South Carolina (12.5 percent).

¹⁰ Ninety seven percent of producers registered on the website are farmers, 1 percent are fishermen, and 2 percent are both farmers and fishermen.

WTP questions

The producer WTP question was asked using a double-bounded (DB) elicitation format. Using the appropriate elicitation approach has always been a major concern. In recent years, the DB elicitation format has virtually supplanted single-bounded (SB) and open-ended (OE) formats mainly because it reduces the strategic bias present in the OE method (Hanemann, 1994; Boyle, 2003); and it provides more efficient estimates of central tendency compared to the SB format (Hanemann et al., 1991).¹¹ Two rounds of questions were presented to each participant, the initial bid amount was randomly assigned among respondents and the second bid amount depending on their answers to the first question (higher if participant responded “yes” to the initial bid and lower if participant responded “no” to the initial bid).

The initial bids used were \$25, \$50, \$75, \$100, \$150, and \$200. The corresponding follow-up annual bids were \$15, \$25, \$50, \$75, \$100, and \$150 when the initial response was a “no”, and \$50, \$75, \$100, \$150, \$200, and \$250 when the initial response was a “yes”. The different bids used in the WTP questions were chosen based on the responses to an OE question obtained in a focus group early in November 2010 (producers’ mean WTP value estimated at \$65), previous studies evaluating the site and consultation with MarketMaker administrators in several states.

¹¹ One limitation of the DB elicitation format is the use of predetermined bids, which could cause anchoring (Boyle, 2003). In addition, a tendency in respondents to answer “yes” to any bid amount presented to them regardless of their true views has been found in some studies (Berrens et al., 1997; Blamey et al., 1999).

The WTP question was preceded by a brief statement that clearly describes the current funding situation of MarketMaker and the possibility that it may become privately funded in the future. An annual participation fee was used as the payment vehicle. The wording and payment vehicle used in the survey were previously tested in a focus group along with two alternative WTP question options. The other two WTP question alternatives involved a more extensive description of the current and future funding situation of MarketMaker. The other payment vehicle considered was an annual voluntary donation. All participants agreed that the scenarios described in the different WTP questions were very realistic and that the WTP question employed in the survey was the most clearly understood and therefore would likely generate the highest level of response. Specific initial and follow-up questions presented to the participants are also found in the full surveys provided in Appendix A.

Econometric Methods

The estimation of the producer WTP for the services provided by MarketMaker was based on the methods proposed by Cameron (1988). Let WTP_i be the unobserved true amount that respondent i is willing to pay. In the DB elicitation format every respondent i is presented with an initial bid B_i and asked if she is willing to pay that amount. If the respondent answers “yes” to the first bid, a second WTP question is asked using a higher bid amount B_i^u . If the respondent answers “no” to the first bid, the second WTP question used a lower bid B_i^l . The respondent will answer ‘yes” to the initial amount if $WTP_i \geq B_i$, and “no” to the second bid amount if $WTP_i < B_i^u$. Similarly, the respondent will answer ‘no” to the initial

amount if $WTP_i < B_i$, and “yes” to the second bid amount if $WTP_i \geq B_i^l$. Using the same logic, it is easy to show that the respondent will answer “yes” to both questions if $WTP_i \geq B_i^u$, and “no” to both questions if $WTP_i < B_i^l$. Therefore, the probability that a respondent answers “yes” to both questions (π^{yy}) can be represented by

$$(2.2) \quad \begin{aligned} \pi^{yy}(B_i, B_i^u) &= Pr\{WTP_i \geq B_i \text{ and } WTP_i \geq B_i^u\} = Pr\{WTP_i \geq B_i^u\} \\ &= 1 - G(B_i^u; \boldsymbol{\theta}) \end{aligned}$$

where $G(\cdot; \boldsymbol{\theta})$ is the cumulative density function (CDF) of some statistical distribution with parameter vector $\boldsymbol{\theta}$. The probability that a respondent answers “no” to both questions (π^{nn}) is given by

$$(2.3) \quad \begin{aligned} \pi^{nn}(B_i, B_i^l) &= Pr\{WTP_i < B_i \text{ and } WTP_i < B_i^l\} = Pr\{WTP_i < B_i^l\} \\ &= G(B_i^l; \boldsymbol{\theta}). \end{aligned}$$

Similarly, the probability that a respondent answers “yes” to the first question and “no” to the second question (π^{yn}) is given by

$$(2.4) \quad \pi^{yn}(B_i, B_i^u) = Pr\{B_i \leq WTP_i < B_i^u\} = G(B_i^u; \boldsymbol{\theta}) - G(B_i; \boldsymbol{\theta}).$$

Finally, the probability that a respondent answers “no” to the first question and “yes” to the second question (π^{ny}) is given by

$$(2.5) \quad \pi^{ny}(B_i, B_i^l) = Pr\{B_i^l \leq WTP_i < B_i\} = G(B_i; \boldsymbol{\theta}) - G(B_i^l; \boldsymbol{\theta}).$$

Given a sample of N individuals, the log-likelihood function can be represented by

$$(2.6) \quad \begin{aligned} \ln L(\boldsymbol{\theta}) &= \sum_{i=1}^N \{(I_{1i})(I_{2i}) \ln \pi^{yy}(B_i, B_i^u) \\ &\quad + (1 - I_{1i})(1 - I_{2i}) \ln \pi^{nn}(B_i, B_i^l) \\ &\quad + (I_{1i})(1 - I_{2i}) \ln \pi^{yn}(B_i, B_i^u) \end{aligned}$$

$$+ (1 - I_{1i})(I_{2i}) \ln \pi^{ny}(B_i, B_i^l)\},$$

where I_{ji} , $j=1,2$, are indicator variables such that I_{ji} is equal to 1 if the i^{th} respondent answers “yes” to the j^{th} question and equal to zero otherwise. The different CDF of the distributions considered in this study are discussed in detail in Zapata (2012b).

Explanatory variables can be introduced in the maximum likelihood estimation by modeling some elements of the parameter vector θ as a function of specific covariates. For example, under the log-logistic distribution the parameter μ can be expressed as $\mu = \mathbf{X}_i\beta$, where \mathbf{X}_i is a vector of covariates (including 1 for the intercept) and β the corresponding vector of parameters. Moreover, the inclusion of explanatory variables and additional parameters in the modeling process allows the estimation of the conditional mean WTP ($E(WTP|\mathbf{X}_i)$) and the corresponding marginal effects (see Table 2.2).

The marginal effects for continuous variables are estimated by taking the partial derivative of the conditional mean function w.r.t. the covariate of interest (i.e., $\frac{\partial E(WTP|\mathbf{X}_i)}{\partial x_j}$). For discrete variables (with values of 0 or 1), the marginal effects are given by the change in the conditional mean WTP from a change in the discrete variable from 0 to 1 holding all other variables fixed as suggested by Cameron and Trivedi (2005, p.124) (i.e., $E(WTP|\mathbf{X}_i, x_{ij} = 1) - E(WTP|\mathbf{X}_i, x_{ij} = 0)$). The marginal effects presented in this paper were calculated as the average marginal effects across the N producers in the sample. The standard errors of the mean WTP, coefficient estimates (β) and marginal effects were estimated using the

bootstrapping procedure outlined by Cameron and Trivedi (2005, p.362). A total of 1000 replications were used to generate the standard errors.

It was assumed that producers' WTP for the services provided by MarketMaker can be explained by producers' characteristics and perceptions. To this end, registration type with MarketMaker, time producers have been registered on the site, time spent on MarketMaker activities, type of user based on usage frequency, number of marketing contacts received due to participation on MarketMaker, total number of new customers gained, increase in annual sales attributed to MarketMaker and size of operation in terms of total annual sales were included in the producers' WTP maximum likelihood modeling process. In particular, variables measuring participation characteristics (i.e., time registered on the site, time spent on MarketMaker activities and type of user) and perceived impacts of MarketMaker (i.e., number of marketing contacts received, new customers gained and increase in annual sales) were considered as covariates in the modeling process because they were identified as quantifiable indicators of an effective participation on MarketMaker based on the producers' logic model developed by Lamie et al. (2011). The other variables, registration type and total annual sales, were included in the maximum likelihood estimation to relate the benefits generated by MarketMaker to specific producers' characteristics. An indicator variable (i.e., survey type) was also included in the estimation to control for differences between email and mail surveys' responses. The categorical variables: time registered on MarketMaker, time spent on MarketMaker activities, marketing contacts received, new customers gained, increase in annual sales

attributed to MarketMaker, and total annual sales were transformed to “continuous” by using the mid-point of each range. The explanatory variables registration and user type were included as dummy variables. Producers who reported that they frequently or sometimes use at least one feature of MarketMaker were coded as active user of the site and those who rarely or never use any feature of MarketMaker were coded as passive users.

Six statistical distributions were considered in the modeling of the producer WTP for the services provided by MarketMaker including the normal, Weibull, log-normal, exponential, log-logistic and gamma distributions. The model that “best fitted” the data was selected using the Akaike information criterion corrected for finite sample sizes (AICC) (Hurvich and Tsai, 1989). The AICC is a log-likelihood based model selection criterion with degrees of freedom adjustment. Given a data set and several candidate models, the model with the smallest AICC is preferred¹².

Results

Summary Statistics

Survey results indicate that nearly 97 percent of the respondents were the owners or the managers of the business. This finding gives more credibility to their answers concerning the characteristics of the operation and the impact of MarketMaker on their business performance. Regarding characteristics of the business, survey respondents indicated that their operations generate, on average,

¹² Even though the Akaike information criterion is not a formal test to discriminate between different models, it is commonly used to compare the type of parametric models employed in this study (e.g., Baghestani et al. 2010; Shauly et al., 2011; Garcia-Aristizabal et al. 2012).

about \$100,090 in total annual sales (versus \$134,806 for the U.S. census). Table 2.3 presents a complete description of the key variables describing respondent and business characteristics. Overall, these survey results are very similar to those presented in Chapter 1. However, it is important to reiterate the fact that the sample of producers used in this Chapter differs from the sample used in Chapter 1 since the full version of the survey including the WTP was not sent to all the states participating in this study.

Participants' responses to the initial and follow-up WTP question are presented in Table 2.5. This table suggests that the producer WTP for the services provided by MarketMaker is less than \$200 for 96 percent of the respondents. As expected, the share of individual accepting to pay a particular bid amount decreases as the bid asked increases (Table 2.5). For example, as the initial bid amount increases from \$25 to \$200 the "yes" responses to the first contingent question fall from 28 percent to 6 percent. When a second higher bid is asked, the "yes" responses fall from 7 percent to 0 percent at \$250.

WTP Estimation Results

The different statistical distributions considered in this study and their corresponding maximized log-likelihood and AICC are presented in Table 2.6. This table suggests that the preferred distribution is the log-logistic distribution¹³. Therefore, the log-logistic distribution was employed to estimate the mean producer WTP for the services provided by MarketMaker, and the marginal effects of each covariate in the model. The explanatory variables *total number of new customers*

¹³ In general, the mean and marginal effect estimates were robust across the different candidate models considered in this study.

gained and *increase in annual sales due to MarketMaker* were excluded from the models because they were found to be highly correlated with the total number of contacts received due to MarketMaker. There was also considerable correlation between these two variables. The mean WTP and the marginal effect of each explanatory variable were estimated using the specific formulas presented in Table 2.2. Maximum likelihood estimation results are reported in Table 2.7.

Registration type, time registered on MarketMaker, time devoted to the website, type of user, the number of marketing contacts received and firm total annual sales were found to have a significant effect on the WTP for the serviced provided by MarketMaker (Table 2.7). The estimated marginal effects of explanatory variables indicate that producers who registered themselves on MarketMaker are willing to pay \$26.52 per year less for the services received from MarketMaker than those who were registered by someone else or do not know how they were enrolled in the site. This may reflect the fact that the benefits producers obtain from MarketMaker are the same regardless of how they were registered in the site. Therefore, self-registered producers will have a lower WTP for the services they received from MarketMaker given that they have put more effort (implying that they paid more in terms of their time) registering in the site as compared to those who were registered by someone else or do not know how they were registered in MarketMaker.

Results also suggest that producers' WTP increases by \$0.55 for each additional month the producer has been registered on the site. This finding suggests that the benefits associated to participating on MarketMaker are positively related

to the time registered to the site. Other variables used to measure MarketMaker usage by participants were also found to be related to producers' valuation of the site. Specifically, each additional minute per month spent on the MarketMaker website increases the annual WTP by \$0.10 and active users of the site are willing to pay \$24.95 more per year than their passive counterparts.

The number of perceived marketing contacts received due to their participation with MarketMaker, as expected, has a positive effect on producer WTP for the services provided by MarketMaker. Each additional perceived marketing contact received increases the annual WTP by \$1.27. Since marketing contacts are potential sales, the more contacts received due to MarketMaker the higher the likelihood that at least some of them will result in actual sales that might be translated into higher WTP.

In terms of the effects of business characteristics on producers' valuation of MarketMaker, results indicate that a \$1,000 increase in total annual sales is expected to increase the annual WTP by only \$0.02. Thus the difference in annual WTP between a producer who generates \$100,000 in total annual sales and one that generates \$50,000 in total annual sales is just \$1. This suggests that producers' WTP for the services provided by MarketMaker is nearly constant across producers' annual sales levels.

Finally, producers who were surveyed using the online questionnaire are willing to pay \$26.33 more than those who responded to the mail survey. This finding could reflect the fact that producers who responded to the email survey are

more exposed to and conscious of electronic technologies such as MarketMaker compared to those who preferred to respond to the traditional survey form.

Results from the unconditional maximum likelihood model (when no regressors are included in the model) in conjunction with the formulas for the unconditional log-logistic mean and median presented in Table 2.2 were used to calculate mean and median annual WTP for the services received from MarketMaker.¹⁴ The average annual producers' WTP for the services provided by MarketMaker was estimated at \$47.02 with a standard error of \$16.94. The median annual producer WTP for the services provided by MarketMaker is \$15.23.

The estimated average annual producer WTP can be used to estimate the aggregate value that registered producers place on the services received from MarketMaker by multiplying the estimated mean annual WTP times the 7,698 producers currently registered at the national level. Thus, the estimated annual aggregate producer' WTP is \$361,960 (standard error of \$130,404).

Summary and Conclusions

Despite the touted potential of E-commerce to improve profits in agriculture, the literature on the economic impact of E-commerce in agribusinesses is very limited. The main goal of this study was to assess the economic benefits of an Electronic Trade Platform (i.e., MarketMaker) on registered producers. Contingent valuation methods using online and mail surveys were employed to estimate the economic value that registered producers place on the services received from

¹⁴ The estimated location and scale parameters (standard error) from the unconditional maximum likelihood estimation are $\mu = 2.7231$ (0.1589) and $\sigma = 0.7324$ (0.0844), respectively.

MarketMaker. Estimation of the WTP model was carried out using parametric maximum likelihood estimation procedures.

The WTP estimation results indicate that, on average, producers are willing to pay \$47.02 annually for the services they receive from MarketMaker. This value is a measure of the increase in annual profits attributed to the use of MarketMaker. The estimated aggregate annual economic value that registered producers place on the services provided by MarketMaker is \$361,960. It is important to emphasize that the aggregate estimate of the economic impact of MarketMaker might represent only a portion of the total benefits generated by MarketMaker given that there are other users of the site not considered in the analysis such as consumers, retailers, wholesalers, chefs/restaurants and farmers markets.

Understanding producers' valuation of MarketMaker is necessary for ensuring the efficient allocation of resources dedicated for its support and development. This information could also be useful to government officials and MarketMaker administrators to justify the expenditure of public funds on the operational and development costs associated with the MarketMaker website. Since its creation in 2000, MarketMaker has offered its electronic infrastructure and resources to registered users at no cost. Hence, the estimated WTP function and its features (e.g. mean and median) could also be used as a guide if a participation fee is imposed in the future.

Empirical results indicate that registration type, time registered on MarketMaker, time devoted to the website, type of user, the number of marketing contacts received and firm total annual sales have a significant effect on producers'

WTP for the services provided by MarketMaker. In particular, those producers who registered by themselves are willing to pay nearly \$26 less per year than their counterparts. This lower WTP could be attributed to the fact that the benefits associated with participation are similar regardless of how producers registered on the site, thus a self-registered producer that have put more time and effort registering in the site is expected to have a lower WTP. Empirical results also show that the effectiveness of MarketMaker is strongly linked with how it is used by producers. For example, a higher WTP is positively related to the time devoted to MarketMaker activities and active users of the site. These findings suggest that MarketMaker leaders should encourage producers to become more active users of the site to achieve the desired benefits from participation. Another interesting result is the positive relation between the time producers have been registered on the site and the stated WTP, implying that the benefits associated with MarketMaker tend to be higher as the users become familiar with the functioning of the site.

Results also indicate that each additional marketing contact received due to their participation with MarketMaker is expected to increase their annual WTP by \$1.27. Hence, with the aim to increase the number of marketing contacts received, MarketMaker website development should focus on encouraging producers to frequently update their site profiles, specifically their contact information (phone number, Email, website URL) and products' attributes and availability. Although statistically significant, the benefits generated by MarketMaker are nearly constant across firms of different size as measured by annual sales levels. Given that some marketing contacts might be generated through MarketMaker without the producer

understanding that MarketMaker was the source of the contact, efforts should be made to enhance the contact tracking and attribution capabilities of MarketMaker.

Lastly, producers that were surveyed using the mail questionnaire had a lower WTP for the services provided by MarketMaker than those who replied to the email version. This may imply that producers who preferred to respond the mail survey are less aware and familiar with electronic technologies. Hence, MarketMaker administrators should consider devoting additional time and effort not only for site development and maintenance, but also to the delivering of tailored training and promotion.

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Table 2.1. Survey Sample Frame Size, Number of Respondents, and Response Rate by State.

State	Sample Frame Size		Number of Respondents			Response Rate		
	Email	Mail	Email	Mail	Total	Email	Mail	Total
Arkansas	45	25	3	8	11	6.67	32.00	24.44
Florida	143	51	27	3	30	18.88	5.88	20.98
Georgia	260	107	18	16	34	6.92	14.95	13.08
Indiana	323	129	34	25	59	10.53	19.38	18.27
Iowa	326	130	27	23	50	8.28	17.69	15.34
Mississippi	93	34	7	4	11	7.53	11.76	11.83
South								
Carolina	256	116	13	19	32	5.08	16.38	12.50
Total	1,446	592	129	98	227	8.92	16.55	15.70

Table 2.2. CDF, Parameterization, Conditional and Unconditional Mean, Median and Marginal Effects of the Log-logistic Distribution.

		Formula
$G(B; \boldsymbol{\theta})^a$		$\left\{1 + \exp\left[-\frac{\log(B) - \mu}{\sigma}\right]\right\}^{-1}$
Parameterization		$\mu = \mathbf{X}_i \boldsymbol{\beta}$
Mean:	Unconditional: $E(WTP)$	$\exp(\mu)\Gamma(1 + \sigma)\Gamma(1 - \sigma)$
	Conditional: $E(WTP \mathbf{X}_i)$	$\exp(\mathbf{X}_i \boldsymbol{\beta})\Gamma(1 + \sigma)\Gamma(1 - \sigma)$
Median		$\exp(\mu)$
Marginal Effect:	Continuous	$\beta_j \exp(\mathbf{X}_i \boldsymbol{\beta})\Gamma(1 + \sigma)\Gamma(1 - \sigma)$
	Discrete	$\exp(\mathbf{X}_i \boldsymbol{\beta})\Gamma(1 + \sigma)\Gamma(1 - \sigma)[1 - \exp(-\beta_j)] _{x_{ij}=1}$

^a μ and σ denote the location and scale parameter, respectively.

Table 2.3. Description and Summary Statistics of Respondents Characteristics and Perceptions.

Variable Name (Units)	Category	Category Proportion			Mean	
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric (Standard Deviation)
Total annual sales (\$1,000)	Less than \$10	42.64	40.82	41.85	(72.73, 144.71)	100.09 (217.02)
	\$10 to \$50	26.36	32.65	29.07		
	\$50 to \$100	13.95	8.16	11.45		
	\$100 to \$250	5.43	11.22	7.93		
	\$250 to \$500	5.43	2.04	3.96		
	\$500 to \$1,000	0.00	5.10	2.20		
	Over \$1,000	6.20	0.00	3.52		
Time registered on MarketMaker (Months)	Less than 1	1.55	0.00	0.88	(16.70, 28.08)	22.02 (11.56)
	1 to 6	10.08	1.02	6.17		
	7 to 12	10.85	4.08	7.93		
	13 to 24	55.81	52.04	54.19		
	25 to 36	13.95	20.41	16.74		
	37 to 48	5.43	16.33	10.13		
	More than 48	2.33	6.12	3.96		
Time spent on MarketMaker activities (Min/month)	Less than 30	79.84	86.73	82.82	(11.02, 46.75)	21.99 (18.39)
	30 to 60	14.73	8.16	11.89		
	61 to 120	2.33	4.08	3.08		
	121 to 300	2.33	0.00	1.32		
	301 to 600	0.00	1.02	0.44		
Marketing contacts attributed to MarketMaker	0	66.38	69.39	67.76	(1.30, 4.00)	2.65 (5.55)
	1 to 9	25.86	24.49	25.23		
	10 to 20	5.17	4.08	4.67		
	21 to 30	2.59	0.00	1.40		
New customers attributed to MarketMaker	0	69.72	71.43	70.53	(1.04, 2.44)	1.65 (3.47)
	1 to 5	19.27	18.37	18.84		
	6 to 10	9.17	7.14	8.21		
	11 to 20	0.92	2.04	1.45		
	More than 20	0.92	1.02	0.97		

Table 2.3. Description and Summary Statistics of Respondents Characteristics and Perceptions (continued).

Variable Name (Units)	Category	Category Proportion			Mean	
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric (Standard Deviation)
Annual sales attributed to MarketMaker	Under \$25	73.79	80.61	77.11	(148.05, 393.87)	221.30 (1,076.90)
	\$25 to \$50	5.83	4.08	4.98		
	\$51 to \$75	1.94	1.02	1.49		
	\$76 to \$99	4.85	1.02	2.99		
	\$100 to \$499	7.77	6.12	6.97		
	\$500 to \$999	3.88	3.06	3.48		
	\$1,000 to \$4,999	0.97	3.06	1.99		
	\$5,000 to \$9,999	0.00	0.00	0.00		
	More than \$10,000	0.97	1.02	1.00		

Note: Marketing contacts and new customers refer to the total contacts received and customers gained since the producer became registered on the MarketMaker website.

Table 2.4. MarketMaker Features and their Rate of Use by Producers.

Feature	Never	Rarely	Sometimes	Frequently
Log on to Check or Update Profile (such as adding new information, photos, social media links, business contacts, alerts, etc.)	0.29	0.53	0.15	0.02
Search for Products	0.46	0.34	0.18	0.03
Search for Business Partnerships (e.g., to find other companies to sell products)	0.60	0.30	0.10	0.01
Search for Buyers and Sales Opportunities	0.49	0.31	0.18	0.02
Find a Target Market for Your Products (e.g., using demographic data, food consumption data)	0.59	0.30	0.10	0.01
Use the Buy/Sell Forum	0.65	0.22	0.11	0.02

Table 2.5. Response Frequency by Initial Bid Amount.

Initial amount	Sample Size	Decision			
		No, No	No, Yes	Yes, No	Yes, Yes
25	46	29	4	10	3
50	34	23	6	4	1
75	43	34	4	5	0
100	46	39	1	5	1
150	24	21	2	0	1
200	34	30	2	2	0

Table 2.6. AICC by Statistical Distribution.

Distribution	Log-Likelihood	AICC
Normal	-166.1	351.6
Weibull	-163.6	345.9
Log-normal	-160.3	339.4
Exponential	-170.1	356.8
Log-logistic	-159.4	337.6
Gamma	-165.2	349.1

Table 2.7. Coefficient and Marginal Effect Estimates.

Variable	Coefficient	Standard Error	Marginal Effect	Standard Error
Constant	2.6964 *** ^a	0.3620		
Registration type (Self-registered=1, Otherwise=0)	- 0.5872 **	0.2811	- 26.5184 **	15.5569
Time registered on MarketMaker (Months)	0.0146 **	0.0084	0.5528 **	0.3183
Time spent on MarketMaker activities (Min/month)	0.0028 **	0.0014	0.1048 **	0.0609
Type of user (Active user =1, Passive user=0)	0.6300 ***	0.2531	24.9529 **	11.5420
Marketing contacts	0.0336 **	0.0202	1.2685 *	0.8511
Total annual sales (\$1,000)	0.0006 **	0.0003	0.0232 **	0.0129
Survey type (Mail=1, Email=0)	- 0.7655 ***	0.2671	- 26.3297 *	8.5284
σ^b	0.6020 ***	0.0651		

^a Significance levels of 0.01, 0.05 and 0.10 are indicated by ***, ** and * respectively.

^b σ corresponds to the shape parameter of the log-logistic model (see Table 2.2).

Chapter 3.

Does E-Commerce Help Farmers' Markets?

Measuring the Impact of MarketMaker

The goal of this chapter was to explore the relationship between e-commerce and direct marketing venues through examination of the impact of MarketMaker on farmers' markets. The areas of interaction and impact are first presented in a logic model. The logic model is used to identify measurable metrics that are gauged using a survey of farmers' market managers participating in the MarketMaker. The impact of MarketMaker is first measured through market managers' perceived increase in the number of business contacts, number of customers, number of vendors and increases in profitability of farmers' markets vendors. Parametric and nonparametric methods are used to estimate the average values of these effects. The impact is further analyzed using an interval-censored logistic regression to estimate which factors help increase annual farmers' markets sales attributed to MarketMaker. Additionally, the impact of MarketMaker on farmers' markets is examined through the estimation of the managers' willingness to pay for its services. This alternative measure is used to ensure the robustness of our results. The findings of this study will shed light on the interaction of e-commerce and conventional types of direct marketing in agriculture and can be used for further development and enhancement of these efforts.

Logic Model

The impact and interaction of MarketMaker with the farmers' markets is shown using a logic model shown in Figure 3.2.¹⁵ This logic model describes the linkages among project inputs, activities, outputs and outcomes. The inputs on the national and state levels of MarketMaker include human resources, adequate technological expertise to support program requirements, and availability of related public and private data (i.e. National Census and independent studies) as well as funds to support planned activities (i.e. training, promotion, networking, etc.). These inputs are used to conduct a series of activities focused on achieving intermediate and final outcomes, such as development, updating and improvement of the content, usability and functionality of the site. MarketMaker purchases, gathers, manages, and distributes relevant existing data (i.e. socio-demographic characteristics, consumers' preferences, etc.) to farmers' market managers looking for specific vendors capable of providing specific niche products at the market. MarketMaker conducts training and promotional sessions at national, state and regional levels in order to create awareness and prepare farmers' market managers as well as participating vendors and consumers to successfully participate in MarketMaker. The adequate combination of inputs and activities will lead to accomplishment of desired outputs, which include signup and participation of new producers, farmers' markets, and consumers in the MarketMaker program, as well as maintaining a

¹⁵ Logic models are frequently used as project planning and evaluation tools. A detailed description of logic models development and use can be found in W.K. Kellogg Foundation (2004). Applications of logic models in the academic literature are found in areas such as agricultural technology transfer (Framst, 1995), research and development (Jordan and Mortensen 1997), and industrial modernization (Torvatn, 1999).

comprehensive and up-to-date database of program participants. The outcomes of the program include creation of initial web presence for some farmers' markets, additional web presence for others as well as additional participation of farmers markets in the short term. The intermediate-term outcomes are observed in the number of new contacts (Email, phone calls) generated through MarketMaker, number of additional vendors through MarketMaker and changes in their composition, number of additional customers found through MarketMaker, as well as the number of new horizontal partnerships (i.e., collaborations among businesses) formed through MarketMaker. In the long-term MarketMaker portends to increase participation of both producers and consumers in farmers' markets which will help insure success and sustainability of farmers' markets participating with MarketMaker. This outcome can be measured by evaluating the changes in total sales, changes in variability of total sales, changes in prices received and quantities sold, as well as changes in the costs of operation of farmers' markets.

Farmers' Market Use of MarketMaker

The data on the metrics developed using the logic model described above were collected in a survey conducted in May - June 2011, in which farmers' market managers were asked about their perceptions regarding the impact of MarketMaker. The survey was distributed by Email to 1,295 farmers' market managers registered on MarketMaker websites in 15 participant states: Arkansas, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Michigan, Mississippi, Nebraska, New York, Ohio, South Carolina, and Washington D.C. The overall response rate of the

survey was 10.2 percent and it generated 132 usable observations. As found in Hamilton (2003) meta-study of 199 online surveys, online survey response rates tend to be low (13.4 percent average response rate in their study). The sample frame size, number of respondents, and response rates by MarketMaker participant state is shown in Table 3.1. The states with the highest response rate were Louisiana (17.5 percent) and Ohio (14.9 percent), and those with the lowest response rate were Nebraska (3.0 percent) and Illinois (7.3 percent).

In order to simplify the respondent's task and to encourage a response, most of the demographic and business information, as well as outcome measures (e.g., number of new contacts found through MarketMaker) were collected using a discrete number of categories, hence the calculation of the mean value of these variables requires the use of special statistical techniques (Bhat, 1994; Carpio et al., 2008; Stewart, 1983).¹⁶ Results demonstrate that the parametric estimate of the mean of every categorical variable was contained in the interval formed by the lower and upper nonparametric estimates of the mean, which confirms the robustness of these findings. Thus we focus mainly on the estimated parametric mean in our discussion.

The results of the survey shown in Table 3.2 indicate that the average age of farmers' market managers responding to this survey was 51 years and nearly 73 percent of them were female. Regarding characteristics of their farmers' markets, survey respondents indicated that their operations generate, on average, about \$135,820 in total annual sales, and the average annual cost of operation is \$10,680.

¹⁶ For specific estimation details please refer to Chapter 1 of this report, Zapata et al. (2011) and Zapata (2012).

Survey results also indicate that, on average, participating farmers' markets have been in operation for 8.5 years and most of them operate once a week (63.46 percent).

Results presented in Table 3.3 demonstrate that most of the farmers' market managers responding to the survey (66 percent) indicated they had registered on the site by themselves, 8 percent indicated that they were registered by someone else, and 26 percent did not know how they became registered in MarketMaker. This finding may be explained by the fact that in some states farmers' market lists provided by State Departments of Agriculture were used to initially populate the MarketMaker database. On average, respondents have been registered on the site for 18.8 months. About 34.3 percent of respondents have been registered for less than 12 months, 34.3 percent have been registered between 12 and 24 months, and 31.4 percent have been registered for more than 24 months (Table 3.3).

In relation to the time devoted to the website, farmers' market managers registered on MarketMaker spend about 50 minutes per month managing their account, with nearly 77 percent of the respondents devoting less than 30 minutes per month on MarketMaker related activities (Table 3.3). Participants were also asked about their overall satisfaction with MarketMaker. Survey results indicate that 37 percent of farmers' market managers are very satisfied or satisfied with MarketMaker, 60.3 percent have a neutral perception, and 2.7 percent are very dissatisfied or dissatisfied with MarketMaker. Farmers' market managers report various degrees of intensity with respect to the use of MarketMaker features (Table 3.4). The features that are most commonly used (sometimes and frequently) are the

“log on to check or update profile” (22 percent of users), and “search for new vendors” (23 percent). Less commonly used features include “search for products” which was used sometimes or frequently by about 19 percent of users, and “reach out to customers” (14 percent).

Table 3.5 describes survey findings regarding the outcomes of farmers’ market participation in MarketMaker. Respondents indicated that as a result of their participation with MarketMaker, they have been contacted, on average, about 1.6 times by customers and vendors.¹⁷ However, 69 percent of farmers’ market managers in our sample have not yet received any contacts due to MarketMaker. Among the 31 percent of farmers’ markets that have been contacted, the average number of new contacts is 3.58. In terms of the number of new vendors gained, respondents indicated that their participation in MarketMaker has helped them obtain an average of 0.8 new vendors (76 percent indicated that they have not yet gained new vendors through the site). Participants also indicated that as result of their participation with MarketMaker they have gained, on average, 1.9 new customers (63 percent of the respondents have not yet obtained new customers). Successful users have obtained an average of 2.34 vendors and 4.63 customers. Lastly, the average annual increase in sales due to participation in MarketMaker was estimated at about 3.6 percent (43 percent of the participants have not yet experienced any increase in annual sales). Relative to the average annual sales of \$135,820, this figure indicates an average increase in annual sales of \$4,889 per

¹⁷ These values likely represent a lower bound of actual contacts due to MarketMaker since due to the lack of interaction; new contacts rarely communicate their source of information, which may be especially true between new customers and farmers’ market managers.

farmers' market. Among farmers' markets that experienced increase in sales, most (50 percent of the whole sample) estimate sales increases in the range of 1-10 percent, and some (7 percent of the whole sample) estimate sales increases of 10-19 percent for an average of 5.33 percent. Given MarketMaker's relative infancy, these results establish a track record and demonstrate its potential among the more successful users of the program. However, as in the context of producers, these impacts are perceived impact measures, and it is not certain to what extent these perceptions reflect reality. Sometimes contacts might be facilitated by MarketMaker but either the buyer forgot their source of information, they did not communicate their source to the vendor, or the vendor simply had no way to know if they had received MarketMaker contacts.

In the remainder of this study we focus on the impact of the MarketMaker on farmers' markets sales and examine the factors that affect this impact. Since sales measure some of the longer term outcomes, they would encompass several shorter term outcomes discussed in this section and thus represent a more comprehensive measure of MarketMaker impact.

Factors Affecting the Impact of MarketMaker on Farmers' Market Sales

Estimation Methods

The choice of the estimation procedure for assessing the factors that affect the impact of MarketMaker on farmers' market sales was driven by the nature of the dependent variable. The data on changes in sales of farmers' markets due to MarketMaker was collected in discrete interval format as shown in Table 3.5. Since

the OLS estimation of this type of data results in asymptotic bias (Stewart, 1983), we follow a maximum likelihood procedure developed by Bhat (1994) to compute a continuous and reliable value for changes in sales. This approach is suitable for data collected within broad intervals.

Denoting the true (but unobserved) change in sales for the i^{th} individual as y_i and the boundary values for the k^{th} interval³ selected as $A_{(k-1)}$ and A_k , the probability that y_i is in the k^{th} interval is given by (Day 2007; Turnbull 1976):

$$(3.1) \quad P(A_{(k-1)} \leq y_i \leq A_k) = F(A_k) - F(A_{(k-1)}) \quad i = 1, 2, \dots, N,$$

where $F(\cdot)$ is the underlying probability distribution of variable y .

The probability of observing a particular set of responses in a random sample of N individuals from the population of interest is then given by the likelihood function:

$$(3.2) \quad L = \prod_{i=1}^n [F(A_k) - F(A_{(k-1)})].$$

In order to express the likelihood function in terms of all interval options available to the respondent, we create a dummy variable d_{ik} which indicates whether an individual chooses the k^{th} interval among K options. Using this indicator variable and the generic likelihood function in (3.2) the resulting log-likelihood function is:

$$(3.3) \quad \ln L = \sum_{i=1}^N \ln \sum_{k=1}^K d_{ik} [F(A_k) - F(A_{(k-1)})].$$

The parametric procedure assumes that the increase in annual sales attributed to MarketMaker (y) follows a normal distribution with mean μ and variance σ^2 . Consequently, the log-likelihood function can be written as:

$$(3.4) \quad \ln L = \sum_{i=1}^N \ln \sum_{k=1}^K d_{ik} \left[\Phi \left(\frac{A_k - \mu}{\sigma} \right) - \Phi \left(\frac{A_{k-1} - \mu}{\sigma} \right) \right],$$

where $F(\cdot)$ in equation (3.3) has been replaced by the cumulative standard normal $\Phi(\cdot)$. Parameter estimates for μ and σ can then be obtained by using maximum likelihood estimation procedures. Moreover, the mean change in annual sales (μ) can be modeled as a function of explanatory variables that may have an impact on the increase in sales associated to the use of MarketMaker (see Table 3.6 for the specific variables used). In particular, the parameter μ can be expressed as $\mu = \mathbf{X}_i \boldsymbol{\beta}$, where \mathbf{X}_i is a vector of explanatory variables (including 1 for the intercept) and $\boldsymbol{\beta}$ the corresponding vector of parameters.

This linear parameterization of μ facilitates the estimation of marginal effects for both continuous and discrete variables. Specifically, the marginal effect of the x_j explanatory variable is given by its corresponding β_j parameter (i.e., $\frac{\partial \mu}{\partial x_j}$ for continuous variables and $\mu|_{x_{ij}=1} - \mu|_{x_{ij}=0}$ for discrete variables).

Since very little is known about factors that affect the use and impact of e-commerce in agriculture, we build our hypotheses in this study based on the logic model developed for MarketMaker evaluation. The outcome that we focus on is the increase in farmers' market sales due to MarketMaker. This outcome is achieved through the effective use of inputs, activities and outputs. As Figure 3.2 indicates, these inputs, activities and outputs are differentiated at the national, state and individual level. At the national level the impact of MarketMaker may differ across the country due to the regional differences in the farmers' markets and the consumer interest in their products, however the regional effect (e.g., North vs.

South) cannot be hypothesized a priori. States differ widely in terms of MarketMaker activity. As shown in Figure 3.1, some states have participated in MarketMaker since 2000, while others are very new to this tool. We hypothesize that the length of presence of MarketMaker in the state will have a positive effect on its impact (especially longer term impact such as sales) due to the larger amount of inputs and activities devoted to the project over time. On the individual level, user characteristics hypothesized to affect the impact of MarketMaker include farmers' market total annual sales, years in operation, the age and gender of the farmers' market manager, and intensity of MarketMaker use. Sales are included to represent the size of the business, which may have a positive effect on the impact of MarketMaker since the costs of learning and implementing e-commerce tools can be spread out across a larger scale of operation. On the other hand, e-commerce may be very effective in identifying niche markets for smaller users, thus the expected relationship between the size of the business on the impact of MarketMaker is ambiguous. Years in operation reflect how established the farmers' market is and differentiate MarketMaker's impact as helping establish the new operations among the markets that are less than 4 years old versus expanding existing operations among the older markets. The age and the gender of the farmers' market manager are used as a proxy for the level of technical ability. We expect younger managers to be more technologically adept and be able to take a better advantage of MarketMaker. The expected relationship between sales and gender is also ambiguous. The nature of participation is also deemed an important determinant for MarketMaker impact. Heavier users (those who spend more than 30 minutes a

month) are expected to gain more benefits from MarketMaker than lighter users. Variable definitions and the results of the estimation are shown in Table 3.6.

Estimation Results

The results of the estimation shown in Table 3.6 demonstrate the impact of the independent variables described in the previous section on the percentage increase in farmers' markets annual sales attributed to MarketMaker. The unconditional mean percentage increase in annual sales was estimated at 1.10 percent with a standard error of 0.96 percent. The nonparametric lower and upper bound of the mean were estimated at 0.72 percent and 6.42 percent, respectively, suggesting high variability in the mean. As discussed before, only about 57 of the respondents experienced increase in sales due to MarketMaker.

Three out of seven variables included in the model were statistically significant at the 10 percent level. As expected, years of MarketMaker presence in the state were positively related to its impact. For each additional year of MarketMaker presence in the state, the farmers' market sales attributed to MarketMaker increased by 0.93 percent. This result differentiates the experience of the farmers' markets in the states with established MarketMaker programs from the newer program participants and demonstrates program's potential for new users. Our second finding is that MarketMaker has larger impacts on established farmers' markets. The increase in sales for established farmers' markets (more than 4 years in operation) was 3.2 percent greater than that for the newer ones. This finding suggests that MarketMaker impact is larger in terms of expanding existing capacity than in helping create a new one. By far the largest determinant of market maker

impact was the type of user. Frequent users experienced an almost 6.7 percent larger increase in sales compared to passive users. This result indicates that in order to see the impact of MarketMaker on their operations, users have to invest time and effort in making the program work for them. It also demonstrates the payoff users can expect for their time investment. Overall these findings outline the components needed for the more successful use of MarketMaker by the farmers' markets: the established program, the established market and the active user-manager. With these components in place, MarketMaker can help significantly increase sales at participating farmers' markets.

Willingness to Pay Analysis

An alternative approach to evaluating the impact of MarketMaker on farmers' markets is through the estimation of the users' willingness to pay (WTP) for the MarketMaker services. Theoretically, WTP measures the maximum amount of money that an individual is willing to give up to obtain a certain product (Cameron, 1988). Thus, WTP reflects the value that users assign to the entire basket of MarketMaker services as well as its economic impact. For the purpose of this study, farmers' market managers were asked about their WTP for MarketMaker services using a double-bounded elicitation format, following the procedure discussed in Chapter 2 of this report. Two rounds of questions were presented to each participant. First, participants were asked if they would be willing to pay an annual fee (bid) for participating in MarketMaker and then a follow up question was asked with another bid, which was higher or lower than the original bid depending

on the first response (see Hanemann (1994) for details about this elicitation procedure). Specific initial and follow-up questions presented to the participants are included in the surveys available in Appendix A of this report. An annual participation fee randomly assigned among respondents was used as a hypothetical payment vehicle to capture the monetary value farmers' market managers place on the services provided by MarketMaker. The initial annual participation fees employed were \$25, \$50, \$75, \$100, \$150, and \$200. The corresponding follow-up annual participation fees were \$15, \$25, \$50, \$75, \$100, and \$150 when the initial response was a "no", and \$50, \$75, \$100, \$150, \$200, and \$250 when the initial response was a "yes".

The WTP questions were included in the surveys farmers' market managers participating in MarketMaker in the states of Arkansas, Florida, Georgia, Mississippi, Indiana, Iowa and South Carolina.¹⁸ A total of 37 usable observations were collected.

Managers' responses to the initial and follow-up WTP questions are presented on Table 3.7. This table suggests that the producer WTP for the services provided by MarketMaker is less than \$150 for at least 95 percent of the respondents. Table 3.7 also suggests that the probability of refusing to pay a particular amount increases as the bid increases. For example, the probability of answering "no/no" increased from 50 percent when \$25 and \$15 bids were asked to 100 percent when \$200 and \$150 bids were asked.

The estimation of the farmers' market managers' WTP for the services provided by MarketMaker was based on the framework outlined by Hanemann et al.

¹⁸ Other participating states did not give permission to use these questions in the survey.

(1991) as described in Chapter 2 of this report. The average annual farmers' market managers' WTP for the services provided by MarketMaker (assumed to follow an exponential distribution) was estimated at \$41.19 with a standard error of \$6.77. The median annual farmers' market managers' WTP for the services provided by MarketMaker is \$28.55. Both measures fall within the upper (49.85) and lower (28.61) bounds of the non-parametric mean, which does not impose a distribution assumption. The estimated parametric mean represents about 7 percent of the average increase in annual sales due to MarketMaker (i.e., \$586) perceived by the farmers' market managers in the WTP sub-sample. The estimated average annual farmers' market managers' WTP can be used to estimate the aggregate value that registered farmers' market managers place on the services received from MarketMaker. An aggregate annual economic value was calculated by multiplying the estimated mean annual WTP times the 2,553 farmers' markets currently registered at the national level. Thus, under this assumption the estimated annual aggregate farmers' markets managers' WTP was calculated to be \$105,158 (with a standard error of \$17,284).

Summary and Conclusions

The goal of this study was to estimate the impact of MarketMaker on farmers' markets. The impact was measured on several levels. First we identified the perceived outcomes through the survey of farmers' market managers. Second we analyzed factors that affect the increase in farmers' markets sales due to

MarketMaker participation. Third we examined the farmers' markets managers WTP for MarketMaker.

Our findings indicate that as a result of their participation with MarketMaker, farmers' markets managers have been contacted, on average, about 1.6 times by customers and vendors, obtained an average of 0.8 new vendors and 1.9 new customers. The average annual increase in sales due to participation in MarketMaker was estimated at about 3.6 percent, or \$4,889 per farmers' market. While only about a third of a sample gained new vendors and contacts, about half of the sample reported increase in sales, suggesting that MarketMaker has been effective in promoting existing farmers' markets.

Through the analysis of factors that affect the increase in farmers' markets sales due to MarketMaker we identified the components needed for the more successful use of MarketMaker by the farmers' markets, namely, the established MarketMaker program, the established farmers' market and the active user-manager. Thus our findings demonstrate the track record in the states with the longer presence of MarketMaker and demonstrate program potential for new users. The fact that more established farmers' markets are able to achieve higher increase in sales than the new ones suggests that MarketMaker is more effective in expanding existing, rather than helping create new capacity. Finally, higher sales among more active users indicates that in order to see the impact of MarketMaker on their operation, users have to invest time and effort in making the program work for them. With these components in place, MarketMaker can help significantly increase sales at participating farmers' markets.

Willingness to pay analysis for the subsample of farmers' markets revealed that FM managers are willing to pay an average of \$41.19 annually for the services provided by MarketMaker. Theoretically this value reflects the value users assign to the entire basket of MarketMaker services as well as its economic impact.

Surprisingly, estimated mean WTP comprised only about 1 percent of the perceived increase in sales estimated in this study. Based on the WTP measure, an aggregate annual economic value of MM (calculated by multiplying the estimated mean annual WTP times the 2,553 farmers' markets currently registered at the national level) was estimated to be \$105,158 (with a standard error of \$17,284).

Given MarketMaker's relative infancy, our findings establish a track record and demonstrate its potential among the more successful users of the program as well as the factors needed for the program to succeed.

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Table 3.1. Survey Sample Frame Size, Number of Respondents, and Response Rate by State.

State	Sample Frame Size	Number of Respondents	Response Rate
Arkansas	38	4	10.53
Colorado	85	9	10.59
District of Columbia	7	1	14.29
Florida	101	7	6.93
Georgia	96	12	12.50
Illinois	219	16	7.31
Indiana	49	7	14.29
Iowa	115	14	12.17
Louisiana	40	7	17.50
Michigan	115	11	9.57
Mississippi	47	6	12.77
Nebraska	33	1	3.03
New York	209	18	8.61
Ohio	101	15	14.85
South Carolina	40	4	10.00
Total	1,295	132	10.19

Table 3.2. Description and Summary Statistics of Respondents Characteristics.

Variable Name (Units)	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
Gender	1=Female	72.53		0.73	0.45
	0=Male	27.47			
Age				51.00	13.40
Total annual sales (\$1,000)	Less than 10	29.90	(97.63, 214.84)	135.82	236.39
	10 to 50	27.84			
	50 to 100	12.37			
	100 to 250	16.49			
	250 to 500	6.19			
	500 to 1,000	3.09			
	Over 1,000	4.12			
Annual cost of operation (\$1000)	Less than 1	28.43	(7.82, 17.73)	10.68	15.58
	1 to 5	27.45			
	5 to 10	19.61			
	10 to 20	6.86			
	20 to 50	9.80			
	More than 50	7.84			
Years of operation	Less than 2	7.69	(6.43, 12.43)	8.54	6.03
	2 to 3	14.42			
	3 to 4	12.50			
	4 to 10	29.81			
	10 to 15	15.38			
	More than 15	20.19			
Time of operation	Daily	1.92			
	2 to 3 times a week	11.54			
	Once a week	63.46			
	Once a month	1.92			
	2 to 4 months a year	5.77			
	5 to 8 months a year	11.54			
	8 to 12 months a year	3.85			

Table 3.3. Registration and Time Spent on MarketMaker.

Variable Name (Units)	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
Registration type	Self-registered	65.75			
	registered by someone else	8.22			
	don't know	26.03			
Time registered on MarketMaker (Months)	Less than 1	4.29	(14.32, 24.81)	18.84	13.06
	1 to 6	18.57			
	7 to 12	11.43			
	12 to 24	34.29			
	24 to 36	20.00			
	36 to 48	8.57			
	More than 48	2.86			
Time spend on MarketMaker activities (Minutes/month)	Less than 30	76.81	(30.88, 85.75)	50.04	116.26
	30 to 60	13.04			
	61 to 120	2.90			
	121 to 300	2.90			
	301 to 600	1.45			
	More than 600	2.90			
Overall satisfaction	Very satisfied	8.22			
	Satisfied	28.77			
	Neutral	60.27			
	Dissatisfied	1.37			
	Very dissatisfied	1.37			

Table 3.4. MarketMaker Features and their Rate of Use by Participants.

Feature	Never	Rarely	Sometimes	Frequently
Log on to Check or Update Profile	0.39	0.40	0.20	0.02
Search for Products	0.50	0.31	0.15	0.04
Search for new vendors	0.54	0.23	0.19	0.04
Reach out to customers	0.55	0.32	0.12	0.02
Other	0.78	0.13	0.04	0.04

Table 3.5 Farmers' Market Managers' Perceived Effort Participating in MarketMaker.

Variable Name	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
Marketing contacts	0	69.33	(0.77, 2.13)	1.45	3.02
	1 to 5	24.00			
	6 to 10	4.00			
	11 to 20	2.67			
New vendors	0	76.40	(0.42, 1.21)	0.81	1.76
	1 to 4	19.10			
	5 to 10	4.49			
New customers or buyers	0	63.41	(1.22, 5.00)	1.86	4.13
	1 to 10	31.71			
	11 to 25	2.44			
	26 to 50	2.44			
Increase in annual sales	No increase	42.86	(0.72, 6.42)	3.57	4.01
	1% to 10%	50.00			
	10% to 19%	7.14			

Note: Marketing contacts, new vendors and new customers refer to the total contacts, vendors and customers gained since the farmers' market became registered on the MarketMaker website.

Table 3.6. Interval-Censored Analysis of the Factors Affecting Farmers' Market Sales Attributed to MarketMaker.

Variable	Parameter Estimate	Std Error	P-Value
Intercept	-4.222	4.331	0.330
Region (South=1, Mid-west=0)	0.109	2.090	0.959
Years in operation (Less than 4 years =0, More than 4 years =1,)	3.213	1.849	0.082
Total sales (Less than \$50,000 =0, More than \$50,000 =1)	1.790	1.807	0.322
MM type of user (Frequent user =1, Passive-user=0)	6.669	1.986	0.001
Manager gender (Female=1, Male =0)	-0.869	1.673	0.603
Manager age (Years)	-0.048	0.057	0.400
Years of MM presence in the state	0.934	0.512	0.068
Sigma	4.743	0.812	0.000

Notes: n=56. Dependent variable is percentage increase in sales attributed to MM with the following observed intervals: no increase in sales (24 obs.), 0.01% - 9.99% (28 obs.), 10% - 19.99% (4 obs.).

Table 3.7. Response Frequency by Initial Bid Amount.

Initial amount	Sample size	Decision			
		NO, NO	NO, YES	YES, NO	YES, YES
25	6	3	1	1	1
50	5	2	0	3	0
75	9	6	1	1	1
100	8	7	0	1	0
150	7	6	0	1	0
200	2	2	0	0	0

Figure 3.1. MarketMaker Launch Year by State.

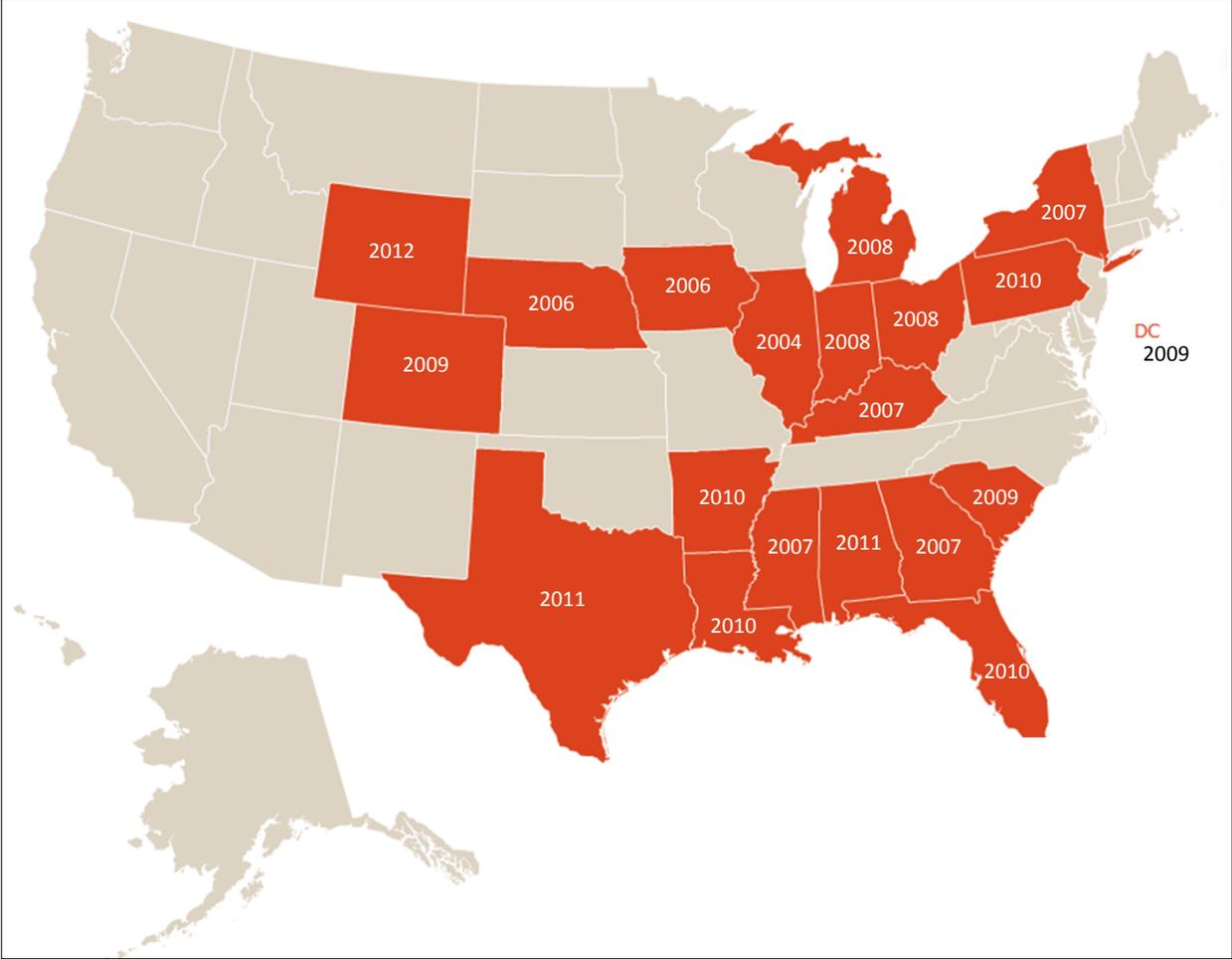
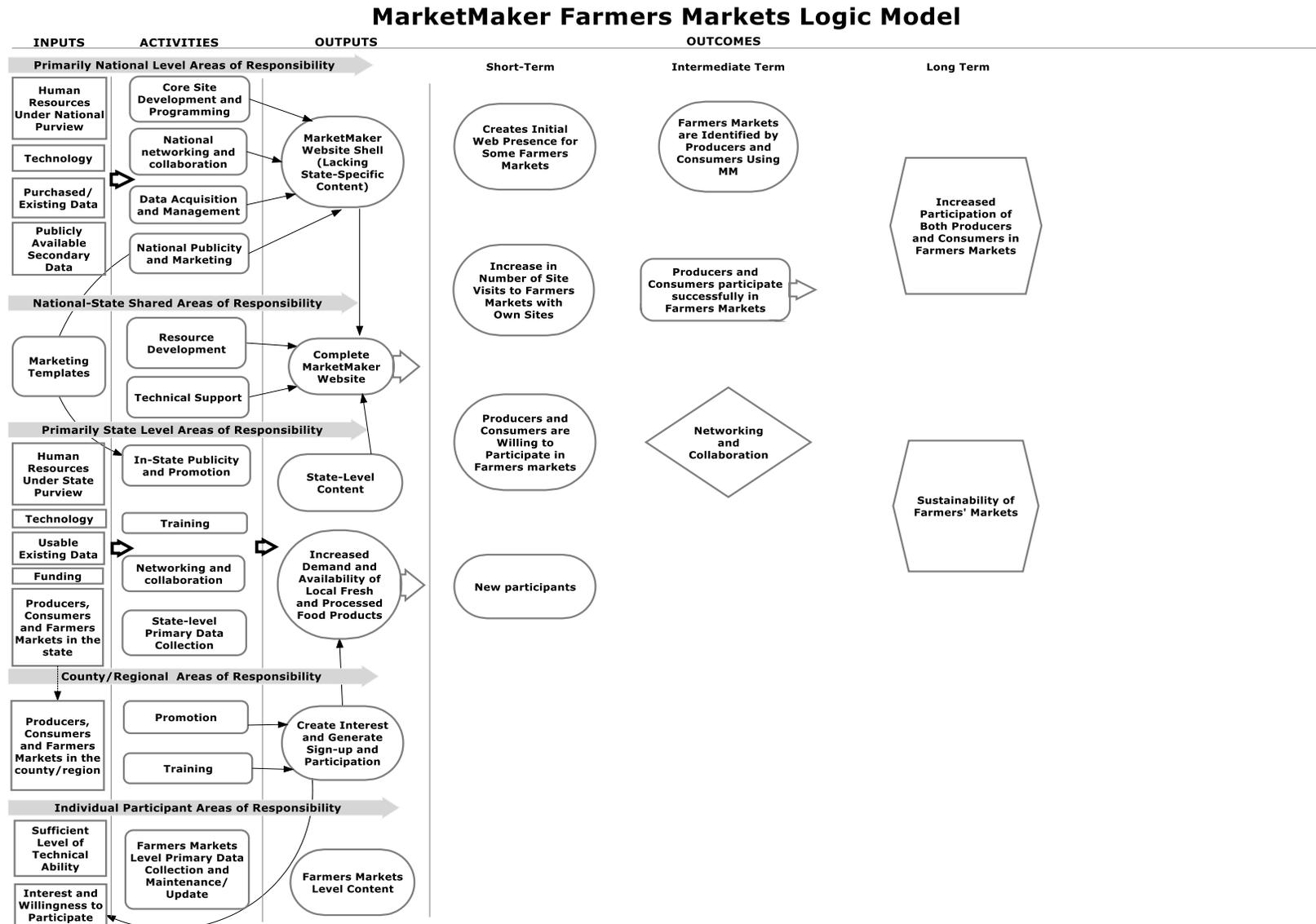


Figure 3.2. MarketMaker Logic Model for Farmers' Markets.



Summary, Conclusions and Implications

Recent decades have been marked by a technological revolution that has changed our lives in many different ways. Technological changes resulted in the emergence of e-commerce as a new marketing channel, allowing individual businesses to reach distant markets, providing opportunities not before available. While e-commerce has grown rapidly in industrial retail markets, it is still relatively new to agriculture and agribusiness. One of the examples of agribusiness-focused e-commerce tools is MarketMaker, an interactive web-based resource that provides geo-coded food marketing information to food entrepreneurs and customers. The site was created in 2000 by a team of University of Illinois Extension researchers with the intention of building an electronic infrastructure that would help connect Illinois food producing farmers with economically viable new markets and has since grown to 19 states and the District of Columbia.

Several previous studies suggest that the growth of e-commerce in agriculture has been heavily focused on the exchange of information and much less on direct electronic transactions. Further, many have suggested e-commerce as an especially important marketing strategy for agricultural and food system entrepreneurs, allowing them to reach targeted distant markets efficiently and cost-effectively. However, due to the infant state of e-commerce in agriculture, its impact has not been widely measured and documented. Therefore the goal of this study was to evaluate the impact of MarketMaker on producers and farmers' markets, the two groups identified as the most important users of this tool. This

goal was accomplished by applying the framework developed by Lamie et al. (2011). Understanding the impact of MarketMaker is necessary for ensuring the efficient allocation of resources dedicated for its support and development. This information could also be useful to government officials and MarketMaker's administrators to justify the expenditure of public funds on the operational and development costs associated with the MarketMaker website.

The perceived impact of MarketMaker was identified based on survey responses of producers and farmers' market managers. Our findings for producers demonstrate that as a result of their participation with MarketMaker, producers have received an average of 2.9 marketing contacts, and have gained an average of 1.6 new customers. Additionally, MarketMaker has assisted farmers and fishermen in increasing their annual sales by an average of \$152. Individual consumers are the main type of customers targeted through MarketMaker activities. Nearly 87 percent of producers registered on MarketMaker participate in direct marketing to individual consumers and wholesale buyers. MarketMaker has helped these producers receive an average of 2.9 marketing contacts seeking information about their direct-market activities. Also, due to participation in MarketMaker, producers have increased their annual direct sales to individual consumers by 1.1 percent and to wholesale buyers by 0.8 percent on average. Our findings for farmers' markets indicate that as a result of their participation with MarketMaker, farmers' market managers have been contacted, on average, about 1.6 times by customers and vendors, obtained an average of 0.8 new vendors and 1.9 new customers. The average annual increase in sales due to participation in MarketMaker was estimated

at about 3.6 percent, or \$4,889 per farmers' market. While only about a third of the sample gained new vendors and contacts, about half of the sample reported increase in sales, suggesting that MarketMaker has been effective in promoting existing farmers' markets.

While the current perceived impact of MarketMaker on various business outcomes—sales, new customers, and marketing contacts—is relatively modest, our findings demonstrate that the effectiveness of MarketMaker is strongly linked with how it is used. For example, producers who registered themselves on the MarketMaker website have received, on average, almost twice as many additional contacts and customers than those who were registered by someone else. Another interesting finding is the positive relation between the amount of time spent on the site and the perceived impact of MarketMaker. The challenge is that only about 13% of producers seem to be average or active users of MarketMaker. On average, producers don't spend enough time on activities associated with MarketMaker (21.3 minutes per month) to gain its full benefits.

Through the analysis of factors that affect the increase in farmers' markets sales due to MarketMaker we identified the components needed for the more successful use of MarketMaker by the farmers' markets, namely, the established MarketMaker program, the established farmers' market and the active user-manager. Thus our findings demonstrate the track record in the states with the longer presence of MarketMaker and demonstrate program potential for new users. The fact that more established farmers' markets are able to achieve higher increases in sales than new markets suggests that MarketMaker is more effective in expanding

existing rather than helping create new capacity. Finally, higher sales among more active users indicates that in order to see the impact of MarketMaker on their operation, users have to invest time and effort in making the program work for them. With these components in place, MarketMaker can help significantly increase sales at participating farmers' markets.

A willingness to pay analysis was conducted to measure the value users assign to the entire basket of MarketMaker services as well as its economic impact. Our results indicate that, on average, producers are willing to pay \$47.02 annually for the services they receive from MarketMaker. Our analysis demonstrated that registration type, time registered on MarketMaker, time devoted to the website, type of user, the number of marketing contacts received and firm total annual sales have a significant effect on producers' WTP for the services provided by MarketMaker. These results are largely consistent with our finding for the perceived impact analysis indicating that user involvement and the longer and more intense use of MarketMaker is likely to result in higher impact. Observation of some short term impacts such as new contacts due to Market Maker among producers is also likely to increase their WTP for this tool. A similar analysis for farmers' markets revealed that farmers' market managers are willing to pay an average of \$41.19 annually for the services provided by MarketMaker.

Since its creation in 2000, MarketMaker has offered its electronic infrastructure and resources to registered users at no cost. Thus, the estimated WTP function and its features (e.g. mean and median) could also be used as a guide if a participation fee is introduced in the future.

Preliminary Cost-Benefit Analysis

Since both costs and benefits of the project change during its lifecycle, we compared changes in average annual costs and benefits of MarketMaker over several years of participation. We first present the procedures used to estimate the economic costs, and subsequently the procedures used to estimate economic benefits.

Economic Costs

To collect data on costs, MarketMaker project leaders in each participating state were contacted in the summer and fall of 2012 with the request to provide an estimate of both cash and in-kind values of these costs. Seven out of 20 representatives responded to this request but only six representatives provided complete information. In order to make the cost data more homogeneous and comparable, only the data from five states that had joined the program during the mid and late 2000s were used for this analysis. The summary of the responses of the five states in terms of average annual costs during the first five years of the program is presented in Table 4.1 and Figure 4.1. These average costs can be thought of as those from a representative MarketMaker participating state. Since MarketMaker is a partnership of Land Grant Institutions and agriculturally focused organizations, the costs are incurred by University and partner organizations. Not surprisingly, the year with the highest total costs is year 1, the year when the state sites are developed. A very high share of the costs (about 50 percent after year 1) is spent on personnel. Figure 4.1 also demonstrates an increase in partner resources and a

decrease in University resources devoted to MarketMaker over time.

Economic Benefits

The calculation of the economic benefits of MarketMaker requires two basic elements: the number of users registered on the site during the period of analysis, and users' economic valuation of the site. The number of producers and farmers' markets used in the calculations is the annual average number of users registered in the five states included in the sample (Table 4.2). This information was obtained from MarketMaker web-statistics monthly reports.

The WTP values discussed in Chapters 2 and 3 of this report are used as the economic value that users place on the services they receive from MarketMaker. Producers' WTP values used in the analysis were assumed to depend on the number of years registered on the site as suggested by the WTP model estimated in Chapter 2. Hence, producers' annual WTP values used in the calculations were \$38.9, \$41.6, \$48.1, and \$54.7 for producers registered on the site one, two, three and four years, respectively. The WTP for farmers' markets was assumed constant at \$41.2/year since regression analysis results indicated that the number of years registered on the site does not have an effect on farmers' markets managers WTP for the site.

Results of the cost benefit analysis for the representative state are shown in Table 4.2. Project costs outweigh project benefits during each of the eight years of analysis.¹⁹ However, the benefit to cost ratio is estimated to trend upwards through time, starting from a value of zero in year 1 when the site is developed (and thus, it

¹⁹ This result applies to the representative state as well and also to the group of states in the sample. Since the costs and benefits reported are average values, the costs and benefits are higher for some states and lower for others; therefore, for some states the benefits can outweigh the costs, which in fact is the case for at least one of the states included in the sample.

is not available to users) to a value of 0.8 in years 6 to 8. Hence, at about year 6, economic benefits cover about 80% of the costs of the site.

Overall, the cost-benefit analysis suggests that for the sustainable development of this project, the costs have to be controlled and the benefits need to be enhanced. In order to enhance the benefits, resources need to be spent wisely targeting increased participation and emphasizing the factors needed for successful participation, as revealed in this study.

Several caveats regarding the results of the study are in order. First, it is important to note that the economic benefits included in the analyses represent only a portion of the total benefits generated by MarketMaker given that the other users of the site such as consumers, retailers, wholesalers, chefs/restaurants were not included. Related studies (e.g., Isengildina-Massa, Carpio and Hughes, 2012) demonstrate that such impacts may be substantial. Other benefits that are also not included in the calculations are the networking benefits to MarketMaker state administrators/leaders. For example, several states are now engaged in the development and deployment of related educational program development and delivery. For example, the MarketReady program developed with leadership from Tim Woods at the University of Kentucky is now being deployed by MarketMaker-affiliated colleagues in Indiana, Ohio, and South Carolina. Second, users' economic benefits are based on producer perceived impacts which might not fully capture benefits due to lack of appropriate attribution (i.e. credit given to MarketMaker for additional contacts and sales (McDowell, 1985)). Hence, it is recommended that MarketMaker state and national leaders more actively seek to improve their

visibility and perceived impact.

Finally, the benefit cost analysis uses average costs and benefit values from a small sample of state participants. A complete analysis of the costs and benefits of the site at the national level should include the costs from all participating states.

Overall, it seems that the MarketMaker project, that started with rather humble beginnings to serve the direct needs of producers in rural western Illinois, has evolved into an impressive collaborative program involving a wide variety of skilled people across nearly half the country. The multi-state network is impressive in terms of its capacity and reach. The MarketMaker effort to create a collection of interdependent websites across individual states is similarly impressive in terms of its scale and scalability, its wide variety of available tools for food sector businesses, and its potential for future success in terms of the long-term commitment of its wide variety of stakeholders, collaborators, and partners. The long-term potential benefits to producers, farmers' markets, and other user groups identified in the logic models developed for this project are now beginning to become evident. But, it is too soon to tell just how extensive these impacts will be. Much depends on the continued commitment of the program partners — and the users themselves — to turn this latent potential into realized net benefits. Perhaps the frameworks and initial analyses created under the scope of this project will help facilitate the execution of appropriate actions necessary by all parties, working in unison, to derive these benefits.

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Table 4.1. Average Annual State Support for MarketMaker.

	Year 1	Year 2	Year 3	Year 4	Year 5
Panel A: University Resources					
CASH					
1. MM site development	18,000	1,000	1,000	1,000	0
2. MM site maintenance	1,400	8,400	9,100	6,800	2,400
3. Personnel	4,600	4,300	4,400	2,800	1,000
4. Training	600	1,800	2,500	2,200	1,400
5. Marketing	0	900	1,500	2,500	2,000
6. Other #1	0	0	0	400	200
IN-KIND					
1. Personnel	14,968	11,698	14,498	8,800	6,063
2. Training	4,000	5,000	4,200	3,600	2,500
3. Marketing	1,900	2,600	2,200	2,000	1,500
4. Other #2	0	0	0	0	0
Sub-total	45,468	35,698	39,398	30,100	17,063
Panel B: Partner Resources					
CASH					
1. MM site development	28,324	2,000	2,000	0	1,400
2. MM site maintenance	0	0	2,300	6,600	11,200
3. Personnel	0	0	0	0	14,272
4. Training	0	600	600	0	2,228
5. Marketing	220	400	400	0	1,460
6. Other #1: travel and F&A	0	0	0	0	2,640
IN-KIND					
1. Personnel	16,200	7,400	7,400	9,400	15,400
2. Training	500	700	900	0	600
3. Marketing	2,400	1,900	1,400	1,000	1,900
4. Other #2	0	0	0	100	100
Sub-total	47,644	13,000	15,000	17,100	51,200
Total	93,112	48,698	54,398	47,200	68,263

Table 4.2. Average Annual State Level Benefits and Costs of MarketMaker by Year of Participation.^a

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Number of farmers' markets ^b	0.0	158.0	168.0	175.0	180.0	183.0	187.0	189.0
Average farmers' market benefits (\$/year)	0.0	41.2	41.2	41.2	41.2	41.2	41.2	41.2
Total farmers' market benefits (\$/year)	0.0	6,509.6	6,921.6	7,210.0	7,416.0	7,539.6	7,704.4	7,786.8
Number of producers ^b	0.0	414.0	491.0	583.0	691.0	819.0	972.0	1,152.0
Average producers' benefits (\$/year)	0.0	34.9	41.5	48.1	54.8	61.4	61.4	61.4
Total producer benefits (\$/year)	0.0	14,431.4	20,372.6	28,057.2	37,838.6	50,280.7	59,673.8	70,724.5
Total Benefits^c	0.0	20,941.0	27,294.2	35,267.2	45,254.6	57,820.3	67,378.2	78,511.3
Total Costs^d	93,112.0	48,698.0	54,398.0	47,200.0	68,263.0	54,640.0	56,125.0	56,557.0
Benefits/Costs	0.0	0.5	0.6	0.7	0.6	0.8	0.8	0.8

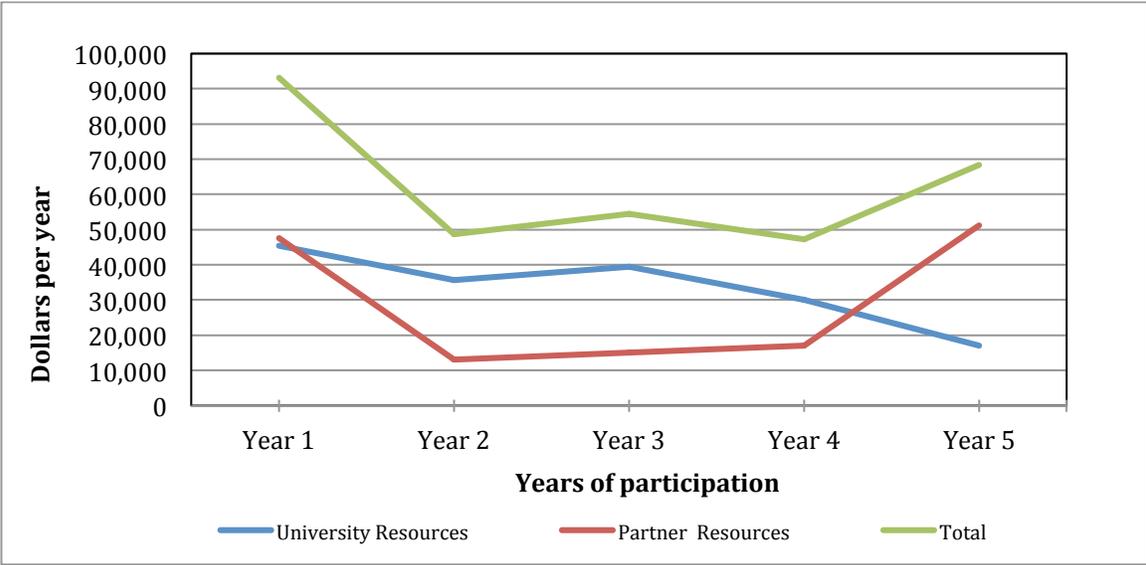
Notes: ^aBenefits and costs in years 1 to 5 are based on reported number of users and costs values. Benefits and costs in years 6 to 8 are predicted values.

^bUser numbers were predicted using the results of log-log regression models estimated using data from years 2 to 5. The dependent variable in the models was the average number of members in the sample, and the explanatory variable the number of years since the site was launched. All estimated regression models imply that the number of MarketMaker members increases at a decreasing rate.

^cWTP values for producers were assumed to increase only until year six (i.e., five years as members of the site) and remain at that level thereafter.

^dCosts in years 6 to 8 are assumed to be equal to the average value of the costs from years 2 to 5, as reported by three of the six states that provided information on MarketMaker costs.

Figure 4.1. Average Annual Costs of MarketMaker Website.



APPENDIX A
SURVEY INSTRUMENTS

Brief Survey for Producers Using MarketMaker

The questions in Section 1 apply to your experiences with MarketMaker.

1. How long have you been registered on the MarketMaker website?

- | | |
|--|--|
| <input type="checkbox"/> Less than a month | <input type="checkbox"/> Between 2 and 3 years |
| <input type="checkbox"/> 1 to 6 months | <input type="checkbox"/> Between 3 and 4 years |
| <input type="checkbox"/> 7 months to a year | <input type="checkbox"/> More than 4 years |
| <input type="checkbox"/> Between 1 and 2 years | <input type="checkbox"/> Not sure |

2. How often do you use the following features of the MarketMaker website?

	Ne ver	Rar ely	Some times	Frequ ently
Log on to check/update profile (such as adding new information, photos, social medial links, business contacts, alerts, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for business partnerships (e.g, to find other companies to sell products)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for buyers and sales opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Find a target market for your products (e.g., using demographic data, food consumption data)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the Buy/Sell Forum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. How would you rate your overall satisfaction with MarketMaker?

- | | |
|---|--|
| <input type="checkbox"/> Very satisfied | <input type="checkbox"/> Dissatisfied |
| <input type="checkbox"/> Satisfied | <input type="checkbox"/> Very dissatisfied |
| <input type="checkbox"/> Neutral | <input type="checkbox"/> No response |

4. What are the main challenges you are facing in using MarketMaker?

The questions in Section 2 refer to your perceptions regarding possible outcomes of your participation with MarketMaker over the entire period of time since you became registered on this website.

1. Approximately, how many additional marketing **CONTACTS** (including customers' calls or emails, input suppliers contacts, contacts from other producers, etc.) do you think were developed as a result of your participation with MarketMaker?
 - No new contacts
 - Less than 10
 - 11 to 20
 - 21 to 30
 - 31 to 40
 - 41 to 50
 - More than 50
 - Uncertain

2. How many new **CUSTOMERS** do you think you have gained due to your participation with MarketMaker?
 - No new customers
 - Less than 5
 - 6 to 10
 - 11 to 20
 - More than 20
 - Uncertain

3. What do you think is the approximate dollar value of your business annual sales generated or assisted by MarketMaker?
 - Under \$25
 - \$25 to \$50
 - \$51 to \$75
 - \$76 to \$99
 - \$100 to \$499
 - \$500 to \$999
 - \$1,000 to \$4,999
 - \$5,000 to \$9,999
 - \$10,000 or more
 - Uncertain

4. What do you think is the percentage of your costs of production and marketing (including the costs of using MarketMaker), i.e. your margin of revenue above cost, relative to the level of your business sales (e.g., for every \$100 in sales, my costs of production and marketing are \$50 or 50%)?
 - Less than 19%
 - 20% to 39%
 - 40% to 59%
 - 60% to 79%
 - 80% to 100%
 - More than 100%
 - Uncertain

The questions in Section 3 are demographic questions and questions about the size of your business.

1. Please describe your relationship with this farm/business. (select all that apply)
 - I am the owner of the farm/business
 - I am the manager of the farm/business
 - I am an employee of the farm/business
 - I am a relative of the owner/manager

2. Please describe the size of your business in terms of total sales for the most recent full calendar year.
 - Less than \$ 10,000
 - \$ 10,000 to \$ 49,999
 - \$ 50,000 to \$ 99,999
 - \$ 100,000 to \$ 249,000
 - \$ 250,000 to \$ 499,000
 - \$ 500,000 and over

3. Please provide the zip code where your farm/business is located:
Zip code: _____

4. What percent of your total family income is generated by your farming business?
 - less than 10%
 - 10% - 20%
 - 21% - 30%
 - 31% - 40%
 - 41% - 50%
 - 51% - 60%
 - 61% - 70%
 - 71% - 80%
 - 81% - 90%
 - 91% - 100%

The questions in Section 4 apply to your experience selling directly to consumers and wholesale buyers and your perceptions regarding possible outcomes of your participation with MarketMaker.

1. Did your farm participate in any of the following direct marketing opportunities during the last year? If so, please estimate the % of your total annual sales (from all sources) during the past year for each of the following (total must not exceed 100%)

Direct to Consumers (bypassing middlemen)

_____ % On-farm market (e.g., pick-your-own and agritourism) and roadside stands

_____ % Farmers' market

_____ % Community Supported Agriculture (CSA)

_____ % Other (Please specify)

- We did not participate in direct marketing to consumers (end survey)**

Direct to Wholesale buyers (bypassing middlemen)

_____ % Restaurants,

_____ % grocery stores and other retailer,

_____ % schools and other institutions

_____ % Other (Please specify)

- We did not participate in direct marketing to wholesale buyers (end survey)**

2. Do you believe that your participation in MarketMaker has helped you increase your annual direct sales?

Direct to consumers

- No increase in sales
- 1-5% higher sales
- 6-10% higher sales
- 11-20% higher sales
- 21-40% higher sales
- Over 40% (please specify)

Direct to Wholesale buyers

- No increase in sales
- 1-5% higher sales
- 6-10% higher sales
- 11-20% higher sales
- 21-40% higher sales
- Over 40% (please specify)

Full Survey for Producers Using MarketMaker

The questions in Section 1 apply to your experiences with MarketMaker.

1. How did you register for MarketMaker?

- Self-registered
- Registered by someone else
- I don't know

2. How long have you been registered on the MarketMaker website?

- | | |
|--|--|
| <input type="checkbox"/> Less than a month | <input type="checkbox"/> Between 2 and 3 years |
| <input type="checkbox"/> 1 to 6 months | <input type="checkbox"/> Between 3 and 4 years |
| <input type="checkbox"/> 7 months to a year | <input type="checkbox"/> More than 4 years |
| <input type="checkbox"/> Between 1 and 2 years | <input type="checkbox"/> Not sure |

3. How often do you use the following features of the MarketMaker website?

	Ne ver	Rar ely	Some times	Frequ ently
Log on to check/update profile (such as adding new information, photos, social medial links, business contacts, alerts, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for business partnerships (e.g, to find other companies to sell products)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for buyers and sales opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Find a target market for your products (e.g., using demographic data, food consumption data)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the Buy/Sell Forum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Are you mostly interested in using MarketMaker for reaching (check all that apply)

- business buyers
- individual consumers
- other producers

5. What is the average time per month spent on any activities associated with MarketMaker?

- Less than 30 minutes
- 30 to 60 minutes
- 1 to 2 hours
- 3 to 5 hours

- 6 to 10 hours
- More than 10 hours

6. How would you rate your overall satisfaction with MarketMaker?

- | | |
|---|--|
| <input type="checkbox"/> Very satisfied | <input type="checkbox"/> Dissatisfied |
| <input type="checkbox"/> Satisfied | <input type="checkbox"/> Very dissatisfied |
| <input type="checkbox"/> Neutral | <input type="checkbox"/> No response |

7. What are the main challenges you are facing in using MarketMaker?

8. Do you have any suggestions for improving MarketMaker?

The questions in Section 2 refer to your perceptions regarding possible outcomes of your participation with MarketMaker over the entire period of time since you became registered on this website.

1. Do you have a process in place to determine how your customers/buyers find your business?

- No
- Yes

If yes, please describe _____

2. Approximately, how many additional marketing **CONTACTS** (including customers' calls or emails, input suppliers contacts, contacts from other producers, etc.) do you think were developed as a result of your participation with MarketMaker?

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> No new contacts | <input type="checkbox"/> 31 to 40 |
| <input type="checkbox"/> Less than 10 | <input type="checkbox"/> 41 to 50 |
| <input type="checkbox"/> 11 to 20 | <input type="checkbox"/> More than 50 |
| <input type="checkbox"/> 21 to 30 | <input type="checkbox"/> Uncertain |

3. How many new **CUSTOMERS** do you think you have gained due to your participation with MarketMaker?

- No new customers
- Less than 5
- 6 to 10
- 11 to 20
- More than 20
- Uncertain

4. What do you think is the approximate dollar value of your business annual sales generated or assisted by MarketMaker?

- Under \$25
- \$25 to \$50
- \$51 to \$75
- \$76 to \$99
- \$100 to \$499
- \$500 to \$999
- \$1,000 to \$4,999
- \$5,000 to \$9,999
- \$10,000 or more
- Uncertain

5. What do you think is the percentage of your costs of production and marketing (including the costs of using MarketMaker), i.e. your margin of revenue above cost, relative to the level of your business sales (e.g., for every \$100 in sales, my costs of production and marketing are \$50 or 50%)?

- | | |
|--|---|
| <input type="checkbox"/> Less than 19% | <input type="checkbox"/> 80% to 100% |
| <input type="checkbox"/> 20% to 39% | <input type="checkbox"/> More than 100% |
| <input type="checkbox"/> 40% to 59% | <input type="checkbox"/> Uncertain |
| <input type="checkbox"/> 60% to 79% | |

The questions in Section 3 are demographic questions and questions about the size of your business.

1. Please describe your relationship with this farm/business. (select all that apply)

- I am the owner of the farm/business
- I am the manager of the farm/business
- I am an employee of the farm/business
- I am a relative of the owner/manager

2. Please describe the size of your business in terms of total sales for the most recent full calendar year.
- Less than \$ 10,000
 - \$ 10,000 to \$ 49,999
 - \$ 50,000 to \$ 99,999
 - \$ 100,000 to \$ 249,000
 - \$ 250,000 to \$ 499,000
 - \$ 500,000 and over
3. Please provide the zip code where your farm/business is located:
Zip code: _____
4. What is your gender?
- Male Female
5. In what year were you born?

6. What percent of your total family income is generated by your farming business?
- less than 10%
 - 10% - 20%
 - 21% - 30%
 - 31% - 40%
 - 41% - 50%
 - 51% - 60%
 - 61% - 70%
 - 71% - 80%
 - 81% - 90%
 - 91% - 100%
7. Have you attended any event organized by your state's Extension service and Department of Agriculture during the last year? (This includes any event organized by any entity of the Cooperative Extension Service and Department of Agriculture.)
- Yes, I have attended at least one event
 - No, I have not attended any event
8. Since its creation in 2000, MarketMaker has offered its electronic infrastructure and resources to consumers, farmers, processors, retailers, chefs/restaurants, farmer markets, and other users at no cost. Currently, MarketMaker is entirely funded by federal and state government institutions, but may become a privately funded organization in the future. If

MarketMaker becomes privately funded, while retaining all the features and services it currently provides, would you be willing to pay an annual participation fee of \$X for the services you receive from MarketMaker?

- Yes No

Initial annual participation fees (X) will be \$25, 50, 75, 100, 150, and 200.

Would you be willing to pay an annual participation fee of \$X±Y for the services you receive from MarketMaker?

- Yes No

Follow-up annual participation fees (X±Y) will be \$15, 25, 50, 75, 100, and 150 when the initial response is a “no”, and \$50, 75, 100, 150, 200, and 250 when the initial response is a “yes”.

9. Did your farm participate in any of the following direct marketing opportunities during the last year?
- No, we did not participate in direct marketing
 - Farmers’ Markets (If yes, show share of direct marketing sales and continue to the next section)
 - Roadside stands (If yes, show share of direct marketing sales and continue to the next section)
 - Community Supported Agriculture (CSA) (If yes, show share of direct marketing sales and continue to the next section)
 - Other (please specify) (If yes show share of direct marketing sales and continue to the next section)

The questions in Section 4 apply to your experiences selling directly to consumers (individuals, restaurants, schools, etc.) and your perceptions regarding possible outcomes of your participation with MarketMaker.

1. How long has your farm been selling directly to consumers?

- Less than 2 years 10 - 15 years
 2 – 3 years More than 15 years
 4 - 9 years

2. What proportion of you annual sales come from direct sales to consumers?
- Less than 10%
 - 10-30%
 - 31-50%
 - 51-75%
 - More than 75%
3. How many additional marketing contacts (including customers' calls or emails, input suppliers contacts, contacts from other producers, etc.) seeking for information about your direct market sales do you think you have made due to your participation with MarketMaker?
- None
 - Less than 5
 - 6 to 10
 - 11 to 20
 - More than 20
4. Do you believe that your participation in MarketMaker has helped you increase your annual direct sales to consumers?
- No increase in sales
 - 1-5% higher sales
 - 6-10% higher sales
 - 11-20% higher sales
 - More than 30% higher sales

Brief Survey for Farmer's Market Manager Using MarketMaker

The questions in Section 1 describe the nature of your business.

1. How would you best describe your relationship with Farmers' Markets?
 - I am an individual farmer selling at Farmers' Markets
 - I am a Farmers' Market manager
 - Other, please specify _____

2. How long has your Farmers' Market been in operation?
 - Less than 2 years
 - 2 – 3 years
 - 4 - 9 years
 - 10 - 15 years
 - More than 15 years

3. Please provide the zip code where your Farmers' Market is located:
Zip code: _____

4. How would you best describe the **size** of your Farmers' Market in terms of total sales during the most recent full calendar year?
 - Less than \$ 10,000
 - \$ 10,000 to \$ 49,999
 - \$ 50,000 to \$ 99,999
 - \$ 100,000 to \$ 249,000
 - \$ 250,000 to \$ 499,000
 - \$ 500,000 to \$1,000,000
 - over \$1,000,000

5. What was the **total cost of operation** for your Farmers' Market during the most recent full calendar year?
 - Less than \$1000
 - \$1000 to \$4999
 - \$5000 to \$9999
 - \$10,000 to \$19,999
 - \$20,000 to \$50,000
 - More than \$50,000

6. How would you best describe the **time of operation** of your Farmers' Market?
 - Daily
 - Two to three times a week
 - Once a week
 - Two to four months a year
 - Five to eight months a year
 - All year long

The questions in Section 2 apply to your experiences with MarketMaker.

1. How long have you been registered on the MarketMaker website?
 - Less than a month
 - 1 to 6 months
 - 7 months to a year
 - Between 1 and 2 years

- More than 4 years
- Between 2 and 3 years
- Between 3 and 4 years
- Not sure

2. How often do you use the following features of the MarketMaker website?

	Never	Rarely	Sometimes	Frequently
Log on to check/update profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for new vendors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reach out to customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. How would you rate your overall satisfaction with MarketMaker?

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied
- No response

4. What are the main challenges you are facing when using MarketMaker?

The questions in Section 3 refer to your perceptions regarding possible outcomes of your participation with MarketMaker over the entire period of time since you became registered on this website.

1. How many **contacts** do you think have been made with your Farmers' Market due to its participation with MarketMaker?

- None
- Less than 5
- 6 to 10
- 11 to 20
- More than 20

2. Approximately, what percentage **increase in the total sales** at your Farmers' Market have you experienced due to participation with MarketMaker?

- No increase
- Less than 10%
- 10% to 19%
- 20% to 29%
- 30% to 39%
- 40% to 49%
- 50% to 59%
- 60% to 69%
- 70% to 79%
- 80% to 89%
- 90% or greater
- Not Sure

Does not apply

3. How many **new vendors** do you think your Farmers' Market have gained due to your membership with MarketMaker?

- None
- Less than 5
- 5 to 10
- 11 to 25
- 25 to 50

The questions in Section 4 are demographic questions describing the Farmers' Market manager.

1. What is your gender?

Male

Female

2. In what year were you born?

Full Survey for Farmer's Market Manager Using MarketMaker

The questions in Section 1 describe the nature of your business.

1. How would you best describe your relationship with Farmers' Markets?
 - I am an individual farmer selling at Farmers' Markets
 - I am a Farmers' Market manager
 - Other, please specify _____

2. How long has your Farmers' Market been in operation?
 - Less than 2 years
 - 2 – 3 years
 - 4 - 9 years
 - 10 - 15 years
 - More than 15 years

3. Please provide the zip code where your Farmers' Market is located:
Zip code: _____

4. How would you best describe the **size** of your Farmers' Market in terms of total sales during the most recent full calendar year?

<input type="checkbox"/> Less than \$ 10,000	<input type="checkbox"/> \$ 250,000 to \$ 499,000
<input type="checkbox"/> \$ 10,000 to \$ 49,999	<input type="checkbox"/> \$ 500,000 to \$ 1,000,000
<input type="checkbox"/> \$ 50,000 to \$ 99,999	<input type="checkbox"/> over \$ 1,00,000
<input type="checkbox"/> \$ 100,000 to \$ 249,000	

5. What was the **total cost of operation** for your Farmers Market during the most recent full calendar year?

<input type="checkbox"/> Less than \$1000	<input type="checkbox"/> \$10,000 to \$19,999
<input type="checkbox"/> \$1000 to \$4999	<input type="checkbox"/> \$20,000 to \$50,000
<input type="checkbox"/> \$5000 to \$9999	<input type="checkbox"/> More than \$50,000

6. How would you best describe the **time of operation** of your Farmers' Market?

<input type="checkbox"/> Daily	<input type="checkbox"/> Two to four months a year
<input type="checkbox"/> Two to three times a week	<input type="checkbox"/> Five to eight months a year
<input type="checkbox"/> Once a week	<input type="checkbox"/> All year long

The questions in Section 2 apply to your experiences with MarketMaker.

1. How did you register for MarketMaker?

- Self-registered
- Registered by someone else
- I don't know

2. How long have you been registered on the MarketMaker website?

- Less than a month
- 1 to 6 months
- 7 months to a year
- Between 1 and 2 years
- Between 2 and 3 years
- Between 3 and 4 years
- More than 4 years
- Not sure

3. How often do you use the following features of the MarketMaker website?

	Never	Rarely	Sometimes	Frequently
Log on to check/update profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search for new vendors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reach out to customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. What is the average time per month spent on any activities associated with MarketMaker?

- Less than 30 minutes
- 30 to 60 minutes
- 1 to 2 hours
- 3 to 5 hours
- 6 to 10 hours
- More than 10 hours

5. How would you rate your overall satisfaction with MarketMaker?

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied
- No response

6. What are the main challenges you are facing when using MarketMaker?

7. Do you have any suggestions to improve MarketMaker?

The questions in Section 3 refer to your perceptions regarding possible outcomes of your participation with MarketMaker over the entire period of time since you became registered on this website.

1. How many contacts do you think have been made with your Farmers' Market due to its participation with MarketMaker?

- None
- Less than 5
- 6 to 10
- 11 to 20
- More than 20
- Don't know

2. Approximately, what percentage increase in the total sales at your Farmers' Market have you experienced due to participation with MarketMaker?

- No increase
- Less than 10%
- 10% to 19%
- 20% to 29%
- 30% to 39%
- 40% to 49%
- 50% to 59%
- 60% to 69%
- 70% to 79%
- 80% to 89%
- 90% or greater
- Not Sure
- Does not apply

3. How many new vendors do you think your Farmers' Market has gained due to your participation with MarketMaker?

- None
- Less than 5
- 5 to 10
- 11 to 25
- 25 to 50

4. How many new customers (buyers) do you think your Farmers' Market has gained due to your participation with MarketMaker?

- Uncertain
- None
- Less than 10
- 11 to 25

- 25 to 50
- 50 to 100

- 101 to 200
- More than 200

5. Since its creation in 2004, MarketMaker has offered its electronic infrastructure and resources to consumers, farmers, processors, retailers, chefs/restaurants, farmers markets, and other users at no cost. Currently, MarketMaker is entirely funded by federal and state government institutions, but may become a privately funded organization in the future. If MarketMaker becomes privately funded, while retaining all the features and services it currently provides, would you be willing to pay an annual participation fee for the services you receive from MarketMaker?

- Yes
- No

What annual participation fee are you willing to pay for the services you receive from MarketMaker? _____

The questions in Section 4 are demographic questions describing the Farmers' Market manager.

1. What is your gender?

- Male
- Female

2. In what year were you born?

3. Have you attended any event organized by your state's extension service or State Department of Agriculture during the last year? (This includes any event organized by any entity of the Cooperative Extension Service or State Department of Agriculture)

- Yes, I have attended at least one event
- No, I have not attended any event

Additional State Specific Questions for Florida

1. Please select the THREE items you feel would be most beneficial to you in implementing Florida Market Maker:
 - a. Workshops on general use conducted by local area extension agents
 - b. Workshops on specialized topics conducted by IFAS State Staff
 - c. Video tutorials posted on the web
 - d. Written user guides
 - e. Newsletter or periodical updates
 - f. "Tips and tricks" posted as updates on sites such as Facebook and Twitter
 - g. Other (please specify) _____

2. What information or topics do you feel you MOST need to make Florida Market Maker an effective tool for your business? Please RANK from 1 to 6, with 1 being "most needed" and 6 being "least needed".
 - a. Updating profile information including data and pictures
 - b. Using the market data search functions
 - c. Posting in forums
 - d. Examples of other business' use of Market Maker
 - e. General information on digital media marketing
 - f. Other (please specify) _____

3. Who are you most likely to approach for assistance or consult with to understand and utilize Florida Market Maker? Please RANK from 1 to 8, with 1 being "most likely to approach for assistance" and 8 being "least likely to approach".
 - a. IFAS State Staff
 - b. Local extension agents
 - c. Other users of Florida Market Maker in your community
 - d. Family and friends who may not use Market Maker but who know the Internet and web applications

- e. Written materials posted online or available in print format
 - f. Videos or podcasts posted online
 - g. Social networking sites such as YouTube or Twitter
 - h. Other (please specify) _____
4. In the past 6 months, have you had contact with University of Florida/Institute of Food and Agriculture Sciences staff regarding Florida MarketMaker? (“contact” can include e-mails, workshops, trade fairs, or any other form of communication related to Florida MarketMaker.)
- a. Yes, I have had contact ONLY with a State Staff person from UF/IFAS regarding MarketMaker
 - b. Yes, I have had contact ONLY with a Regional or Local Cooperative Extension Staff regarding MarketMaker
 - c. Yes, I have had contact with BOTH State Staff and Regional or Local Extension Staff regarding MarketMaker
 - d. No, I have never had contact with a Florida Cooperative Extension staff member regarding MarketMaker
5. Please provide any suggestions or comments you feel University of Florida/Institute of Food and Agriculture Sciences Staff might utilize to improve access, use or understanding of Florida MarketMaker.
-
-

Additional State Specific Questions for Georgia

1. How did you find out about MarketMaker?
-

Additional State Specific Questions for Indiana

Do you produce organic vegetables or fruit?

1. Yes 2.No

How important is price when choosing the products you will grow?

Not important Neutral Very Important

1 2 3 4 5

Please to what extent the following are barriers to producing organic vegetables or fruit. Choose one per category.

Barriers	Not at all (1)	A little (2)	Somewhat (3)	Very Much (4)	Extremely (5)
Labor					
Inputs					
Price					
Paperwork					

Additional State Specific Questions for Iowa and Louisiana

1. Please specify the other farm directory or marketing websites with which your business is registered. (Check all that apply)
 - Local Harvest - <http://www.localharvest.org/>
 - Farm Locator - <http://www.newfarm.org/farmlocator/index.php>
 - Eat Well Guide - <http://www.eatwellguide.org>
 - Rural Bounty - <http://www.ruralbounty.com/>
 - Local Farm Link - <http://localfarmlink.com>
 - Chef Collaborative - <http://guide.chefscollaborative.org/>
 - Agricultural Business - <http://agrinet.tamu.edu/agbus/home.htm>
 - Green People - <http://www.greenpeople.org/>
 - Eat Wild, Grass-Fed Food - <http://www.eatwild.com/products/index.html>
 - Family Farmed - <http://www.familyfarmed.org/>
 - Pick Your Own - <http://www.pickyourown.org/>
 - State locally growth campaign website
 - Farm Bureau
 - Local Food directory for my city/county
 - Other, specified _____
 - Not registered with other websites

Additional State Specific Questions for Michigan

Section1

3. How did you learn about MarketMaker?

4. Are you mostly interested in using MarketMaker for reaching (check all that apply)

- business buyers**
- individual consumers**
- business partners**

7. What additional support for MarketMaker do you expect from the State committee and MarketMaker partners?

8. Would you be willing to purchase advertising space on MarketMaker?

- Yes**
- No**

9. If MarketMaker could provide an on-line ordering and sales program, would you be interested in participating?

- Yes**
- No**

Additional State Specific Questions for Mississippi

1. In what year was your business established?

2. How many persons were employed in your business?

	Full time	Part time
One to ten	<input type="checkbox"/>	<input type="checkbox"/>
Eleven to twenty	<input type="checkbox"/>	<input type="checkbox"/>
Twenty one to thirty	<input type="checkbox"/>	<input type="checkbox"/>
Thirty one to forty	<input type="checkbox"/>	<input type="checkbox"/>
Forty one to fifty	<input type="checkbox"/>	<input type="checkbox"/>
Fifty one to sixty	<input type="checkbox"/>	<input type="checkbox"/>
Sixty one to seventy	<input type="checkbox"/>	<input type="checkbox"/>

Seventy one to eighty	<input type="checkbox"/>	<input type="checkbox"/>
Eighty one to ninety	<input type="checkbox"/>	<input type="checkbox"/>
Ninety one to one hundred	<input type="checkbox"/>	<input type="checkbox"/>
More than one hundred	<input type="checkbox"/>	<input type="checkbox"/>

3. How many percent of your sales were made to customers outside of Mississippi?

- | | |
|--|---|
| <input type="checkbox"/> Less than 10% | <input type="checkbox"/> 60% to 69% |
| <input type="checkbox"/> 10% to 19% | <input type="checkbox"/> 70% to 79% |
| <input type="checkbox"/> 20% to 29% | <input type="checkbox"/> 80% to 89% |
| <input type="checkbox"/> 30% to 39% | <input type="checkbox"/> 90% or greater |
| <input type="checkbox"/> 40% to 49% | <input type="checkbox"/> Not Sure |
| <input type="checkbox"/> 50% to 59% | |

4. How many percent of your purchases were made to suppliers outside of Mississippi?

- Less than 10%
- 10% to 19%
- 20% to 29%
- 30% to 39%
- 40% to 49%
- 50% to 59%
- 60% to 69%
- 70% to 79%
- 80% to 89%
- 90% or greater
- Not Sure

Additional State Specific Questions for South Carolina

1. How do you think your annual profitability changed due to participation with MarketMaker?

- Increased Not changed
 Decreased Don't know

Approximately, what is the percentage increase/decrease in total profitability?

- Less than 5%
 6% to 10%
 11% to 20%
 More than 20% percent

2. Do you think participation with MarketMaker allowed you to change average prices per unit that you are able to charge for your products?

- Yes, increased prices in some cases Don't know
 Yes, decreased prices in some cases
 No, did not change prices

Approximately, what is the percentage increase/decrease in prices per unit that your business is able to charge?

- Less than 5%
 6% to 10%
 11% to 20%
 More than 20% percent

3. Do you think participation with MarketMaker affected your average costs of production and marketing per unit?

- Yes, Costs have increased No, costs have not changed
 Yes, Costs have decreased Don't know

Approximately, what is the percentage increase/decrease of your average per unit costs of production and marketing?

- Less than 5%
- 6% to 10%
- 11% to 20%
- More than 20% percent

4. Do you think participation with MarketMaker allowed you to change quantities of products that you are able to sell annually?

- Yes, quantities have increased
- Yes, quantities have decreased
- No, quantities have not changed
- Don't know

Approximately, what is the percentage increase/decrease of annual quantity sold?

- Less than 5%
- 6% to 10%
- 11% to 20%
- More than 20% percent

5. Do you think participation with MarketMaker allowed you to change quantities of production inputs that you buy annually?

- Yes, quantities have increased
- Yes, quantities have decreased
- No, quantities have not changed
- Don't know

Approximately, what is the percentage increase/decrease of annual quantity of input bought?

- Less than 5%
- 6% to 10%
- 11% to 20%
- More than 20% percent

Additional State Specific Questions for Ohio

Ohio-specific questions will be added at the end of section 3:

4. Do you currently use a mobile device to view web sites or use mobile apps on any of the following?
(check all that apply)

- r Android
- r iPhone
- r Blackberry
- r Windows
- r iPad or other Tablet
- r I have not used mobile applications, but I plan to in the next year or two.
- r I do not use mobile applications and I do not plan to during the next 2 years.

5. In 2010, did you...? (check all that apply) ___ Retain existing jobs?

___ Add new jobs?

___ Make a capital investment in your business (such as land, buildings, equipment)?

6. In 2011, do you plan to...? (check all that apply) ___ Retain existing jobs?

___ Add new jobs?

___ Make a capital investment in your business (such as land, buildings, equipment)?

7. Do you believe Ohio MarketMaker help keep more food dollars in the regional economy?

Yes

No

Uncertain

You also wanted to add the following question at the end of section 4:

3. What would make MarketMaker an even more valuable business tool that you would use on a regular basis to help you meet your business goals?

Additional State Specific Questions for Ohio

1. How many full time and/or part time jobs did your farmers' market retain in the last full calendar year? (count paid staff and vendors) ____ full time jobs ____ part time jobs
2. How many full time jobs did your farmers' market create in the last full calendar year? (count paid staff and vendors that are newly created jobs.) ____ full time jobs ____ part time jobs
3. Please estimate the number of customers who visit your farmers' market on any market day throughout the season _____ estimated number of consumers
4. Does your farmers' market accept (please check all that apply) Debit, Credit, EBT (food stamps), WIC, SFMNP?
5. What is the biggest challenge your farmers' market faced this past season? _____

APPENDIX B
PUBLICATIONS AND PRESENTATIONS

Do Internet-Based Promotion Efforts Work? Evaluating
MarketMaker. *Journal of Agribusiness*, 29 (1) (2011):
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**Do Internet-Based Promotion Efforts Work?
Evaluating MarketMaker**

Samuel D. Zapata, Carlos E. Carpio, Olga Isengildina-Massa,
and R. Dave Lamie

MarketMaker is one of the most extensive collections of electronic searchable food industry-related data engines in the country with over 17,500 profiles, including over 7,600 agricultural producers. This article summarizes the results of a survey that assesses the impact of MarketMaker on agricultural producers registered on the website. Results indicate that, by participating on MarketMaker, producers' annual sales have increased by about \$121. The number of contacts received, new customers gained, and increased annual sales due to participation in the site are positively related to self-registration on the MarketMaker site, time since registration, and monthly time devoted to the website.

Key words: e-commerce, economic impact, effectiveness, direct marketing, nonparametric methods, supply chain

MarketMaker is an interactive web-based resource that provides geo-coded food marketing information to food entrepreneurs and customers. The site was created in 2000 by a team of University of Illinois Extension personnel with the intention of building an electronic infrastructure that would easily connect Illinois food-producing farmers with economically viable new markets to aid in the development of quality driven food supply chains.

MarketMaker enables both producing and consuming users to make informed decisions. For producers, it provides information to help better target consumers and identify potential businesses with which to collaborate. The site allows a producer to select consumer attributes and receive a geo-coded response that shows the location of consumers with those attributes. Consumer data related to six different demographic characteristics can be mapped to locate markets. Full census profiles for geographic markets can also be generated.

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A second feature on the website includes business data that allows producers to identify other potential supply chain partners. Since this data is also geo-coded, the user can find potential business partners that are best situated to serve their intended markets. The mapping feature makes MarketMaker an intuitive vehicle for gathering the marketing data necessary to launch a new value-added venture.

For consumers—households, processors, handlers, retail, and wholesale companies—MarketMaker provides information about where to purchase products or to identify upstream opportunities for adding value before final sale.

Since market systems are rarely defined by state boundaries, a logical progression for the state-level project was to expand to other states. There are 18 states that have launched MarketMaker sites including Illinois, Iowa, Nebraska, Kentucky, New York, Georgia, Mississippi, Michigan, Ohio, Indiana, South Carolina, Colorado, Arkansas, Florida, Pennsylvania, Louisiana, Alabama and Washington, D.C. Several other states are also considering development of a state site. To date, the MarketMaker site includes nearly 17,500 profiles of food-related enterprises—including 7,698 producers—and receives about 1 million hits per month from over 86,000 food industry entrepreneurs.

As the MarketMaker network grows and develops a historical track record, so does the need to formally track the financial, economic, and other benefits to participants. Hence, the main goal of this article is to summarize the results of a survey that assesses the current and potential benefits obtained by agricultural producers¹ using MarketMaker. This information is necessary *to ensure the most efficient allocation of resources dedicated to its support and development*. Entities in the states where MarketMaker is not yet present may also find this information useful as they make decisions regarding allocation of funds to support their clientele.

Parametric and nonparametric methods were proposed to estimate the mean of a variable when its actual value is observed to take a particular value (usually zero) or to fall in a certain interval on a continuous scale. These procedures were necessary since several of the variables in the survey were collected using a discrete number of categories in order to simplify the respondent's task and to encourage response.

Literature Review

Agricultural producers' use of computers and the Internet have increased in recent years. In 2009, 59% of U.S. farms had Internet access and 64% had access to a computer, compared to 29% and 47% in 1999, respectively (USDA-NASS, 2009). One of the potential applications of computers and the Internet in agriculture is e-commerce, which refers to the use of the Internet to market, buy and sell goods and services, exchange

¹ Agricultural producers include both farmers and fishermen.

information via Internet, and create and maintain web-based relationships between participant entities (Fruhling and Digman, 2000).

E-commerce has been said to have the potential to both increase sales, as well as to significantly decrease costs through greater efficiencies of operation. Gains in efficiency could result from the reduction of inventory levels, transportation costs, information costs, and order and delivery times (Batte and Ernst, 2007; and Montealegre, Thompson and Eales, 2007). Moreover, the creation of electronic markets that are expected to be more transparent and competitive than physical markets may attract more consumers and, thus, increase demand and improve the firm's strategic position with customers seeking specific niche products or having geographical restrictions (Batte and Ernst, 2007; and Montealegre, Thompson and Eales, 2007).

In spite of the touted potential of e-commerce to improve profits in agriculture, the literature on the economic impact of e-commerce is very limited. Most of the literature related to the use of computers and the Internet has focused on describing and analyzing the extent of adoption and usage by agribusinesses (USDA-NASS, 2009; and Batte, 2004).

Some research efforts have also concentrated on specific ways farmers use the Internet. According to USDA-NASS (2009), 36% of farms in the United States used computers for farm business, 13% purchased agricultural inputs over the Internet, and 11% used the Internet to conduct marketing activities. The main use of the internet by farmers seems to be related to the exchange of information. Park and Mishra (2003), using the data from the 2000 Agricultural Resource Management Survey (ARMS), found that 83% of U.S. farmers used the internet for price tracking, 56% used it to access agricultural information services, and other (percentage not reported) used the Internet to keep records and transmit data to clients. Similarly, Smith et al. (2004)—in a study of 517 farmers in the Great Plains states of Kansas, Iowa, Nebraska, and Oklahoma—found that most of the surveyed farmers used the Internet as a source of information. Specifically, the study reported that 62% of surveyed farmers used the Internet to obtain information on commodity markets, 54% used it to gather technical information on inputs, 36% to retrieve financial information, 73% to collect weather information, and 37% to obtain information on agricultural policy.

Use of the Internet to buy and sell products appears to be less common. Briggeman and Whitacre (2008), using 2005 ARMS data, found that only 6.6% of U.S. farmers used it to purchase farm inputs. Reasons for this unwillingness to buy online could have included quality and service concerns, as well as the fact that the difference in input prices between physical and electronic purchases was not significant (Batte and Ernst, 2007).

Less is known about adoption and use of computers and the Internet by other types of agribusinesses such as input and service providers. However, there is some evidence indicating that rates of adoption and use among them is higher compared to agricultural producers. For example, Ehmke et al. (2001) showed that, as early as 2000, 79% of surveyed agribusinesses comprising farm equipment and service companies in Ohio had Internet access and 16% were selling via the Internet.

In terms of research efforts evaluating the effectiveness of specific e-commerce platforms, we are aware of only two state-level efforts that focus on the impact of MarketMaker for agribusiness operations in Ohio and New York. Fox (2009) developed and implemented a survey of various representatives of Ohio's food chain, including producers, processors, wineries, farmers' markets, and distributors. One of the objectives of the project was to explore changes in marketing practices and market access that resulted from the use of MarketMaker. The survey asked Ohio registered producers if they considered that the MarketMaker site was helping keep more food dollars in the regional economy. Sixty-three percent of producers agreed with the statement. Cho and Tobias (2009) conducted a survey of New York farmers registered on MarketMaker. Survey results indicated that the average increase in annual sales attributed to MarketMaker was between \$225 and \$790. Additionally, 12% of the respondents reported receiving marketing contacts through MarketMaker and using the MarketMaker directory to contact other food industry business partners.

Overall, as the literature review shows, rates of adoption and use of computers and the Internet by U.S. agribusinesses continue to increase; however, the development of e-commerce has been relatively slow and mainly limited to the exchange of information. Studies evaluating the effectiveness of agricultural e-commerce platforms such as MarketMaker are very limited.

Survey Description

To study the impact of MarketMaker, agricultural producers previously registered on the site were surveyed during the months of May and June 2011. The survey instrument was based on logic models² developed by Lamie et al. (2011). Survey development efforts were led by a Clemson University team of researchers working closely with MarketMaker administrators in each state. Final survey instruments were approved by the MarketMaker National Evaluation Committee and the MarketMaker Policy Advisory

² Logic models are graphical depictions of the linkages among a project inputs and outputs. Logic models are used as planning and evaluation tools. A detailed description of logic models development and use can be found in W.K. Kellogg Foundation (2004). Applications of logic models in the academic literature are found in areas such as agricultural technology transfer (Framst, 1995), research and development (Jordan and Mortensen 1997), and industrial modernization (Torvatn, 1999).

Committee. The survey was distributed by email to 4,264 producers³ registered on MarketMaker websites in 14 participating states: Illinois, Iowa, Nebraska, New York, Georgia, Mississippi, Ohio, Indiana, South Carolina, Colorado, Arkansas, Florida, Louisiana, and Washington, D.C.

The questionnaire was divided into four sections. The first section focused on users' experiences with MarketMaker. Section 2 concentrated on participants' perceptions regarding the impact of MarketMaker on their business. The third section asked respondents about their demographic characteristics, as well as business characteristics. Finally, Section 4, which was only applied to producers participating in direct-marketing channels, focused on the impact of MarketMaker on direct marketing.

An invitation email containing a brief description of the project and the link to the questionnaire was sent to all agricultural producers from the participating states. The invitation email clearly reflected the support of the local MarketMaker leaders and administrators. Two reminder emails (one and two weeks after the initial email) were sent to those individuals who had not responded to the survey. To further encourage participation in the survey, respondents were offered the opportunity to enter a drawing to win \$100. Typical completion time of the questionnaire was 5-10 minutes.

The overall response rate of the survey was 7.1% and it generated 304 usable observations. As found in Hamilton (2003) meta-study of 199 online surveys, online survey response rates tend to be low (13.4% average response rate in their study). The sample frame size, number of respondents, and response rate by MarketMaker participant state is shown in Table 1. The states with the highest response rates were Florida (17.5%) and Louisiana (11.5%), and those with the lowest response rates were the District of Columbia (0.0%)⁴ and Nebraska (3.7%).

³ Ninety seven percent of producers registered on the website are farmers, 1% are fishermen, and 2% are both farmers and fishermen.

⁴ The frame size in Washington, D.C., only includes six producers.

Table 1. Survey Sample Frame Size, Number of Respondents, and Response Rate by State

State	Sample Frame Size	Number of Respondents	Response Rate
<i>Arkansas</i>	45	3	6.67
<i>Colorado</i>	485	28	5.77
<i>District of Columbia</i>	6	0	0.00
<i>Florida</i>	143	25	17.48
<i>Georgia</i>	260	16	6.15
<i>Illinois</i>	737	42	5.70
<i>Indiana</i>	323	31	9.60
<i>Iowa</i>	326	26	7.98
<i>Louisiana</i>	148	17	11.49
<i>Mississippi</i>	93	7	7.53
<i>Nebraska</i>	328	12	3.66
<i>New York</i>	753	49	6.51
<i>Ohio</i>	361	35	9.70
<i>South Carolina</i>	256	13	5.08
<i>Total</i>	4,264	304	7.13

Estimation of the Means

In order to simplify the respondent's task and to encourage a response, most of the demographic and business information, as well as outcome measures (e.g., number of new contacts found through MarketMaker) were collected using a discrete number of categories, hence the calculation of the mean value of these variables required the use of special statistical techniques (Bhat, 1994; Carpio, Wohlgenant, and Safley, 2008; and Stewart, 1983). In addition to serving as a summary statistic of the variables, mean values of the outcome measures were required, for example, for the calculation of the economic impact of the MarketMaker website at the aggregate level (state and national).

In this section, we present two alternative approaches used for the estimation of the mean values: a parametric and nonparametric approach. The parametric approach was adapted from the literature on the estimation of equations using data in which the dependent variable is only observed to fall in a certain interval (Stewart, 1983; and Bhat,

1994). The nonparametric procedure was adapted from the survival statistical literature (Turnbull, 1976) and the contingent valuation literature (Day, 2007).

We denote the true (but unobserved) variable of interest for the i^{th} individual is y_i . The probability that y_i is in the k^{th} interval⁵ with boundary values of $A_{(k-1)}$ and A_k , is given by:

$$(1) \quad \mathbf{P}(A_{(k-1)} \leq y_i \leq A_k) = \mathbf{F}(A_k) - \mathbf{F}(A_{(k-1)}) \quad i = 1, 2, \dots, N,$$

where $F(\cdot)$ is the underlying probability distribution of variable y (Day 2007; and Turnbull 1976).

The probability of observing a particular set of responses in a random sample of N individuals from the population of interest is then given by the likelihood function:

$$(2) \quad \mathbf{L} = \prod_{i=1}^N \mathbf{F}(A_k) - \mathbf{F}(A_{(k-1)}).$$

In order to express the likelihood function in terms of all interval options available to the respondent, we create a dummy variable d_{ik} which indicates whether an individual chooses the k^{th} interval among K options. Using this indicator variable and the generic likelihood function in (2), the resulting log-likelihood function is:

$$(3) \quad \ln \mathbf{L} = \sum_{i=1}^N \ln \sum_{k=1}^{K+1} d_{ik} [\mathbf{F}(A_k) - \mathbf{F}(A_{(k-1)})].$$

Parametric Procedure

The parametric procedure used for the estimation of the mean of y assumes that the variable follows a normal distribution with mean μ and variance σ^2 . Consequently, the log-likelihood function can be written as:

$$(4) \quad \ln \mathbf{L} = \sum_{i=1}^N \ln \sum_{k=1}^{K+1} d_{ik} \left[\Phi \left(\frac{A_k - \mu}{\sigma} \right) - \Phi \left(\frac{A_{(k-1)} - \mu}{\sigma} \right) \right],$$

where $F(\cdot)$ in equation (3) has been replaced by the cumulative standard normal $\Phi(\cdot)$. Parameter estimates for μ and σ can then be obtained by using the maximum likelihood estimation procedures. Since in some of the cases the first “interval” option offered to the respondents was zero, the term $\ln \sum_{k=1}^{K+1} d_{ik} [\Phi(\frac{A_k - \mu}{\sigma}) - \Phi(\frac{A_{(k-1)} - \mu}{\sigma})]$ needs to be replaced by $\ln \phi(\frac{\mu}{\sigma})$ for those respondents who selected this interval option (e.g., number of contacts in Table 4).

Parameter estimates obtained in equation (4) can also be used to estimate the conditional mean of the unobserved y_i 's using (Stewart, 1983):

(5)

$$E(y_i | y_i \in \text{kth interval}) = \mu + \sigma \left[\frac{\phi(\frac{A_{(k-1)} - \mu}{\sigma}) - \phi(\frac{A_k - \mu}{\sigma})}{\Phi(\frac{A_k - \mu}{\sigma}) - \Phi(\frac{A_{(k-1)} - \mu}{\sigma})} \right] \quad i = 1, 2, \dots, N.$$

Notice that the previous literature using data in which a variable is only observed to fall in a certain interval has focused on two main issues: 1) the imputation of the values of the unobserved variable for each respondent, and 2) the analysis of the effect of explanatory variables on the conditional mean of the unobserved variable. In contrast, the objective of our analysis is the estimation of the mean of the marginal distribution of the variable of interest.

Nonparametric Procedure

Estimation of the mean of the variables of interest was also carried out using the nonparametric approach for interval-censored data proposed by Turnbull (1976). This technique does not impose ad hoc assumptions about the probability distribution of the variable of interest y . This is important since several of the variables analyzed in this study are likely not normally distributed and it is unknown to what extent the normal approximation is appropriate.

Given that the probability distribution of y (F) is unknown, Turnbull's procedure considers each $F_k = F(A_k)$ as a parameter to be estimated. Moreover, in order to ensure that the likelihood estimates define a valid cumulative distribution function, the estimation algorithm needs to be expressed as a constrained maximization problem of the form:

$$(6) \quad \text{Max}_{\mathbf{F}} \ln L(\mathbf{F}|\mathbf{d}) = \sum_{i=1}^N \ln \sum_{k=1}^{K+1} d_{ik} (F_k - F_{(k-1)})$$

$$\text{Subject to: } 0 = F_0 \leq F_1 \dots \leq F_{K+1} = 1.$$

Since (6) is strictly concave, the F_k estimates are unique. Estimation is then carried out using Turnbull's self-consistent algorithm (Day, 2007; Gomez, Calle, and Oller, 2004; and Turnbull, 1976). The expected value of y can thus be written as (Haab and McConnell, 1997):

$$(7) \quad E(y) = \int_0^{A_K} y dF(y) = \sum_{j=1}^M \int_{A_{k-1}}^{A_k} y dF(y).$$

Replacing y by the lower or upper bound of each interval, it can be shown that the lower (LB) and upper bound (UB) estimates of the expected value of y ($E(y)$) are:

$$(8) \quad E(y_{LB}) = \sum_{k=1}^{K+1} A_{k-1} (F_{(k-1)} - F_k)$$

$$(9) \quad E(y_{UB}) = \sum_{k=1}^{K+1} A_k (F_{(k-1)} - F_k).$$

Hence, the drawback of using the nonparametric procedure is that it generates upper and lower bounds of the mean of the distribution rather than a unique point estimate. Maximization of the log-likelihood functions was performed using the computing software Matrix Laboratory (MATLAB)..

Results

The results section includes summary statistics for respondent characteristics, summary statistics concerning MarketMaker registration and use, as well as producer perceptions about the impact of MarketMaker. This section also includes a brief discussion about the relationships between MarketMaker outcomes and some characteristics of the use of the MarketMaker website by producers. For the categorical variables, we mainly used the estimated parametric mean in the discussion of results. A short discussion about the difference between the parametric and nonparametric means estimates is presented at the end of the section.

Characteristics of Respondents

Survey results indicate that nearly 94% of the respondents were the owners or the managers of the business. This finding gives more credibility to their answers concerning the characteristics of the operation and the impact of MarketMaker on their business performance. Forty-nine percent of respondents were female. This percentage is higher than that reported by operators interviewed in the 2007 Census of Agriculture which possibly has to do with the fact that women are the dominant users of computers on family farms (Mackrell, 2006). On the other hand, the average age of the survey respondents was 53 years which is consistent with the U.S. Census of Agriculture data (54.9 years) (USDA-NASS, 2009).

Regarding characteristics of the business, survey respondents indicated that their operations generate, on average, about \$152,500 in total annual sales (versus \$134,806 for the U.S. census), and that income from their business activities represents 38.9% of the individual's total family income compared to 28% for the average U.S. farmer (USDA-NASS, 2009). Table 2 presents a complete description of the key variables describing respondent and business characteristics.

Table 2. Description and Summary Statistics of Respondents Characteristics

Variable Name (Units)	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
<i>Relationship with the business</i>	Owner	86.04			
	Manager	7.79			
	Employee	4.22			
	Other	1.95			
<i>Gender</i>	1=Female	0.49		0.51	0.25
	0=Male	0.51			
<i>Age</i>				52.93	12.81
<i>Total annual sales (\$1,000)</i>	Less than \$10	37.09	(123.66, 262.32)	151.5	267.9
	\$10 to \$50	21.52			
	\$50 to \$100	14.57			
	\$100 to \$250	9.93			
	\$250 to \$500	5.96			
	\$500 to \$1,000	3.97			
	Over \$1,000	6.95			
	<i>Share of total family income from farming (%)</i>	Less than 10	34.72	(33.12, 42.60)	38.85
10 to 20		13.96			
21 to 30		8.30			
31 to 40		4.15			
41 to 50		6.42			
51 to 60		3.02			
61 to 70		2.64			
71 to 80		4.53			
81 to 90		5.66			
91 to 100		16.60			

Variable Name (Units)	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
<i>Time registered on MarketMaker (Months)</i>	Less than 1	1.52	(14.35, 24.38)	20.02	13.02
	1 to 6	13.13			
	7 to 12	18.69			
	12 to 24	39.90			
	24 to 36	16.16			
	36 to 48	7.07			
	more than 48	3.54			
<i>Time spent on MarketMaker activities (Mins/mon)</i>	Less than 30	81.52	(9.77, 41.27)	24.35	22.67
	30 to 60	14.22			
	61 to 120	1.42			
	121 to 300	2.84			

MarketMaker Registration and Use

Most of the agricultural producers responding to the survey (73%) indicated they had registered on the site by themselves, 7% indicated they were registered by someone else, and 20% did not know how they became enrolled in MarketMaker. This finding may be explained by the fact that, in some states, sometimes producer lists provided by state departments of agriculture were used to initially populate their MarketMaker databases.

On average, respondents have been registered on the site for 20 months. About 33% of respondents have been registered for less than 12 months, 40% have been registered between 12 and 24 months, and 27% have been registered for more than 24 months (Table 2). Producers reported various degrees of intensity with respect to the use of MarketMaker features (see Table 3). The features that were most commonly used (sometimes and frequently) are the “log on to check or update profile” (24% of users), “search for products” (26%), and “search for buyers and sales opportunities” (25%). Less commonly used features included “search for business partnerships” which was used sometimes or frequently by about 17% of users; “use the buy/sell Forum,” a relatively new feature introduced in 2010 (15%); and “find target market for your products” (13%). This table also stands to imply that about 42% of registered producers could be

considered as non-users of MarketMaker, 37% were passive users, 18% average users and only 3% were active users. Thus, efforts should be made to encourage more active use of the website by registered producers.

Table 3. MarketMaker Features and their Rate of Use by Producers.

Feature	Never	Rarely	Sometimes	Frequently
Log on to Check or Update Profile (such as adding new information, photos, social media links, business contacts, alerts, etc.)	0.25	0.51	0.22	0.02
Search for Products	0.37	0.37	0.23	0.03
Search for Business Partnerships (e.g., to find other companies to sell products)	0.49	0.33	0.16	0.02
Search for Buyers and Sales Opportunities	0.41	0.35	0.21	0.04
Find a Target Market for Your Products (e.g., using demographic data, food consumption data)	0.48	0.38	0.11	0.02
Use the Buy/Sell Forum	0.55	0.30	0.12	0.03
Other	0.80	0.15	0.03	0.02

In relation to the time devoted to the website, producers registered on MarketMaker spend about 23 minutes per month managing their account, with nearly 82% of the producers devoting less than 30 minutes per month on MarketMaker-related activities (Table 2). Producers were also asked about the type of customers they intended to reach with MarketMaker. Survey results indicate that 82% of agricultural producers use the MarketMaker website to reach individual consumers, 30% to connect with business buyers, and 10% to contact other producers. Hence, even though a lot of effort by the MarketMaker administrators has been devoted to promote business-to-business activities on the site (Lamie et al., 2011), producers still perceived MarketMaker mainly as a tool to reach individual consumers.

Producers' Perceptions about Impact of MarketMaker

Survey questions related to the impact of MarketMaker asked respondents about its perceived impact on the total number of contacts received due to their participation in the site, total number of new customers gained, and the increase in annual sales since

producers registered in the website (Table 4). Producers indicated that, as a result of their participation with MarketMaker, they have been contacted, on average, about 2.6 times by customers, input suppliers, and other producers. At the same time, nearly 64% of producers in the sample had not received any contacts due to MarketMaker. However, the proportion of producers who had received marketing contacts through MarketMaker in our sample (36%) is greater than the 12% reported by registered New York producers (Cho and Tobias, 2009).

Table 4. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales as a Result of Participating in MarketMaker.

Variable Name	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
<i>Marketing contacts</i>	0	63.57	(1.31, 4.35)	2.61	4.78
	1 to 9	28.87			
	10 to 20	5.15			
	21 to 30	2.41			
<i>New customers</i>	0	72.06	(0.89, 2.17)	1.54	3.33
	1 to 5	19.12			
	6 to 10	6.99			
	11 to 20	1.10			
	More than 20	0.74			
<i>Annual sales</i>	Under \$25	75.00	(76.58, 227.97)	121.3	715.61
	\$25 to \$50	6.45			
	\$51 to \$75	2.82			
	\$76 to \$99	4.44			
	\$100 to \$499	7.66			
	\$500 to \$999	2.02			
	\$1,000 to \$4,999	1.21			
	\$5,000 to \$9,999	0.00			
	More than \$10,000	0.40			

Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

In terms of the number of new customers gained, respondents indicated that their participation has helped them obtain an average of 1.5 new customers even though 72% of the respondents indicated that they have gained no new customers through the site.

Lastly, survey respondents' perceived average annual increase in sales due to MarketMaker was estimated at about \$121, with 75% of the participants indicating the increase in annual sales was \$25 or less. The overall increase in annual sales due to MarketMaker in the sample was lower than that found by Cho and Tobias (2009) where the average increase in annual sales assisted by MarketMaker reported by New York producers was between \$225 and \$790. This finding may be due to the fact that our sample combined producers from different states that may have had MarketMaker presence for a shorter period of time than New York or it could reflect the success of New York MarketMaker administrators' marketing and training programs.

Since the statistics discussed previously are values across producers with different characteristics, we also present the values of the perceived impacts of MarketMaker across different types of users⁵. Figures 1 to 3 display the perceived number of additional contacts, new customers, and increases in annual sales for groups of users differentiated by the type of registration (Figure 1), time registered in MarketMaker (Figure 2), and time spent on the site (Figure 3). As indicated in the figures, all of the business outcome measures seem to be positively related to self-registration in MarketMaker, the amount of time since registering on the site, and the amount of time users spend on MarketMaker activities. In fact, producers who registered themselves on the MarketMaker website have received, on average, almost twice as many additional contacts and customers than those who were registered by someone else or do not know how they were enrolled in MarketMaker. This finding suggests that more education and promotion of MarketMaker are needed to encourage self-registration. Moreover, as Figure 3 suggests, producers who reported spending between 30 and 60 minutes per month on the MarketMaker website had an average annual sales increase of \$242 compared to only \$32 for those users who spent less than 30 minutes a month on MarketMaker-related activities. This finding suggests that MarketMaker state and national leaders should encourage producers to become more active users of MarketMaker to achieve the desired benefits from participation.

⁵ The number of additional contacts, new customers and increase in annual sales for groups of users in Figures 1 to 3 were calculated using equation (5).



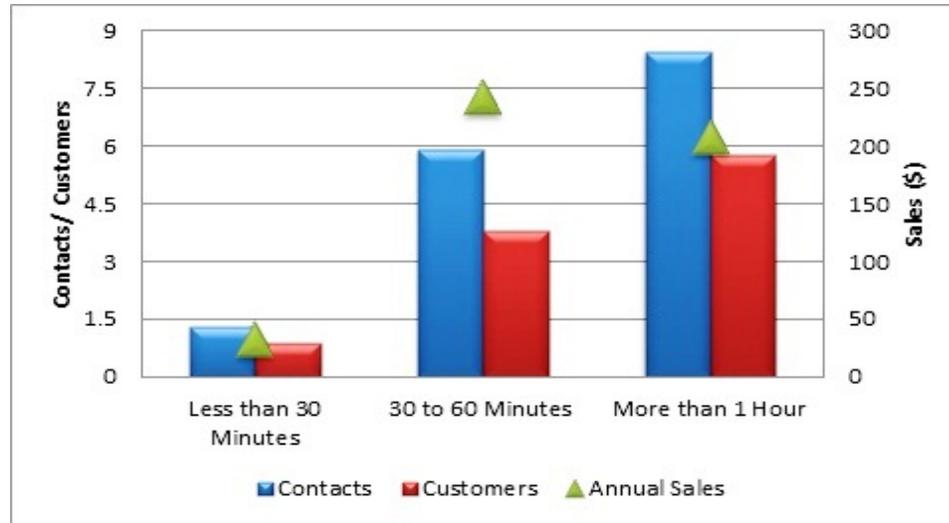
Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Figure1. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Registration Type.



Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Figure2. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Time Registered in MarketMaker.



Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Figure3. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Time Spent (Monthly) on Activities Associated with MarketMaker.

MarketMaker Impact on Direct Sales

The optional section for those producers participating in direct marketing channels—to consumers or wholesale buyers—was completed by 267 agricultural producers which corresponds to about 88% of the total respondents. Forty-eight percent of this group of respondents participated in direct marketing to individual consumers, 4% in direct marketing to wholesale buyers, and 48% participated in direct marketing to both individual consumers and wholesale buyers.

Survey respondents indicated that, as a result of their participation with MarketMaker, they have received, on average, a total of 1.9 additional marketing contacts seeking information about their direct market activities, but the majority of surveyed producers (63%) indicated that they have not received any additional marketing contacts through MarketMaker. Average annual increases in direct sales due to participation in MarketMaker was 0.7% (76% of the sample experienced no increase in this type of sales) and 1.2% (85% of the sample experienced no increase in this type of sales). Therefore, as in the case of the overall impact of MarketMaker on all business activities, the impact of

the site on direct marketing activities seems to be perceived by producers as relatively modest so far. A detailed description of the impact of MarketMaker on participants' direct marketing channels is shown in Table 5.

Table 5. Perceived MarketMaker Impact on Direct Marketing Activities.

Variable Name	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
<i>Marketing contacts</i>	0	62.87	(1.33, 3.14)	1.93	3.87
	1 to 5	24.55			
	6 to 10	8.38			
	11 to 20	2.99			
	More than 20	1.20			
<i>Increase in annual direct sales to individual consumers</i>	0%	76.21	(0.66, 1.75)	0.74	1.83
	1% to 5%	18.15			
	6% to 10%	3.63			
	11% to 20%	1.61			
	21% to 40%	0.40			
<i>Increase in annual direct sales to wholesalers</i>	0%	84.56	(0.96, 2.02)	1.17	5.20
	1% to 5%	8.09			
	6% to 10%	4.41			
	11% to 20%	1.47			
	21% to 40%	0.74			
	Over 40%	0.74			

Note: Marketing contacts refers to the total contacts gained since the producer became registered on the MarketMaker website.

Parametric vs. Nonparametric Mean Estimation

Two important points need to be noted regarding the estimation of the parametric and nonparametric means of the variables elicited and reported in intervals. First, the parametric estimate of the mean of every categorical variable was contained in the interval formed by the lower and upper nonparametric estimates of the mean (see Tables 2, 4, and 5). Second, results of the nonparametric analysis indicated that the estimated \hat{F}_x values could be calculated using the “raw” proportions of observations belonging to each category. For example, for the variable total annual sales in Table 2, $\hat{F}_x=37.09$ and $\hat{F}_x=37.09+21.52=58.61$. Hence, this result suggests that the nonparametric upper and lower bound of the mean of the distribution can be estimated simply using the raw proportions of the summary data without having to optimize equation (6). However, more research is needed to formally prove this empirical finding.

Summary and Conclusions

Although e-commerce is expected to improve agricultural profits, literature on the potential economic impact of e-commerce is very limited. In this study, we present the results of a survey that investigated the impact of the MarketMaker website on the business performance of agricultural producers. This paper also introduces econometric modeling innovations for the use of parametric and nonparametric procedures for the estimation of the distribution mean of a variable (continuous or discrete) that is only observed to fall in a certain interval. In our context, the calculation of the mean values of the distribution was important for the estimation of aggregate impacts across all site users.

MarketMaker intends to provide marketing information to both producers and consumers in order to facilitate their market interactions. However, survey results indicate that the perceived impact of MarketMaker on various business outcomes—sales, new customers, and marketing contacts—are presently relatively modest. The results of this study also show that the effectiveness of MarketMaker is strongly linked with how it is used by producers. For example, producers who registered themselves on the MarketMaker website have received, on average, almost twice as many additional contacts and customers than those who were registered by someone else or do not know how they were enrolled in MarketMaker. Hence, the best approach to “sell” the site is to actively promote it directly to producers instead of adding names from previously constructed producer lists. Another interesting finding is the positive relation between the amount of time spent on the site and the perceived impact of MarketMaker. The

challenge is that only about 21% of producers seem to be average or active users of MarketMaker. On average, producers don't spend enough time on activities associated with MarketMaker (23.3 minutes per month) to gain its full benefits. Therefore, the average impact of the website has been moderate so far.

As a result of their participation with MarketMaker, producers have received an average of 2.6 marketing contacts, and have gained an average of 1.5 new customers. Additionally, MarketMaker has assisted farmers and fishermen in increasing their annual sales by an average of \$121. Individual consumers are the main type of customers targeted through MarketMaker activities.

Nearly 88% of producers registered on MarketMaker participate in direct marketing to individual consumers and wholesale buyers. MarketMaker has helped these producers receive an average of 1.9 marketing contacts seeking information about their direct-market activities. Also, due to participation in MarketMaker, producers have increased their annual direct sales to individual consumers by 0.7% and to wholesale buyers by 1.2% on average.

Since these findings are based on the survey questions that only reflect perceived impacts, it is not certain to what extent these perceptions reflect reality. For example, MarketMaker does not currently allow buying and selling of products through the website, thus the only approach to obtain sales data is through producer surveys. In any case, producer support for the site will likely be based on its perceived impact on their businesses; hence, it is recommended that MarketMaker state and national leaders more actively seek to improve their visibility and perceived impact. For instance, MarketMaker could encourage customers—maybe through using coupons—to mention the website in their interaction with producers.

As the logic models developed by Lamie et al. (2011) indicate, the development of the MarketMaker website is a necessary, but not sufficient condition for the success of MarketMaker. Marketing, promotion, and training that integrate MarketMaker into a broader strategic decision-making context for users is also needed. As states consider the adoption of MarketMaker, they should consider providing dedicated resources not only for site development and maintenance, but also for programmatic development and delivery. This will require some combination of state-level reallocation of existing resources or identification of new resources to deliver more directed training and promotion.

In addition, MarketMaker website development should focus on encouraging initial registration by users themselves and on providing good reasons for users to return to the site to benefit from the additional features that MarketMaker offers. Focus groups conducted with MarketMaker users suggest that the current site could benefit from efforts to package carefully selected elements of the current MarketMaker site to specific user groups to make it more "user-friendly" (Lamie et al., 2011). The current configuration of

the site is, perhaps, most useful to user groups that can devote time to the effort. Therein lies a conundrum because household consumers and other direct marketing targets are the least likely to invest time in learning how to use the site, yet producers overwhelmingly hope to use MarketMaker to reach them.

It is important to note that the results of this study are preliminary and a second round of surveys and analyses are expected to be conducted in Fall 2011 to obtain a larger sample of users. Future work with this dataset will also involve an analysis of the relationship between short-term, medium-term (e.g., time spent on the site and use of futures) and long-term outcomes (e.g., increases in sales) using multivariate statistical techniques. The information obtained from this analysis can be useful in identifying the MarketMaker features that are more likely to result in positive, long-term outcomes for producers. Additionally, a willingness to pay (WTP) study will be conducted to obtain an estimate of the overall economic value that registered producers place on the services received from MarketMaker. We believe that the WTP measure will incorporate the value of other benefits of MarketMaker beyond those measured by the metrics presented in this study.

Future work evaluating MarketMaker should compare the results of this study, which uses cross-sectional data, with analyses using longitudinal or panel data in order to better capture the dynamics of MarketMaker users' behaviors (in addition to potential gains in the precision in estimations). In fact, the information generated in this survey can be used as baseline information for these types of future studies.

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Producer Willingness to Pay for the Services Provided by an Electronic Trade Platform:

The Case of MarketMaker

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Introduction

- E-commerce may have the potential to both increase sales revenues and decrease costs through greater efficiencies of operations.
- Most studies evaluating E-commerce websites have focused on assessing user-perceived quality rather than on the economic impacts these sites generate.
- Studies evaluating the effectiveness of specific agricultural E-commerce platforms are very limited and descriptive in nature.

Objectives

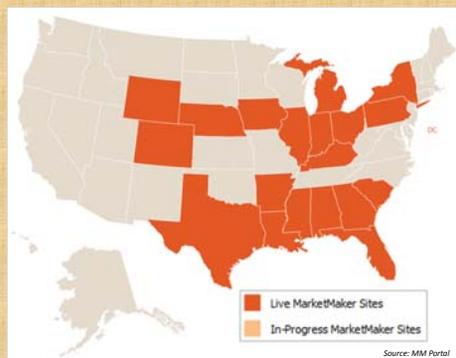
The main goals of this study are:

- To estimate the economic value of the services provided by an E-Commerce website – MarketMaker (MM) – on agricultural businesses.
- To determine how producers' characteristics and perceptions affect the economic valuation of the site.

MarketMaker

- MM is one of the most extensive collections of electronic searchable food industry related data engines in the country (Figure 1).
- MM website is used by producers as a free marketing tool that helps identifying new customers and provides potential clientele with detailed information about farmers' product portfolio, geographic location and contact information.
- To date, the site is operating in 18 states throughout the country with over 17,500 profiles – including 7,698 for producers – and receives about 1 million hits per month.

Figure 1. National MM Presence



Data and Methods

- Contingent valuation methods were employed to estimate the economic benefits of MM on registered producers.

- Theoretically, producers' willingness to pay (WTP) for the services provided by MM represents the increase in profits attributed to the adoption of MM.

- Email and mail surveys were distributed to 1,446 producers registered on MM in 7 participant states: AR, FL, GA, IN, IA, MS, and SC. The overall response rate of the survey was 15.7 %.

- Respondents' characteristics were analyzed using both parametric and nonparametric techniques (Table 1).

- The producer WTP question was asked using a double-bounded elicitation format.

- First, participants were asked if they are willing to pay an annual fee (\$) for participating in MM and then a follow up question was asked with another bid, higher (\$), or lower (\$) depending on the response to the first question.

- Responses were analyzed using a censored regression approach. Six statistical distributions were considered in the modeling of the producer WTP: Normal, Weibull, Log-normal, Exponential, Log-logistic and Gamma distributions

Table 1. Characteristics and Perceptions of Respondents (n=227)

Variable Name (Units)	Category	Category Proportion			Mean	
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric (Standard Deviation)
Registration type	1= Self-registered	82.95	64.29	74.89		
	0 = Otherwise	17.05	35.71	25.11		0.75 (0.43)
Marketing contacts*	0	66.38	69.39	67.76	(1.30, 4.00)	2.65 (5.55)
	1 to 9	25.86	24.49	25.23		
	10 to 20	5.17	4.08	4.67		
	21 to 30	2.59	0.00	1.40		
	31 to 40	0.00	0.00	0.93		
Total annual sales (\$1,000)	Less than \$10	42.64	40.82	41.85	(72.73, 144.71)	100.09 (217.02)
	\$10 to \$50	26.36	32.65	29.07		
	\$50 to \$100	13.95	8.16	11.45		
	\$100 to \$250	5.43	11.22	7.93		
	\$250 to \$500	5.43	2.04	3.96		
	\$500 to \$1,000	0.00	5.10	2.20		
	Over \$1,000	6.20	0.00	3.52		
Type of user	1= Active	41.09	22.45	33.04		0.33 (0.47)
	0 = Passive	58.91	77.55	66.96		
Time registered on MM (Months)	Less than 1	1.55	0.00	0.88	(16.70, 28.08)	22.02 (11.56)
	1 to 6	10.08	1.02	6.17		
	7 to 12	10.85	4.08	7.93		
	13 to 24	55.81	52.04	54.19		
	25 to 36	13.95	20.41	16.74		
Time spent on MM activities (Min/month)	37 to 48	5.43	16.33	10.13		
	Over 48	2.33	6.12	3.96		
	Less than 30	79.84	86.73	82.82	(11.02, 46.75)	21.99 (18.39)
	30 to 60	14.73	8.16	11.89		
	61 to 120	2.33	4.08	3.08		
	121 to 300	2.33	0.00	1.32		
	301 to 600	0.00	1.02	0.44		
	Over 600	0.78	0.00	0.44		

* Marketing contacts refer to the total contacts received since the producer became registered on the MM website.

- Estimation of the different models was carried out using maximum likelihood estimation procedures, and selection of the model that "best described" the data was based on the Akaike information criterion corrected for finite sample sizes (AICC).

- The standard errors of both coefficient estimates and marginal effects were estimated using bootstrapping techniques.

Results and Discussion

- Based on the AICC results, the Log-logistic (LL) distribution was the preferred distribution for the WTP analysis.

- The mean WTP and marginal effects for the LL distribution are:

$$E(WTP|X_i) = \exp(X_i\beta)\Gamma(1+\sigma)\Gamma(1-\sigma)$$

$$\frac{\partial E(WTP|X_i)}{\partial x_j} = \beta_j E(WTP|X_i)$$

where X_i is a vector of covariates, β a vector of parameters and σ is the shape parameter.

- On average, producers are willing to pay \$47.02 (s.e. \$16.64) annually for the services they receive from MM.

- The WTP value is also a measure of the increase in annual profits attributed to the use of MM and could also be used as a guide if a participation fee is imposed in the future.

- The estimated aggregate annual economic value that registered producers place on the services provided by MM is \$361,960. This aggregate estimate only represents a portion of the total benefits generated by MM since other users of the site are not considered in the analysis (e.g., consumers and farmers markets).

- Empirical results indicate that region, registration type, the number of marketing contacts received due to MM, gender of the participant, and firm's total annual sales have a significant effect on producers WTP for the serviced provided by MM (Table 2).

Table 2. Coefficient and Marginal Effect Estimates Log-logistic model (n=227)

Variable	Coefficient	Standard error	Marginal effect	Standard error
Constant	2.6964 ****	0.3620		
Registration type (Self-registered=1, Otherwise=0)	-0.5872 **	0.2811	26.5184 **	15.5569
Time registered on MM (Months)	0.0146 **	0.0084	0.5528 **	0.3183
Time spent on MM activities (Min/months)	0.0028 **	0.0014	0.1048 **	0.0609
Type of user (Active=1, Passive=0)	0.6300 ***	0.2531	24.9529 **	11.5420
Marketing contacts	0.0336 **	0.0202	1.2685 *	0.8511
Total annual sales (\$1,000)	0.0006 **	0.0003	0.0232 **	0.0129
Survey type (Mail=1, Email=0)	-0.7655 ***	0.2671	26.3297 ****	8.5284
	0.6020 ***	0.0651		

Log-likelihood function -139.5

* Significance levels of 0.01, 0.05 and 0.10 are indicated by ***, ** and * respectively. ^aσ corresponds to the shape parameter of the log-logistic model.

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The Economic Impact of an E-Commerce Website



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Objectives

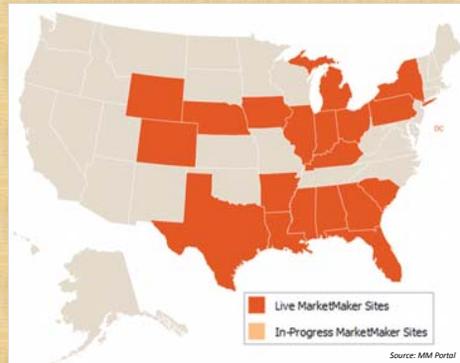
The main goals of this study are:

- To estimate the economic value of the services provided by an E-Commerce website – MarketMaker (MM) – on agricultural businesses.
- To determine how producers' characteristics and perceptions affect the economic valuation of the site.

MarketMaker

- MM is one of the most extensive collections of electronic searchable food industry related data engines in the country (Figure 1).
- MM website is used by producers as a free marketing tool that helps identifying new customers and provides potential clientele with detailed information about farmers' product portfolio, geographic location and contact information.
- To date, the site is operating in 18 states through the country with over 17,500 profiles – including 7,698 producers – and receives about 1 million hits per month.

Figure 1. National MM Presence



Data and Methods

- Contingent valuation methods were employed to estimate the economic benefits of MM on registered producers.
 - Theoretically, producers' willingness to pay (WTP) for the services provided by MM represents the increase in profits attributed to the adoption of MM.
- Email and mail surveys were distributed to 1,446 producers registered on MM in 7 participant states: AR, FL, GA, IN, IA, MS, and SC. The overall response rate of the study was 15.7 %.
- Respondents' characteristics were analyzed using both parametric and nonparametric techniques (Table 1).
- The producer WTP question was asked using a double-bounded elicitation format.
 - First, participants were asked if they are willing to pay an annual fee (B_1) for participating in MM and then a follow up question was asked with another bid, higher (B_2^H) or lower (B_2^L) depending on the response to the first question
 - This elicitation format generates interval-censored responses instead of exact observations (Figure 2).

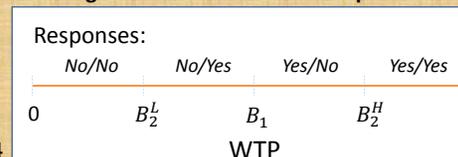
Table 1. Characteristics and Perceptions of Respondents

Variable Name (Units)	Category	Category Proportion			Mean	
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric (Standard Deviation)
Registration type	1= Self-registered	82.95	64.29	74.89	(1.30, 4.00)	0.75 (0.43)
	0 = Otherwise	17.05	35.71	25.11		
Marketing contacts*	0	66.38	69.39	67.76	(1.30, 4.00)	2.65 (5.55)
	1 to 9	25.86	24.49	25.23		
	10 to 20	5.17	4.08	4.67		
	21 to 30	2.59	0.00	1.40		
	31 to 40	0.00	2.04	0.93		
Total annual sales (\$1,000)	Less than \$10	42.64	40.82	41.85	(72.73, 144.71)	100.09 (217.02)
	\$10 to \$50	26.36	32.65	29.07		
	\$50 to \$100	13.95	8.16	11.45		
	\$100 to \$250	5.43	11.22	7.93		
	\$250 to \$500	5.43	2.04	3.96		
	\$500 to \$1,000	0.00	5.10	2.20		
Type of user	1= Active	41.09	22.45	33.04	(16.70, 28.08)	22.02 (11.56)
	0 = Passive	58.91	77.55	66.96		
Time registered on MM (Months)	Less than 1	1.55	0.00	0.88	(11.02, 46.75)	21.99 (18.39)
	1 to 6	10.08	1.02	6.17		
	7 to 12	10.85	4.08	7.93		
	13 to 24	55.81	52.04	54.19		
	25 to 36	13.95	20.41	16.74		
	37 to 48	5.43	16.33	10.13		
Time spent on MM activities (Min/month)	Over 48	2.33	6.12	3.96	(11.02, 46.75)	21.99 (18.39)
	Less than 30	79.84	86.73	82.82		
	30 to 60	14.73	8.16	11.89		
	61 to 120	2.33	4.08	3.08		
	121 to 300	2.33	0.00	1.32		
	301 to 600	0.00	1.02	0.44		
Over 600	0.78	0.00	0.44			

* Marketing contacts refer to the total contacts received since the producer became registered on the MM website.

- Six statistical distributions were considered in the modeling of the producer WTP: Normal, Weibull, Log-normal, Exponential, Log-logistic and Gamma distributions.
- Estimation of the different models was carried out using maximum likelihood estimation procedures.
- The selection of the model that "best described" the data was based on the Akaike information criterion corrected for finite sample sizes (AICC).
- The standard errors of both coefficient estimates and marginal effects were estimated using bootstrapping techniques.

Figure 2. WTP's Censored Responses



Results and Discussion

- Based on the AICC results, the Log-logistic (LL) distribution was the preferred distribution for the WTP analysis.
- The mean WTP and marginal effects for the LL distribution are:
 - $E(WTP|X_i) = \exp(X_i\beta)\Gamma(1 + \sigma)\Gamma(1 - \sigma)$
 - $\frac{\partial E(WTP|X_i)}{\partial x_j} = \beta_j E(WTP|X_i)$
 where X_i is a vector of covariates, β a vector of parameters and σ is the shape parameter.
- On average, producers are willing to pay \$47.02 (s.e. \$16.64) annually for the services they receive from MM.
- The WTP value is also a measure of the increase in annual profits attributed to the use of MM.
- The estimated WTP value could also be used as a guide if a participation fee is imposed in the future.
- The effects of producers' characteristics and perceptions on their valuation of MM are presented in Table 2.

Table 2. Coefficient and Marginal Effect Estimates.

Variable	Coefficient	Standard error	Marginal effect	Standard error
Constant	2.6964	***	0.3620	
Registration type (Self-registered=1, Otherwise=0)	-0.5872	**	0.2811	-26.5184 ** 15.5569
Time registered on MM (Months)	0.0146	**	0.0084	0.5528 ** 0.3183
Time spent on MM activities (Min/months)	0.0028	**	0.0014	0.1048 ** 0.0609
Type of user (Active=1, Passive=0)	0.6300	***	0.2531	24.9529 ** 11.5420
Marketing contacts	0.0336	**	0.0202	1.2685 * 0.8511
Total annual sales (\$1,000)	0.0006	**	0.0003	0.0232 ** 0.0129
Survey type (Mail=1, Email=0)	-0.7655	***	0.2671	-26.3297 *** 8.5284
σ^b	0.6020	***	0.0651	

* Significance levels of 0.01, 0.05 and 0.10 are indicated by ***, ** and * respectively. ^b σ corresponds to the shape parameter of the log-logistic model.

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Support for this research is provided by a grant from the AMS-USDA Federal/State Marketing Improvement Program (FSMIP)

Do Internet-Based Promotions Work? Evaluating MarketMaker. Presentation at the 2012 WERA-72 Meetings.

Do Internet-Based Promotion efforts Works? Evaluating MarketMaker

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Support for this research is provided by a grant from the AMS-USDA Federal/State Marketing Improvement Program (FSMIP)

INTRODUCTION

- MarketMaker (MM) is an interactive web-based resource that provides geo-coded food marketing information to food entrepreneurs and customers.
- MM was created in 2000 by University of Illinois Extension with intention of building electronic infrastructure that would more easily connect:
 - food producing farmers with consumers
 - producers with producers.

- To date, MM has been implemented in 19 states.
- MM website includes nearly 17,500 profiles of food related enterprises including 7,530 producers.

National MarketMaker State Partners

Source: NMS Portal

OBJECTIVE

- Assess the economic impact of MM on users.
 - Additional marketing contacts developed
 - New customers gained
 - Dollar value generated or assisted by MM

LITERATURE REVIEW

Farmers, computers and the Internet

- In 2009, 59% of U.S. farms had Internet access and 64% had access to computer, compared to 29% and 47% in 1999, respectively (USDA-NASS, 2009).
- One of potential applications of computers and internet in farm businesses is E-commerce.

- According to some authors (Batte and Ernst, 2007; Montealegre et al., 2007), E-commerce has potential to:
 - increase revenues and decrease costs through greater efficiencies of operation.
 - electronic markets are expected to be more transparent and ... may attract more consumers.

- Literature evaluating the effectiveness of specific e-commerce platforms is very limited.
 - Sixty three percent of Ohio MM registered producers considered that MM was helping to keep more food dollars in the regional economy (Fox, 2009).
 - MM helped New York registered producer to increase annual sales by \$508 on average (Cho and Tobias, 2009).

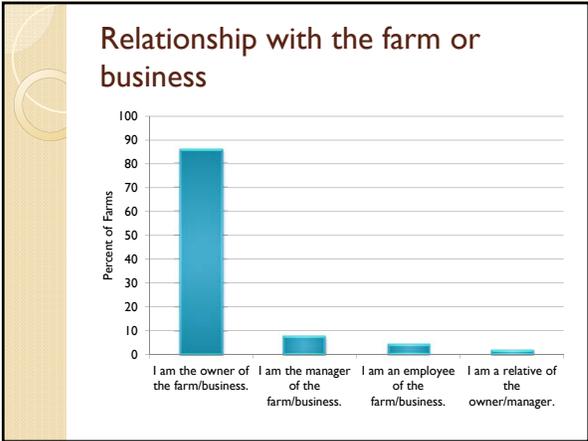
- ### METHODOLOGY
- An online survey was distributed between the months of May and June 2010 among 4,264 farmers and fishermen in 14 MarketMaker participant states.
 - The questionnaire was divided in 4 sections:
 - 1) Experiences of the producer with MM
 - 2) Possible outcomes of his participation with MM
 - 3) Demographic characteristics
 - 4) Optional section for producers participating in direct marketing channels

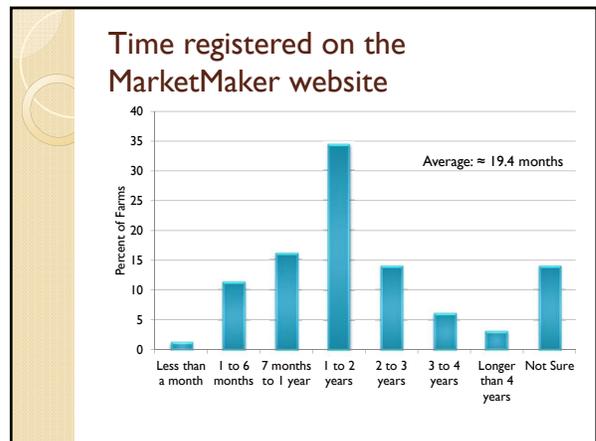
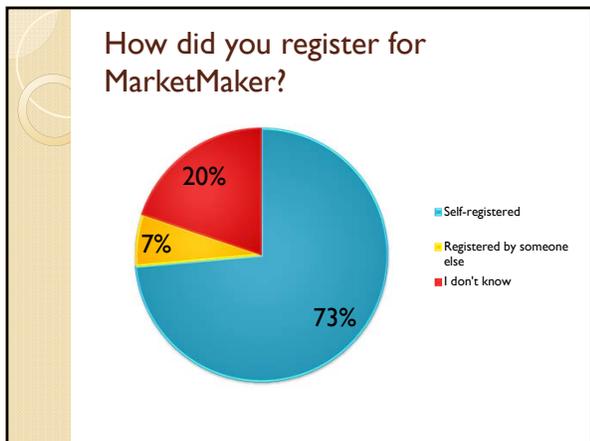
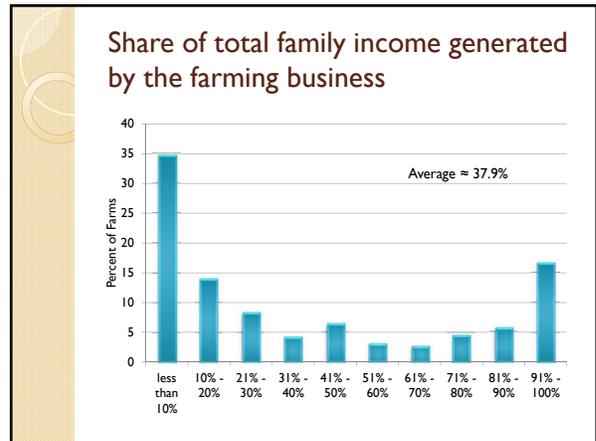
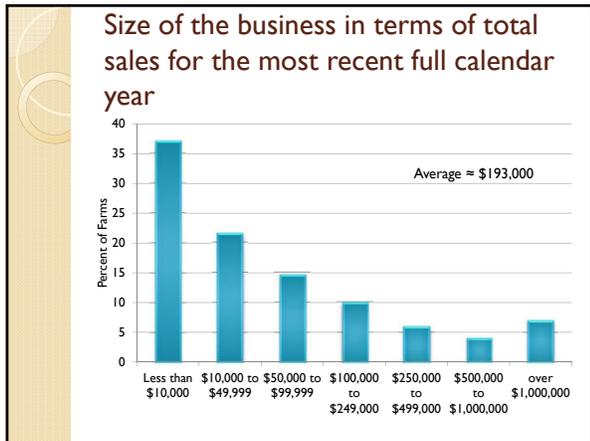
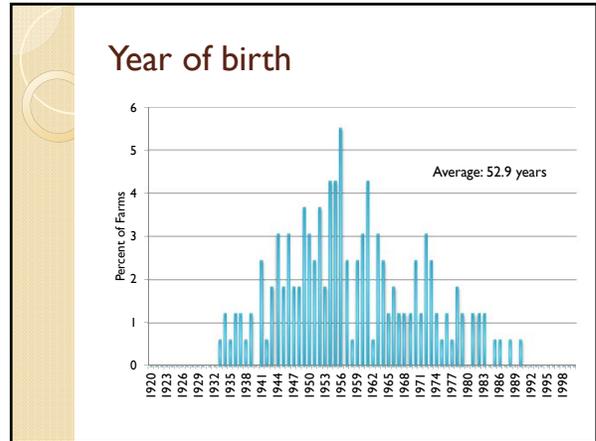
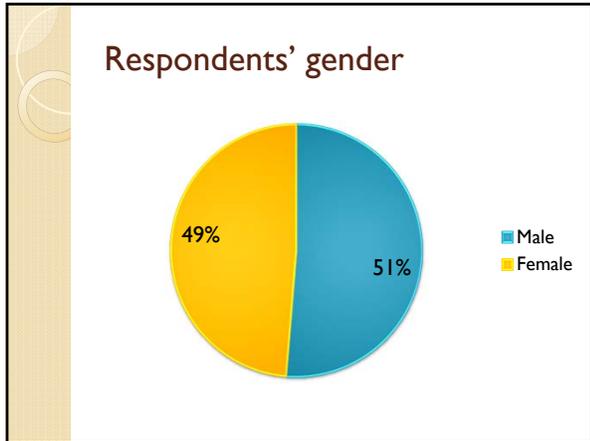
- To encourage participation in the survey
 - 2 reminder emails
- Typical completion time was 5-10 minutes.
- Overall response rate was 7.1% and generated 304 usable observations.

PRELIMINARY RESULTS

Response Rate by State

State	Sample Frame Size	Number of Respondents	Response Rate
Arkansas	45	3	6.67
Colorado	485	28	5.77
District of Columbia	6	0	0.00
Florida	143	25	17.48
Georgia	260	16	6.15
Illinois	737	42	5.70
Indiana	323	31	9.60
Iowa	326	26	7.98
Louisiana	148	17	11.49
Mississippi	93	7	7.53
Nebraska	328	12	3.66
New York	753	49	6.51
Ohio	361	35	9.70
South Carolina	256	13	5.08
Total	4,264	304	7.13

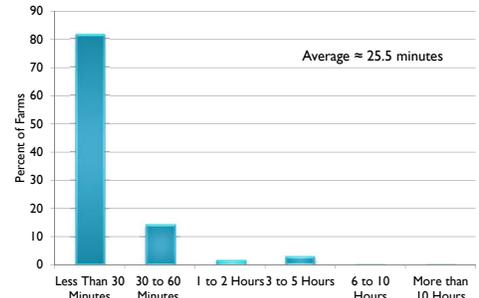




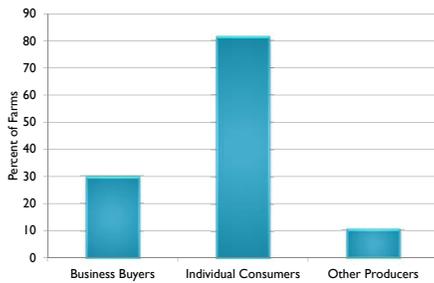
MarketMaker features and their relative rate of use by farmers

Feature	Never	Rarely	Percent	
			Sometimes	Frequently
Log on to Check or Update Profile	25	51	22	2
Search for Products	37	37	23	3
Search for Business Partnerships	49	33	16	2
Search for Buyers and Sales Opportunities	41	35	21	4
Find a Target Market for Your Products	48	38	11	2
Use the Buy/Sell Forum	55	30	12	3
Other	80	15	3	2

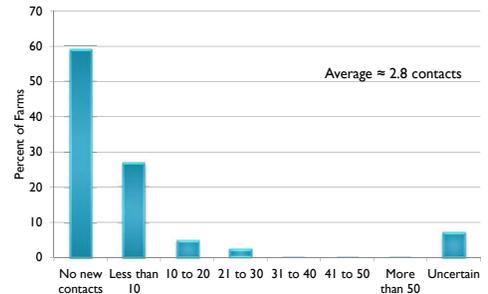
Average time per month spent on activities associated with MarketMaker



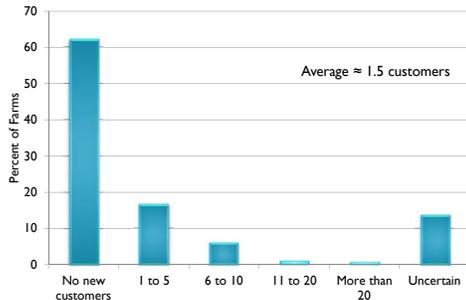
Consumer groups intended to reach with MarketMaker



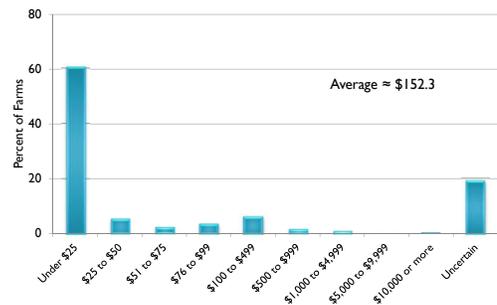
Additional marketing CONTACTS developed as a result of participating in MarketMaker



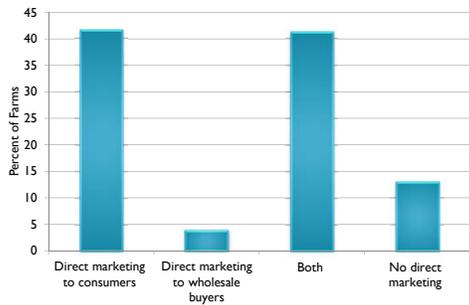
New CUSTOMERS gained due to participating in MarketMaker



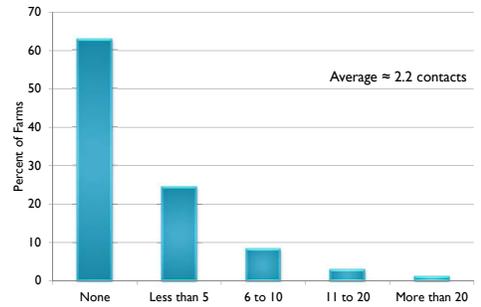
DOLLAR VALUE of business's annual sales generated or assisted by MarketMaker



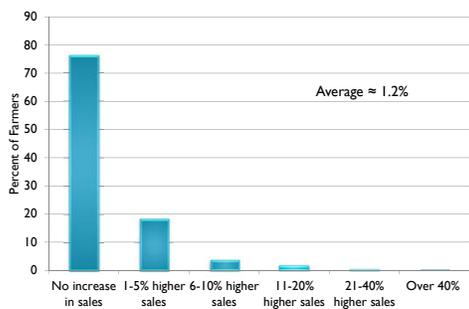
Participation in direct marketing opportunities (bypassing middlemen) during the last year



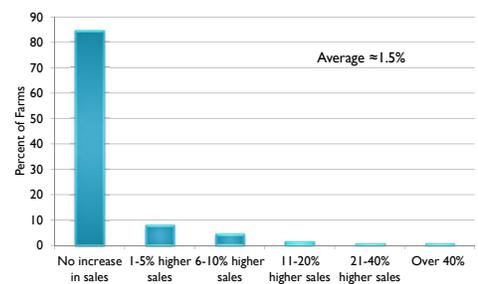
Additional marketing CONTACTS seeking for information about direct market sales due to participating in MarketMaker



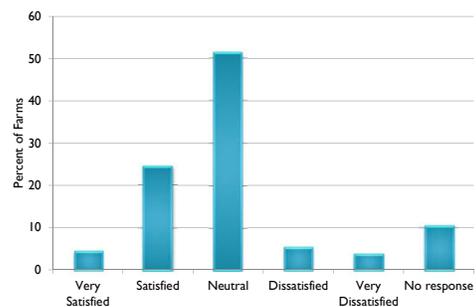
Increase in annual direct sales to individual consumers due to MarketMaker



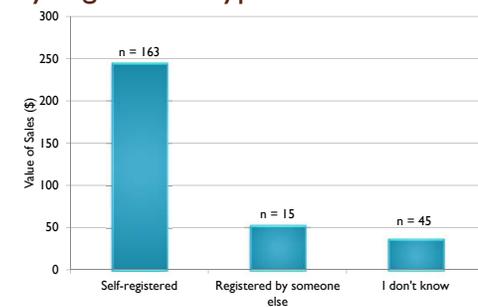
Increase in annual direct sales to wholesale buyers due to MarketMaker



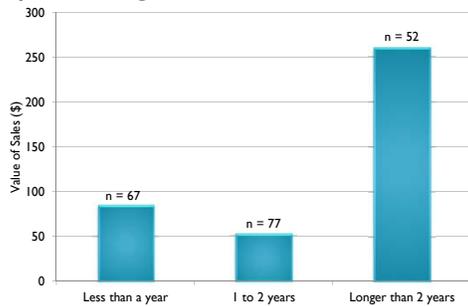
Overall satisfaction with MarketMaker



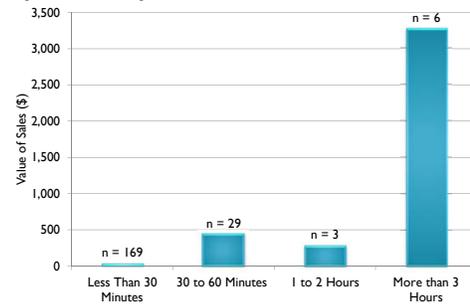
Annual sales due to MarketMaker by registration type



Annual sales due to MarketMaker by time registered on the site



Annual sales due to MarketMaker by monthly use



SUMMARY AND PRELIMINARY CONCLUSIONS

- Most of the registered producers never or rarely use the features of MM
- As a result of their participation with MM producers have received on average:
 - 2.8 additional marketing contacts,
 - 1.5 new customers
 - \$152 in extra sales

- Those producers participating in direct marketing activities on average
 - have received 2.2 additional marketing contacts,
 - have increased annual direct sales to individual consumers by 1.2% and to wholesale buyers by 1.5% as a result of participating in MarketMaker.

Future work with the data

- Analysis of the relationship between short-term, medium term and long term outcomes using multivariate statistical techniques.
- Estimate the economic value of the services received from MarketMaker (WTP study).

“THANK YOU”

Implementation of an Evaluation Framework for the MarketMaker National Network.

Presentation at the 2010 National MarketMaker Annual Partnership Meeting, Destin, FL



Implementation of an Evaluation Framework for the MarketMaker National Network

Carlos Carpio
David Lamie
Olga Isengildina-Massa

Support for this research is provided by a grant from the AMS-USDA Federal/State Marketing Improvement Program (FSMIP)

Clemson University



Introduction

- As MM network grows so does need to formally track financial, economic, and other impacts on participants
- Two years ago Clemson team sought and received funding from the USDA Federal/State Marketing Improvement grant program (USDA-FSMIP) to *develop evaluation framework* for this project
- This year Clemson team received additional funding from USDA-FSMIP for the *implementation of evaluation framework*



Development evaluation framework

- 1) Development of logic models for selected groups of users
- 2) Development of comprehensive set of quantifiable evaluation indicators
- 3) Development of survey instruments to collect data on indicators
- 4) Pre-testing of survey instruments



Main goal of project

- “Implementation of evaluation protocol that generates information for assessment of short, intermediate, and long term economic impact of MM on *users* as well as assessment of costs and benefits of MM in each partner state.”
- Users: we will only focus on farmers and farmers’ markets



Objectives

- Provide baseline information for longitudinal study on long term economic impact of MM
- Estimate users perceived current impact of MM for success of their business
- Analyze relationships between long term expected outcomes of MM use with medium and short term outcomes as well as characteristics of users
- Assess the costs and benefits of MM in each partner state



Work Plan

Stage I: Development of Survey Instruments Adapted to the Needs of each Partner State

Timeline: September 2010 – December 2010

- Two sections on surveys:
 - 1) Core survey questions: needed to ensure that survey results from different states are comparable and can be aggregated.
 - 2) State level questions: to satisfy needs of state-level MM partners.



Work Plan

Stage II: Survey of Users Registered on the MM website

Timeline: January 2011 to August 2011

- Population of farmers/producers consists of approximately 6,500 registered users.
- Survey will be conducted via e-mail (60% users) and via postal mail (40%).
- Cover letter adapted to each state.



Work Plan

Stage II: Survey of Users Registered on the MM website

Timeline: January 2011 to August 2011

- Similar surveying approach will be used for population of about 2,000 registered farmers' market managers registered on the website.



Work Plan

Stage III: Data Analysis

Timeline: September 2011 to August 2012

3.1. Summary statistics

- users' utilization of MM site
- users' perceptions of MM compared to other marketing websites
- users' perceptions regarding impact of MM for marketing efforts and profitability of operations



Work Plan

Stage III: Data Analysis

3.2. Statistical analysis

- relationships between short-term, medium term and long term outcomes
- relationship between long term impacts and users characteristics

3.3. Benefit costs analysis



Work Plan

Stage IV: Outreach Materials Development and Dissemination of Results

Overview of Key Information from Clemson MarketMaker Evaluation Projects

Lamie, R. David; Carlos Carpio, Samuel Zapata, and Olga Isengildena-Massa

Clemson University faculty and a graduate student were successful in their application for two successive USDA-AMS FSMIP grants to support the evaluation of the MarketMaker platform. The first project focused on the development of a framework and tools for evaluation and the second focused on the implementation of this framework. This briefing is an attempt to compile the most relevant information for review by the national MarketMaker Policy Advisory Council and primary state contacts involved in the MarketMaker program. Summarized results are provided below, organized by project. Additional detail can be found in the references provided following the two project briefings.

Project One: Evaluating MarketMaker: Analyzing the Impact of an Electronic Food Marketing Network and Its Capacity to Improve Efficient Market Access for Small to Midsized Farmers and Food Entrepreneurs

This project's activities encompassed the development of logic models, a series of focus groups, exploitation of diagnostic data from the site, development of metrics, and development of survey instruments to collect data based on these metrics. Each of these topics is addressed in the following sections. Additional detail can be found in the publications listed in the appendix.

1. Development of Logic Models

For this project, logic models were developed for each of the major identified MarketMaker user groups. This included producers, consumers, food retailers, food wholesalers, restaurants/chefs, and farmers markets. This section verbally describes the major components and rationale for the accompanying logic models found in Appendix One. Logic model components were identified and organized as inputs, activities, outputs, and outcomes, flowing from left to right in the diagrams. Outcomes were identified as short, intermediate, and long-term.

Those components directly tied to the MarketMaker website are contextualized with other components thought to be either important or necessary to combine with the MarketMaker site to deliver the specified outcomes. Economists might consider these components to be complements to MarketMaker in the production of these outcomes. Though one could infer this possibility, no direct consideration of substitutes (alternative Internet-based platforms or other) was addressed in this process. The final visual display, which appears deceptively simplistic, was the culmination of much thought and discussion

on the part of the research team. As one might expect, many of the inputs were either identical or very similar across user groups, especially those directly related to the development of the MarketMaker website and the accompanying education and training intended to encourage adoption and use of this tool. Variations in the models generally increase as one scans from left to right in the diagrams. The similarity across user groups underlines one of the key potential advantages of the MarketMaker effort; economies of scope.

MarketMaker plays slightly different roles in the process of delivering outcomes, depending on the user group and their identified outcomes. Though outside the scope of this project, one could consider empirically evaluating the relative importance of each output (MarketMaker site, training, etc.) based on specific priorities for delivering ultimate outcomes. One would expect this to vary depending on a host of factors, including differences in target user group demographics and readiness to learn or adopt new technology, availability of competitor/substitute resources, and quality/price combinations associated with complementary outputs.

The situation likely varies across and within states, leaving the final “recipe for success” up to in-state specialists and collaborators, who are more likely to understand what will work in their particular situations. However, there is also likely much value in the learning that takes place in the multi-state and in-state cross-agency network of collaboration that the MarketMaker project engenders. Evaluation of this network and its demonstrated and/or potential usefulness is beyond the scope of this project. However, it would be useful to better understand these network dynamics in order to facilitate their potential.

2. Focus Groups

Focus groups were held in Moline, IL; Manhattan in New York City; Denver, Colorado; and Grand Rapids, Michigan. Over all, focus group participants seemed to like the idea that Land Grant Universities and state departments of agriculture were collaborating on a project to help leverage the power of the Internet for the benefit of a broad array of producers and other food sector constituencies. There seemed to be a reasonable level of trust that the MarketMaker project would not devolve into a tool to benefit only some participants in the industry.

However, there was quite a lot of concern expressed about the current usability of the site and the ability of (especially) unsophisticated users to easily leverage this investment for their benefit. There seemed to be less concern with the ability of more sophisticated or more highly-capitalized users since they would be more likely to be able to dedicate resources to training and effective use of the site. There was a lot of concern expressed about the “busyness” of the site. Given the mission of the MarketMaker project to serve all constituencies in the food sector, this is to be expected. Various applications within the site have been developed to serve these various constituencies and the site has rapidly evolved. One of the most often repeated critiques of the site is that it was not sufficiently targeted to any one particular group’s needs and, therefore, was not of as much value as it would be if it were more refined according to these needs.

One possible approach to dealing with this conundrum is for the site to be divided into separate portals, each targeted to specific audiences, leveraging the core data structure across many of these portals. This approach could result in a number of sites stripped of features not found to be relevant to the target audience. The core site could remain somewhat busy and serve as a virtual laboratory for application development. Advisory groups composed of individuals with specific interests in these target audiences could be developed and targeted focus groups and evaluation measures could be put in place for each. Priorities for program and site development of these targeted portals could be set by a consensus of state partners facilitated by the overall program advisory structure.

Much of the feedback from the focus groups was directly provided to the development team as they worked on MarketMaker version 3.0. Some efforts were made to better segregate and explain site features. The overall appearance of the site was improved. But, there likely remains much work to do to achieve the full potential of the effort. Even so, the foundation has been laid for a program that has potential to live up to its promise, especially if an evaluation process is put in place to gather useful feedback, to discuss its implications, and to decide collaboratively how to proceed with further development of the program.

3. Exploiting Site Diagnostic Data

One of the goals of this project was to assess the potential of and maximize the use of assessment tools internal to the MarketMaker website. The motivation for this was to take advantage of the information available through these means and to help guide the development of secondary data collection efforts. This is especially important as there is a need to monitor the impact of the MarketMaker site with regularity. Given the cost of secondary data collection via surveys is much more expensive than collection of data directly from the site, the prospects for meaningful data collection are greatly enhanced if the need for secondary data collection is minimized.

At the first focus group in Moline (where Paul Schuytema, former head programmer for MarketMaker, was in attendance), we surfaced the idea of MarketMaker using Google Analytics to help glean more information from the site(s). They implemented this approach soon after. Google Analytics has become somewhat of an industry standard for collection and analysis of website-specific data. Google Analytics (GA) is a free service provided by Google that collects, summarizes and presents information about the quantity and quality of the visitors to a specific website. Since February 2009, GA is being used by MarketMaker allowing its personnel to gather and analyze valuable information related to the website traffic and marketing effectiveness at both the national and state levels. GA information currently collected by MarketMaker and its potential use includes the following (Ostrow, 2007):

Website visitors – This feature includes a report of the total number of visitors to the website during a specified period of time, the number of unique visitors, average number of

pages viewed within the website by each visitor, and the average time each visitor spends on the website.

Bouncerate – The bounce rate tells the website administrators the number of users that come to the site and leave without going any further. This feature also allows site administrators to see how the bounce rate varies across different pages (e.g., between and within MarketMaker state sites).

Visitor loyalty – This feature allows administrators to track the frequency that website visitors return to the site.

Technical profile – Among other things, GA's technical profile allows site administrators to know the browser type, internet connection speed, and preferred languages used by site visitors.

Traffic sources – Traffic sources refer to the way in which visitors come to the website. Traffic sources include direct traffic, referring sites, or search engines. Direct traffic includes typing the site's URL in the browser as well links from a variety of non-environments. GA classifies a traffic source as a referring site when a visitor comes to the website by clicking on a link in a partner website or a non-search results page. Search engines visits are those that come from a search engine website such as Google, Yahoo, Bing, etc.

Keyword source – This feature helps site administrators to track what people are typing in search engines to find the site.

Exclude internal traffic – GA lets site administrators filter out traffic from specific visitors.

Top content and exit pages – This feature helps to identify the most popular pages in a website since it provides information on the number of times a page has been viewed and the time spent by the average visitor on each page. The feature also points to the pages in the site where users' visits most commonly terminate.

Site overlay – This feature opens up the site and allows the administrator to mouse over the sites' links in order to analyze the relative clicks on each menu item.

Geo overlay – This feature allows the administrators to see where the site traffic is coming from (geographical location) and how the site is performing in above mentioned metrics by country, state, county, city, or even within a specific number of miles from a specified location compared to the website's total or average values.

Comparing date ranges – This option allows users to compare the performance of a site during two time periods using any of the metrics mentioned previously.

Create and email reports –GA allows the creation and sharing of automatic customized reports for a specific period of time and any of the metrics mentioned above. The frequency

of the reports (daily, weekly, monthly, or quarterly) can be set up by the user. Using GA as the source, a monthly report is sent to all MarketMaker state coordinators regarding the performance of their own state site on selected metrics described above.

Specifically, the report includes the number of visits, number of absolute unique visitors, pages viewed and average number of pages viewed, average time on site, bounce rate and the percentage on new visits. The report also allows MarketMaker state administrators to identify the main traffic sources and the type of browser used by visitors. Finally, a map overlying the geographical location of visitors and the top content of the site is presented.

There are other GA tools that could be collected by MarketMaker personnel using GA, but they would require further configuration and setup. These tools include the following:

Setting Goals – GA allows the user to set specific goals in each collected metric and to track their progress relative to these goals. This tool would be especially useful for state level site coordinators as they work with state level program advisory committees in strategic and program planning efforts.

Local Conversion Data – Once a website’s goals have been set, the site administrators can track the site progress towards achieving the goals by different locations (country, state, county, or city).

Complete AdWords Integration – If a site advertises through Google AdWords, GA provides information (number of displays, clicks, and local conversion data in any defined goal) on the impact of a campaign, group, and keyword on the site. This feature could be very useful if MarketMaker supports electronic transactions in the future since GA automatically calculates the gross gain (revenue minus the cost of getting the customer) for each transaction.

It is important to mention that none of the GA features and metrics is directly related to the outcome metrics suggested by the logic models. However, a good performance of the MarketMaker website, as measured by the GA statistics metrics mentioned earlier, could lead to achieve some of the long term goals of MarketMaker. These measures deal directly with the performance of the site and are considered important inputs necessary to produce desirable outcomes. For example, a high number of visitors to the MarketMaker site seeking specific food-related products – parameters captured in GA by the number of visits to the MarketMaker site and Business Search Results page within the site – could result in potential customers to producers or Farmers’ Markets.

It was highly recommended that the national MarketMaker team proceed with setting up the full range of GA tools available, that they develop analytical and management capacity to use these tools effectively, and that they train state PIs to become more adept at using these important site management tools. This information should become a regular

feature of the agendas of the MarketMaker Policy Advisory Committee and State PI meetings. It should also be included in individual state-level consultations from the national program, and should be integrated within both national and state-level strategic planning processes.

4. Development of Metrics Based on Logic Models

The next phase of the project was to develop a set of quantifiable metrics directly associated with the logic models. Logic models provide the conceptual framework to help the researchers and stakeholders better understand the interconnections between the identified elements of the MarketMaker site and the environment in which it operates. Developing metrics to evaluate the performance of each of these elements is a necessary step in the direction of being able to take appropriate action to enhance this performance.

The development of metrics involved an iterative process whereby the Clemson research team developed preliminary sets of indicators based upon their own knowledge of MarketMaker user groups and their extensive experience with survey research design and implementation. The MarketMaker Evaluation Committee reviewed these metrics and made recommendations for improvement. Given the resource allocation required to develop metrics and to design and implement surveys across all MarketMaker states, the Clemson research team found it necessary to prioritize this activity for selected user groups. The MarketMaker Evaluation Committee was asked to prioritize these groups. They prioritized producers, farmers markets, and wholesale distributors as the highest priority user groups for this activity. Tables in the full report referenced in the appendix provide both currently existing and future necessary metrics identified for these priority groups.

5. Development of Preliminary Survey Instruments and Preliminary Thoughts on Data Analysis

The next step in the process was to develop preliminary survey instruments. Questions included in the survey instruments were based on the metrics presented in the previous section. The survey instruments also included questions related to the characteristic of the business and the respondent.

Surveys were developed to evaluate the impact of MarketMaker on several levels (short, intermediate and long-term). For example, in the case of producers using MM, and as shown in the metrics (Table 3 of full report), in the short term the impact will be constituted in producer participation, creating initial web presence for some producers and increasing web traffic for producers with own web-sites. These effects can be captured by web statistics currently collected by MarketMaker and specific questions of the producer survey. In the intermediate term, the producers' participation in MarketMaker may result in an increase in the number of contacts and consumers through MarketMaker, and an increase in the number of horizontal and vertical partnerships. Survey questions were designed to capture this information. In the long term MarketMaker may increase the revenues of producers, decrease the marketing costs and reduce operation risks due to

new partnerships initiated with the help of the presence and use of the site. These perceived impacts can be captured by several questions in the producer survey as well.

Finally, other questions are included to provide feedback to MarketMaker personnel regarding the use of this tool, factors that affect the use, and potential areas for improvement. Please note that since these long term effects are likely the most important information that everybody is interested in, we made a strong effort to ask about the impact of MarketMaker on profitability from several different angles. This will insure that we get more usable data and will be able to evaluate validity and reliability of these data.

These preliminary survey drafts were developed and shared with the MarketMaker Evaluation Committee in Destin, Florida at the Food Distribution Research Society Meetings on 10/16/2010. The overall consensus was that these instruments were too lengthy so we recommend future work to refine the instruments using the feedback of MM administrators at the national and state levels.

Data Collection - The overall success of the implementation of data collection through the survey instruments will depend on the quality and quantity of the data collected. The quality of the data should be ensured through the extensive development and pre-testing of the survey instruments. The quantity of the data can be ensured by limiting survey length, selecting the appropriate time of the year and implementation format for each user group, and providing motivation to the users for completing the survey (e.g., economic incentives).

Data collected during users' registration to the site provides the contact information of the entire population of registered MM users (about 7,500 as shown in Table 1). Moreover, since the registration information includes the e-mail address for most of the users, the survey could be conducted via e-mail complemented (when needed) with mail surveys for those users that do not provide an e-mail. A limitation of the proposed approach is that the survey is limited to MM users. Future evaluation work could include the development of surveys that compare business outcomes of users and non-users.

Survey Data Analysis - The first part of any survey analysis should involve the calculation and interpretation of basic summary statistics (mean values, proportions, etc.) of the survey responses. In our context, this can provide a broad picture of users' utilization of the MM site, users' perceptions of MM compared to other marketing websites, and also users' perceptions regarding the impact of MM for their marketing efforts and the profitability of their operations. These summary statistics should be calculated (when possible) for each state as well as at the aggregate level.

More detailed analysis of the data will require the use of more advanced statistical/econometric methods and could involve, for example: 1. Analysis of the relationship between short-term, medium term and long term outcomes using multivariate statistical techniques (e.g, regression and correlation analysis). If short term outcomes are found to be important determinants of long term outcomes, this information can be used to project the long term impact of MM based on information that can be gathered within the MM website. The relationship between long term outcomes and short term outcomes can

also shed light on the MM features that are more likely to result in positive outcomes for the users. 2. Calculation of average values of all outcomes measures which are required for the calculations of the economic impact of the MM website at the aggregate level (state and national). 3. Analysis of the relationship between long term impacts and users characteristics. Information of this type might prove useful for the MM personal in their efforts to tailor the website to the various groups of producers that use the website.

Aggregate Costs and Benefits - The final objective of the evaluation of MM should be the analysis of the aggregate costs and benefits of the site. Results from point 2 above can be used to calculate aggregate benefits at the state and national levels whereas than cost estimates can be obtained from each of the partner states and the national MM team. Both current as well as projected benefit should be included.

6. Overall Thoughts and Recommendations from the Research Team Based on Project One

We sincerely hope that our efforts to develop an on-going evaluation framework for the MarketMaker project will be of substantial use to those involved in its on-going development and implementation. We are grateful for the comments received during our presentations of preliminary results at several academic venues (Appendix Three in full report). Our reaction to these comments helped us to make changes in our approaches at key points in the project, and to strengthen the overall outcomes of our project.

Overall, the research team finds that the MarketMaker program is one of the most complex (and, potentially, best) multi-state, multi-disciplinary, multi-constituency collaborative Extension outreach efforts in the country. Though our work did not directly deal with evaluation of the network of talented and well-positioned individuals and institutions, this network is clearly evident. As the logic models we developed clearly indicate, the importance of this network to help provide the foundation for MarketMaker website and related program development efforts is of utmost importance. In these current times of economic stagnation and fiscal restraint, a broad base of support is necessary for program survival. MarketMaker represents a valiant effort to develop a public infrastructure designed to support a broad constituency of interests.

It is the strong recommendation of the evaluation research team that focus groups similar to the ones conducted in this project be conducted annually, especially in advance of significant program design changes. Carefully conducted focus groups can help identify problematic situations prior to implementation and can also serve to generate new, innovative ideas. Carefully considering who should be involved in these focus groups is important. Targeted user groups can provide valuable direct feedback. Including key program personnel and representatives of key stakeholder groups (e.g. program funders) as silent observers can be a powerful tool for program development. As the purpose of the focus groups is evaluative in nature, making sure that program staff are not directly involved in promotional activities either before or during the session is of utmost importance. In order to insure the objective nature of these activities, a third party should

likely be employed to implement, though program staff could serve to help design the process toward high priority programmatic goals.

It is highly recommended that the national MarketMaker team proceed with setting up the full range of Google Analytics tools available, that they develop analytical and management capacity to use these tools effectively, and that they train state MM coordinators (PIs) and their respective personnel to become more adept at using these important site management tools. This information should become a regular feature of the agendas of the MarketMaker Policy Advisory Committee and State PI meetings. It should also be included in individual state-level consultations from the national program, and should be integrated within both national and state-level strategic planning processes. Given that many key individuals may not find it possible to participate in face-to-face meetings, training resources should be made available using contemporary media (e.g. video tutorials) so that individual state program leaders are not required to develop their own resources. Organizing the development of these materials at the national level also insures program consistency and integrity.

On a related note, more clarity is needed to differentiate and clearly explain the roles and expectations of national and state level resources. The logic models developed in this project can be used to guide this process, but even more detail is likely necessary. For instance, many state leaders have been involved in efforts to secure funding or to develop innovations that benefit the entire network. They seem to do this based on the assumption that other states and the national level team will reciprocate and free-riding behavior will be minimized. But, there is no guarantee that this will occur. Future state level participation and investment of resources will require that program leadership clearly articulate the shared benefits of state level innovation and reciprocity. Core funding acquired at the national level will need to be shared equitably with the states, perhaps based upon their level of personal and monetary investment in the project. Excellent communication about the changing nature of these roles should be part of the on-going strategic program planning process.

In addition, we recommend that the logic models developed in this study be revised by the MM Evaluation Committee in consultation with state leaders on a continuous basis as they develop and update the program strategic plan. Logic models provide a rational and organized way to identify resources, processes and expected outcomes. They can help new states coming into the network to make informed decisions about the resources required for program success. They can be revised when environmental or technological factors change. They can provide a somewhat sophisticated framework for overall program management and leadership.

The final objective of the evaluation of MM should include the analysis of the aggregate costs and benefits of the site. Since the site does not collect information needed for this type of analysis, we recommend using surveys to collect the required data. Preliminary survey instruments (available in this report) based on logic models and metrics revised by several MM stakeholders can be used as a starting point of these efforts. Moreover, to make data comparable across time and space (i.e., across states), evaluation

efforts and survey implementation should be coordinated by the MarketMaker Evaluation Committee.

Finally, future work plans for evaluation survey implementation, based upon the foundational work done in this project, should be developed under the auspices of the MarketMaker Evaluation Committee with full support from the MarketMaker network of state program coordinators. Whether or not that committee will have the capacity within itself to manage a full or partial-scale implementation is an open question. However, this committee should be charged with the responsibility of assessing what scale of implementation is necessary and to recommend approaches. This committee should work closely with the MM Policy Advisory Committee to generate whatever resources are necessary for implementation of the selected evaluation procedure. Finally, it should be recognized that program evaluation can be a powerful tool to help guide program development and adequate resources should be maintained to support this function.

Project Two: Implementation of an Evaluation Framework for the MarketMaker National Network

The project work plan, outlined in the grant proposal, included four stages:

- I. Development of Survey Instruments Adapted to the Needs of each Partner State
- II. Survey of Users Registered on the MM website
- III. Survey Data Analysis
- IV. Development of Outreach Materials and Dissemination of Results

Accomplishments to Date

Stages I and II of the project have been completed and we have made substantial progress on Stage III:

The development of survey instruments was completed in March 2011.

Producers Survey

During April-June 2011 our survey instrument was distributed by e-mail to 4,264 producers registered on MarketMaker. The overall response rate of the e-mail survey was 7.1 percent. In order to obtain a larger sample, a second round of surveys was sent to 2,030 producers. Differently from the first round, these surveys were distributed via postal mail during January-March 2012. We obtained an overall response rate of about 15 percent.

Data analyses of the first round of surveys are included in the paper:

Zapata, S.D., C.E. Carpio, O. Isengildina-Massa, and R.D. Lamie. 2011. "Do Internet-Based Promotion efforts Work? Evaluating MarketMaker." *Journal of Agribusiness* 29(1): 159-180.

We have also finalized a paper analyzing producers' willingness to pay (WTP) for MarketMaker.

Farmers' Markets Managers Survey

The survey was distributed by e-mail to 1,295 Farmers' Market managers registered on MarketMaker websites in 15 participant states (May – June 2011). The overall response rate of the survey was 10.2 percent and it generated 132 usable observations. We have finalized preliminary data analysis.

Survey of MM Administrators

Objective number 4 of the grant proposal was to “assess the costs and benefits of MM in each partner state.” Therefore, we developed and implemented a short survey to gather data about expenditures on MarketMaker and related programming on the partner states.

Next Steps

Given the longer than expected time involved in survey development and data collection, we need more time to analyze the data and write the final report. Moreover, since Stage IV (development of outreach materials) of the project is dependent upon the completion of the previous three stages, we need extra time to work on this part of the grant.

Producers Surveys:

Update summary statistics analyses using data collected in the second survey and write final report section (July 2012- August 2012):

Farmers' Markets Managers Survey:

Finalize analyses of Farmers' Markets managers' survey data and write corresponding report section (September 2012- October 2012).

Survey of MM Administrators:

Finalize data collection and analysis (July 2012- August 2012).

Development of Outreach Materials and Dissemination of Results (July 2012- December 2012).

Finalize final report writing (November 2012 – December 2012).

Overview of Survey Research Procedures and Results to Date

Based on results from the producer survey, an article was developed and accepted for publication in the Journal of Agribusiness. This article summarized the results of a survey that assesses the impact of MarketMaker on agricultural producers registered on the website. Results indicate that, by participating on MarketMaker, producers' annual sales have increased by about \$152. The number of contacts received, new customers

gained, and increased annual sales due to participation in the site are positively related to self-registration on the MarketMaker site, time since registration, and monthly time devoted to the website.

To study the impact of MarketMaker, agricultural producers previously registered on the site were surveyed using both online and mail paper instruments during the months of May 2011 and February 2012. The survey instrument was based on logic models² developed by Lamie et al. (2011). Survey development efforts were led by a Clemson University team of researchers working closely with MarketMaker administrators in each state. Final survey instruments were approved by the MarketMaker National Evaluation Committee and the MarketMaker Policy Advisory Committee. The survey was initially distributed by email to 4,264 producers³ registered on MarketMaker websites in 14 participating states: Illinois, Iowa, Nebraska, New York, Georgia, Mississippi, Ohio, Indiana, South Carolina, Colorado, Arkansas, Florida, Louisiana, and Washington, D.C. In February 2012, a second round of surveys was mailed to a subsample of 2,030 producers with the purpose of increasing the number of responses. Traditional mail was used in the final round of surveys to capture the responses of those producers who may be less familiar with using computers and the Internet.

The questionnaire was divided into four sections. The first section focused on users' experiences with MarketMaker. Section 2 concentrated on participants' perceptions regarding the impact of MarketMaker on their business. The third section asked respondents about their demographic characteristics, as well as business characteristics. Finally, Section 4, which was only applied to producers participating in direct-marketing channels, focused on the impact of MarketMaker on direct marketing.

An invitation email containing a brief description of the project and the link to the questionnaire was sent to all agricultural producers from the participating states. The invitation email clearly reflected the support of the local MarketMaker leaders and administrators. Two reminder emails (one and two weeks after the initial email) were sent to those individuals who had not responded to the survey. To further encourage participation in the survey, respondents were offered the opportunity to enter a drawing to win \$100. Typical completion time of the questionnaire was 5-10 minutes.

The overall response rate of the email survey was 8.7% and it generated 397 usable observations. As found in Hamilton (2003) meta-study of 199 online surveys, online survey response rates tend to be low (13.4% average response rate in their study). With the aim to increase the number of responses, a mail survey and two reminder letters were sent to a random sample of about 50 percent of those producers who did not respond the email survey. The mail survey generated 417 additional responses and had an overall response rate of 20.6%. The aggregated response rate of the study was 17.7 % with 814 usable observations. The sample frame size, number of respondents, and response rate by MarketMaker participant state is shown in Table 1. The states with the highest response

rates were Arkansas (28.9 %) and Florida (23.8%), and those with the lowest response rates were the District of Columbia (0.0%)⁴ and Nebraska (11.9%).

Survey results indicate that nearly 96% of the respondents were the owners or the managers of the business. This finding gives more credibility to their answers concerning the characteristics of the operation and the impact of MarketMaker on their business performance. Forty-six percent of respondents were female. This percentage is higher than that reported by operators interviewed in the 2007 Census of Agriculture which possibly has to do with the fact that women are the dominant users of computers on family farms (Mackrell, 2006). On the other hand, the average age of the survey respondents was 55 years which is consistent with the U.S. Census of Agriculture data (54.9 years) (USDA-NASS, 2009).

Regarding characteristics of the business, survey respondents indicated that their operations generate, on average, about \$138,663 in total annual sales (versus \$134,806 for the U.S. census), and that income from their business activities represents 39.4% of the individual's total family income compared to 28% for the average U.S. farmer (USDA-NASS, 2009). Table 2 presents a complete description of the key variables describing respondent and business characteristics.

Table 1. Survey Sample Frame Size, Number of Respondents, and Response Rate by State.

State	Sample Frame Size		Number of Respondents			Response Rate		
	Email	Mail	Email	Mail	Total	Email	Mail	Total
Arkansas	45	25	3	10	13	6.67	40.00	28.89
Colorado	485	219	32	31	63	6.60	14.16	12.99
District of Columbia	6	3	0	0	0	0.00	0.00	0.00
Florida	143	51	28	6	34	19.58	11.76	23.78
Georgia	260	107	22	23	45	8.46	21.50	17.31
Illinois	737	333	61	71	132	8.28	21.32	17.91
Indiana	323	129	40	36	76	12.38	27.91	23.53
Iowa	326	130	32	29	61	9.82	22.31	18.71
Louisiana	148	61	21	13	34	14.19	21.31	22.97
Michigan	326	156	24	33	57	7.36	21.15	17.48
Mississippi	93	34	8	8	16	8.60	23.53	17.20
Nebraska	328	150	13	26	39	3.96	17.33	11.89
New York	753	354	53	67	120	7.04	18.93	15.94
Ohio	361	162	38	38	76	10.53	23.46	21.05
South Carolina	256	116	22	26	48	8.59	22.41	18.75
Total	4590	2030	397	417	814	8.65	20.54	17.73

MarketMaker Registration and Use

Most of the agricultural producers responding to the survey (68%) indicated they had registered on the site by themselves, 8% indicated they were registered by someone else, and 24% did not know how they became enrolled in MarketMaker. This finding may be explained by the fact that, in some states, sometimes producer lists provided by state departments of agriculture were used to initially populate their MarketMaker databases.

On average, respondents have been registered on the site for 23 months. About 21% of respondents have been registered for less than 12 months, 38% have been registered between 12 and 24 months, and 41% have been registered for more than 24 months (Table 2). Producers reported various degrees of intensity with respect to the use of MarketMaker features (see Table 3). The features that were most commonly used (sometimes and frequently) are the “log on to check or update profile” (19% of users), “search for products” (18%), and “search for buyers and sales opportunities” (19%). Less commonly used features included “search for business partnerships” which was used sometimes or frequently by about 12% of users; “use the buy/sell Forum,” a relatively new feature introduced in 2010 (11%); and “find target market for your products” (12%). This table also stands to imply that about 58% of registered producers could be considered as non-users of MarketMaker, 28% were passive users, 12% average users and only 1% were active users. Thus, efforts should be made to encourage more active use of the website by registered producers.

In relation to the time devoted to the website, producers registered on MarketMaker spend about 21 minutes per month managing their account, with nearly 85% of the producers devoting less than 30 minutes per month on MarketMaker-related activities (Table 2). Producers were also asked about the type of customers they intended to reach with MarketMaker. Survey results indicate that 85% of agricultural producers use the MarketMaker website to reach individual consumers, 30% to connect with business buyers, and 12% to contact other producers. Hence, even though a lot of effort by the MarketMaker administrators has been devoted to promote business-to-business activities on the site (Lamie et al., 2011), producers still perceived MarketMaker mainly as a tool to reach individual consumers.

Table 2. Description and Summary Statistics of Respondents Characteristics.

Variable Name (Units)	Category	Category Proportion			Mean		Std. Dev.
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric	
Relationship with the business	Owner	84.93	94.42	89.99			
	Manager	8.99	3.30	5.96			
	Employee	4.06	0.76	2.30			
	Other	2.03	1.52	1.76			
Gender	1=Female	0.49	0.44	0.46		0.46	0.50
	0=Male	0.51	0.56	0.54			
Age						55.05 ^a	12.93
Total annual sales (\$1,000)	Less than \$10	36.80	33.24	34.94	(96.59, 195.29)	138.66	244.93
	\$10 to \$50	21.36	28.92	25.32			
	\$50 to \$100	14.24	12.43	13.30			
	\$100 to \$250	11.28	12.16	11.74			
	\$250 to \$500	6.23	4.05	5.09			
	\$500 to \$1,000	3.86	9.19	6.65			
	Over \$1,000	6.23	0.00	2.97			
Share of total family income from farming (%)	Less than 10	34.90	32.04	33.39	(34.85, 43.99)	39.42	36.30
	10 to 20	13.42	14.07	13.77			
	21 to 30	7.72	8.38	8.07			
	31 to 40	4.70	5.09	4.91			
	41 to 50	6.38	5.39	5.85			
	51 to 60	3.02	2.69	2.85			
	61 to 70	2.68	1.50	2.06			
	71 to 80	4.70	3.29	3.96			
	81 to 90	6.04	5.09	5.54			
	91 to 100	16.44	22.46	19.62			
Time registered on MarketMaker (Months)	Less than 1	2.20	1.48	1.81	(18.35, 29.59)	23.48	13.72
	1 to 6	13.66	2.59	7.65			
	7 to 12	18.50	5.93	11.67			
	12 to 24	37.44	38.15	37.83			
	24 to 36	16.74	25.93	21.73			
	36 to 48	7.49	17.41	12.88			
	More than 48	3.96	8.52	6.44			

Table 2. Description and Summary Statistics of Respondents Characteristics. (Continued)

Variable Name (Units)	Category	Category Proportion			Mean		Std. Dev.
		Email	Mail	Total	Nonparametric lower and upper bounds	Parametric	
Time spent on MarketMaker activities (Minutes/month)	Less than 30	81.30	88.29	84.60	(8.52, 42.33)	21.30	17.9 5
	30 to 60	13.91	8.29	11.26			
	61 to 120	1.74	2.93	2.30			
	121 to 300	2.61	0.00	1.38			
	121 to 300	0.00	0.49	0.23			
	More than 600	0.43	0.00	0.23			

^a The average age of the email and mail survey respondents was 52.91 years and 57.08 years, respectively.

Producers' Perceptions about Impact of MarketMaker

Survey questions related to the impact of MarketMaker asked respondents about its perceived impact on the total number of contacts received due to their participation in the site, total number of new customers gained, and the increase in annual sales since producers registered in the website (Table 4). Producers indicated that, as a result of their participation with MarketMaker, they have been contacted, on average, about 2.9 times by customers, input suppliers, and other producers. At the same time, nearly 64% of producers in the sample had not received any contacts due to MarketMaker. However, the proportion of producers who had received marketing contacts through MarketMaker in our sample (36%) is greater than the 12% reported by registered New York producers (Cho and Tobias, 2009).

In terms of the number of new customers gained, respondents indicated that their participation has helped them obtain an average of 1.6 new customers even though 70% of the respondents indicated that they have gained no new customers through the site.

Lastly, survey respondents' perceived average annual increase in sales due to MarketMaker was estimated at about \$152, with 75% of the participants indicating the increase in annual sales was \$25 or less. The overall increase in annual sales due to MarketMaker in the sample was lower than that found by Cho and Tobias (2009) where the average increase in annual sales assisted by MarketMaker reported by New York producers was between \$225 and \$790. This finding may be due to the fact that our sample combined producers from different states that may have had MarketMaker presence for a shorter period of time than New York or it could reflect the success of New York MarketMaker administrators' marketing and training programs.

Table 3. MarketMaker Features and their Rate of Use by Producers.

Feature	Never	Rarely	Sometimes	Frequently
Log on to Check or Update Profile (such as adding new information, photos, social media links, business contacts, alerts, etc.)	0.38	0.44	0.17	0.02
Search for Products	0.50	0.31	0.16	0.02
Search for Business Partnerships (e.g., to find other companies to sell products)	0.60	0.28	0.11	0.01
Search for Buyers and Sales Opportunities	0.50	0.31	0.17	0.02
Find a Target Market for Your Products (e.g., using demographic data, food consumption data)	0.59	0.29	0.11	0.02
Use the Buy/Sell Forum	0.65	0.24	0.09	0.02
Other	0.85	0.11	0.02	0.01

Table 4. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales as a Result of Participating in MarketMaker.

Variable Name (Units)	Category	Category Proportion			Mean		Std. Dev
		Email	Mail	Total	Nonpara metric lower and upper bounds	Parametric	
Marketing contacts	0	63.53	64.86	64.17	(1.41, 4.47)	2.9019	5.7946
	1 to 9	29.48	27.16	28.35			
	10 to 20	4.86	5.43	5.14			
	21 to 30	2.13	0.96	1.56			
	31 to 40	0.00	0.96	0.47			
	41 to 50	0.00	0.32	0.16			
	More than 50	0.00	0.32	0.16			
New customers	0	71.20	69.08	70.15	(1.00, 2.40)	1.6215	3.3911
	1 to 5	20.06	19.74	19.90			
	6 to 10	7.12	7.89	7.50			
	11 to 20	0.97	2.30	1.63			
	More than 20	0.65	0.99	0.82			
Annual sales	Under \$25	74.64	74.43	74.54	(81.94, 258.18)	151.65	732.11
	\$25 to \$50	6.79	6.11	6.46			
	\$51 to \$75	2.50	2.29	2.40			
	\$76 to \$99	5.36	2.67	4.06			
	\$100 to \$499	7.14	8.40	7.75			
	\$500 to \$999	2.14	3.05	2.58			
	\$1,000 to \$4,999	1.07	2.67	1.85			
	\$5,000 to \$9,999	0.00	0.00	0.00			
More than \$10,000	0.36	0.38	0.37				

Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Since the statistics discussed previously are values across producers with different characteristics, we also present the values of the perceived impacts of MarketMaker across different types of users⁶. Figures 1 to 3 display the perceived number of additional contacts, new customers, and increases in annual sales for groups of users differentiated by the type of registration (Figure 1), time registered in MarketMaker (Figure 2), and time spent on the site (Figure 3). As indicated in the figures, all of the business outcome measures seem to be positively related to self-registration in MarketMaker, the amount of time since registering on the site, and the amount of time users spend on MarketMaker activities.

In fact, producers who registered themselves on the MarketMaker website have received, on average, almost twice as many additional contacts and customers than those who were registered by someone. This finding suggests that more education and promotion of MarketMaker are needed to encourage self-registration. Moreover, as Figure 3 suggests, producers who reported spending between 30 and 60 minutes per month on the MarketMaker website had an average annual sales increase of \$279 compared to only \$51 for those users who spent less than 30 minutes a month on MarketMaker-related activities. This finding suggests that MarketMaker state and national leaders should encourage producers to become more active users of MarketMaker to achieve the desired benefits from participation.

MarketMaker Impact on Direct Sales

The optional section for those producers participating in direct marketing channels—to consumers or wholesale buyers—was completed by 707 agricultural producers which corresponds to about 87% of the total respondents. Fifty-one percent of this group of respondents participated in direct marketing to individual consumers, 8% in direct marketing to wholesale buyers, and 41% participated in direct marketing to both individual consumers and wholesale buyers.

Survey respondents indicated that, as a result of their participation with MarketMaker, they have received, on average, a total of 1.9 additional marketing contacts seeking information about their direct market activities, but the majority of surveyed producers (66%) indicated that they have not received any additional marketing contacts through MarketMaker. Average annual increases in direct sales to individual consumers and wholesalers due to participation in MarketMaker was 1.1% (76% of the sample experienced no increase in this type of sales) and 0.8% (88% of the sample experienced no increase in this type of sales), respectively. Therefore, as in the case of the overall impact of MarketMaker on all business activities, the impact of the site on direct marketing activities seems to be perceived by producers as relatively modest so far. A detailed description of the impact of MarketMaker on participants' direct marketing channels is shown in Table 5.

Table 5. Perceived MarketMaker Impact on Direct Marketing Activities.

Variable Name	Category	Category Proportion	Mean		Std. Dev.
			Nonparametric lower and upper bounds	Parametric	
Marketing contacts	0	62.87	(1.33, 3.14)	1.93	3.87
	1 to 5	24.55			
	6 to 10	8.38			
	11 to 20	2.99			
	More than 20	1.20			
Increase in annual direct sales to individual consumers	0%	76.21	(0.66, 1.75)	0.74	1.83
	1% to 5%	18.15			
	6% to 10%	3.63			
	11% to 20%	1.61			
	21% to 40%	0.40			
Increase in annual direct sales to wholesalers	0%	84.56	(0.96, 2.02)	1.17	5.20
	1% to 5%	8.09			
	6% to 10%	4.41			
	11% to 20%	1.47			
	21% to 40%	0.74			
	Over 40%	0.74			

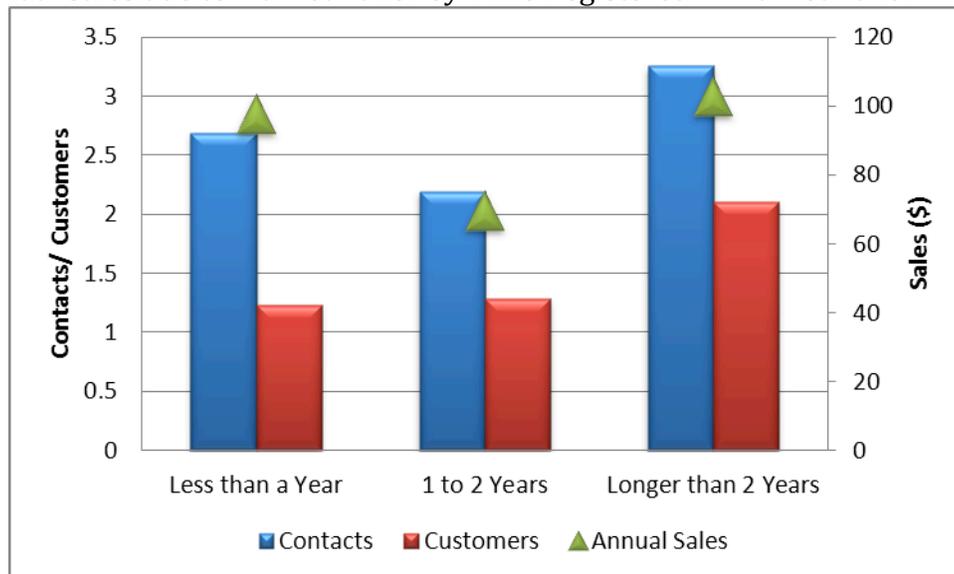
Note: Marketing contacts refers to the total contacts gained since the producer became registered on the MarketMaker website.

Figure 1. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Registration Type.



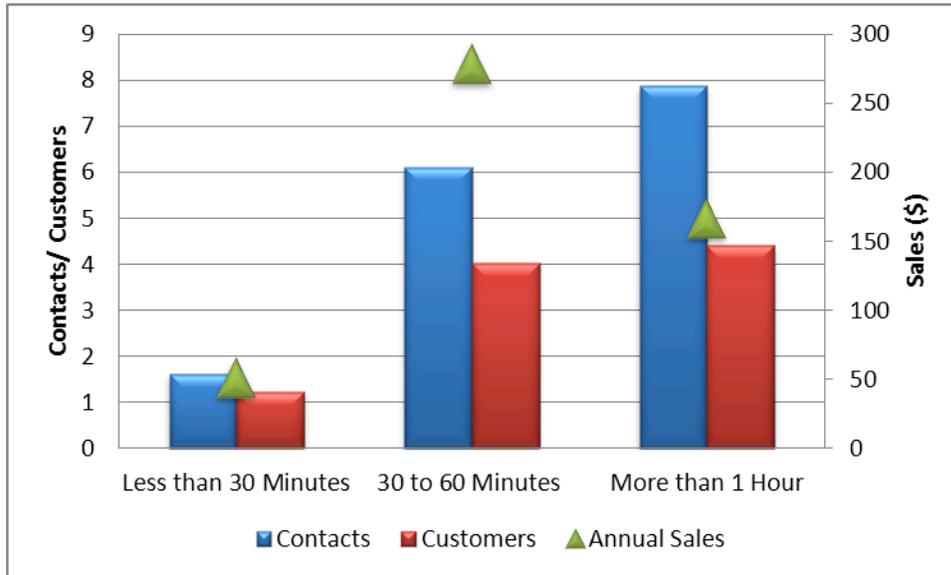
Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Figure 2. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Time Registered in MarketMaker.



Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Figure 3. Perceived Additional Marketing Contacts, New Customers and Increase in Annual Sales due to MarketMaker by Time Spent (Monthly) on Activities Associated with MarketMaker.



Note: Marketing contacts and new customers refer to the total contacts and customers gained since the producer became registered on the MarketMaker website.

Summary and Conclusions

Although e-commerce is expected to improve agricultural profits, literature on the potential economic impact of e-commerce is very limited. In this study, we present the results of a survey that investigated the impact of the MarketMaker website on the business performance of agricultural producers. This paper also introduces econometric modeling innovations for the use of parametric and nonparametric procedures for the estimation of the distribution mean of a variable (continuous or discrete) that is only observed to fall in a certain interval. In our context, the calculation of the mean values of the distribution was important for the estimation of aggregate impacts across all site users.

MarketMaker intends to provide marketing information to both producers and consumers in order to facilitate their market interactions. However, survey results indicate that the perceived impact of MarketMaker on various business outcomes—sales, new customers, and marketing contacts—are presently relatively modest. The results of this study also show that the effectiveness of MarketMaker is strongly linked with how it is used by producers. For example, producers who registered themselves on the MarketMaker website have received, on average, almost twice as many additional contacts and customers than those who were registered by someone else.

Hence, the best approach to "sell" the site is to actively promote it directly to producers instead of adding names from previously constructed producer lists. Another interesting finding is the positive relation between the amount of time spent on the site and the perceived impact of MarketMaker. The challenge is that only about 13% of producers seem to be average or active users of MarketMaker. On average, producers don't spend enough time on activities associated with MarketMaker (21.3 minutes per month) to gain its full benefits. Therefore, the average impact of the website has been moderate so far.

As a result of their participation with MarketMaker, producers have received an average of 2.9 marketing contacts, and have gained an average of 1.6 new customers. Additionally, MarketMaker has assisted farmers and fishermen in increasing their annual sales by an average of \$152. Individual consumers are the main type of customers targeted through MarketMaker activities.

Nearly 87% of producers registered on MarketMaker participate in direct marketing to individual consumers and wholesale buyers. MarketMaker has helped these producers receive an average of 2.9 marketing contacts seeking information about their direct-market activities. Also, due to participation in MarketMaker, producers have increased their annual direct sales to individual consumers by 1.1% and to wholesale buyers by 0.8% on average.

Since these findings are based on the survey questions that only reflect perceived impacts, it is not certain to what extent these perceptions reflect reality. For example, MarketMaker does not currently allow buying and selling of products through the website, thus the only approach to obtain sales data is through producer surveys. In any case, producer support for the site will likely be based on its perceived impact on their businesses; hence, it is recommended that MarketMaker state and national leaders more

actively seek to improve their visibility and perceived impact. For instance, MarketMaker could encourage customers—maybe through using coupons—to mention the website in their interaction with producers.

As the logic models developed by Lamie et al. (2011) indicate, the development of the MarketMaker website is a necessary, but not sufficient condition for the success of MarketMaker. Marketing, promotion, and training that integrate MarketMaker into a broader strategic decision-making context for users is also needed. As states consider the adoption of MarketMaker, they should consider providing dedicated resources not only for site development and maintenance, but also for programmatic development and delivery. This will require some combination of state-level reallocation of existing resources or identification of new resources to deliver more directed training and promotion.

In addition, MarketMaker website development should focus on encouraging initial registration by users themselves and on providing good reasons for users to return to the site to benefit from the additional features that MarketMaker offers. Focus groups conducted with MarketMaker users suggest that the current site could benefit from efforts to package carefully selected elements of the current MarketMaker site to specific user groups to make it more “user-friendly” (Lamie et al., 2011). The current configuration of the site is, perhaps, most useful to user groups that can devote time to the effort. Therein lies a conundrum because household consumers and other direct marketing targets are the least likely to invest time in learning how to use the site, yet producers overwhelmingly hope to use MarketMaker to reach them.

Future work with this dataset will also involve an analysis of the relationship between short-term, medium-term (e.g., time spent on the site and use of futures) and long-term outcomes (e.g., increases in sales) using multivariate statistical techniques. The information obtained from this analysis can be useful in identifying the MarketMaker features that are more likely to result in positive, long-term outcomes for producers. Additionally, a willingness to pay (WTP) study was conducted to obtain an estimate of the overall economic value that registered producers place on the services received from MarketMaker (see Zapata 2012 for details). We believe that the WTP measure incorporate the value of other benefits of MarketMaker beyond those measured by the metrics presented in this study.

Future work evaluating MarketMaker should compare the results of this study, which uses cross-sectional data, with analyses using longitudinal or panel data in order to better capture the dynamics of MarketMaker users’ behaviors (in addition to potential gains in the precision in estimations). In fact, the information generated in this survey can be used as baseline information for these types of future studies.

Related Professional Posters, Presentations, and Publications

Lamie, R. David, Samuel Zapata, Olga Isengildina-Massa, Carlos Carpio. Evaluating Marketmaker: Analyzing the Impact of an Electronic Food Marketing Network and its Capacity to Improve Efficient Market Access for Small to Mid-Sized Farmers and Food Entrepreneurs. Prepared for "Enhancing Local and Regional Food Systems: Exploring the Research, What Works, and What We Need to Learn", Northeast Rural Development Center, Kerhonkson, NY 19-20 May 2009.

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Leveraging the Capabilities of the Internet to Establish and Deepen Food Supply Chains. Preliminary draft of white paper summarizing study findings for a non-economist audience.

Leveraging the Capabilities of the Internet to Establish and Deepen Food Supply Chains

R. David Lamie, Carlos Carpio, Olga Isengildina-Massa, and Samuel Zapata

The World Wide Web has been with us now for 20 years and in this short period of time it has radically changed all sectors of the economy and most lifestyles. Some readers might remember having to carefully craft written fax, or God forbid, even snail mail correspondence. Some might have even used the ancient device known as the rotary telephone. The newest readers of Choices likely grew up in the digital world and would never allow themselves to be “trapped” by these inefficient means of communication.

The food sector has also changed significantly because of these new Internet-enabled means of handling communication and information, making many existing transactions more efficient, helping smaller purveyors reach more distant markets, and introducing consumers at all levels in the supply chain to a broader array of products and services than ever before. Individual businesses are coming on-line with their own websites and various groups are propping up marketing strategies that tie several producers together into one multi-establishment web presence, usually geographically or product attribute-based, reducing the search costs for consumers and helping small purveyors to establish scale economies and reach distant markets.

Multi-establishment projects vary in geographical coverage, primary target audiences, features, and scope and depth of included data. Though not always evident by casual inspection, they also differ substantially in who is involved in developing, promoting, and funding these websites. But, they are all similar with respect to the opportunity they present to food sector establishments to gain web presence and exposure to new target audiences unreachable prior to the Internet and infeasible unless done with others. How this web presence translates into ultimate desirable outcomes for individual users is of great interest to those responsible for supporting these efforts as well as those who invest the time and effort in hopes that these approaches will yield useful results.

In order to more clearly understand how these projects can result in useful results, one must consider more than the website itself. A systems perspective of the role that such websites plays as a facilitator of desirable outcomes for users is provided in the accompanying diagram titled MarketMaker Producer Logic Model. This systems logic model was developed as part of a USDA-FSMIP-funded project to develop the framework for evaluation of the national Food Industry MarketMaker website project (Lamie et al, 2011). Logic models are used widely in program planning and are a useful way to organize complicated systems (W.K. Kellogg Foundation, 2004). The order of logic in the model generally flows from left to right, starting with inputs (ingredients), then activities (recipe), to outputs (salad). Outputs produce short (satisfy hunger), intermediate (change body mass index), and long-term (improved health) results. It is often useful to start with the desired

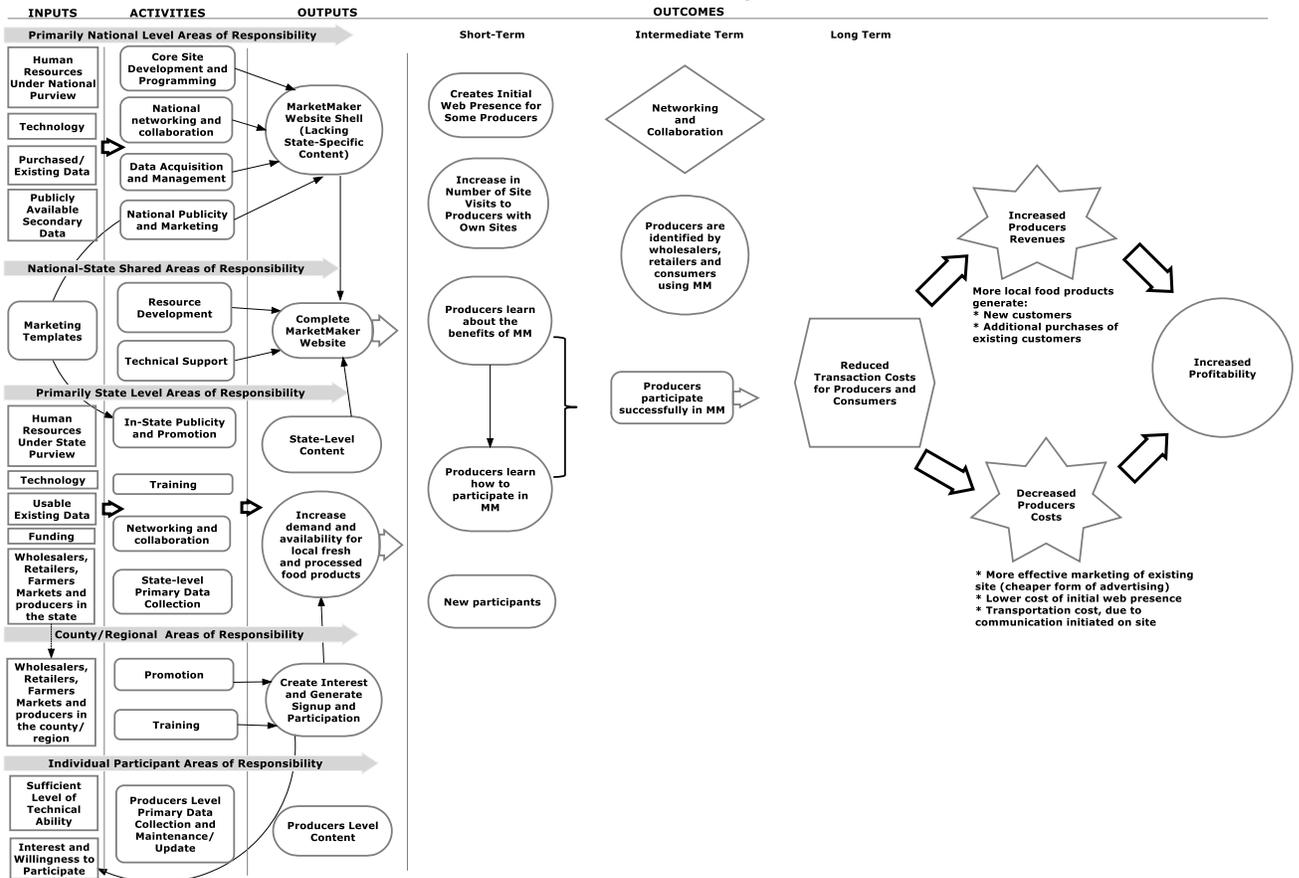
long-term results and work backwards, reverse-engineering and identifying important stages in the process.

For the remainder of this article, we will focus on MarketMaker, a collaborative effort between Land Grant Universities, state departments of agriculture, Sea Grant, and other affiliating organizations to build a comprehensive website for the food supply chain. The program is currently in about 20 states and is still growing (www.facebook.com/foodmarketmaker). For the MarketMaker website, the desired long-term outcome for producers who invest in its use was identified as increased profitability, with decreased costs and increased revenues both being possible ways to achieve this result. Although e-commerce is expected to improve agricultural profits, literature on the potential economic impact of e-commerce is very limited.

In our model, the primary mechanism for increasing profitability is by reducing search and transaction costs for both producers and consumers, creating a more effective and efficient market. But, these ultimate results do not occur immediately, nor is registering with the site thought to be a magic bullet, requiring no other activities on the part of the producer or others. As one moves from the right to left in the diagram, matters become increasingly complicated. At the far left side of the diagram, moving down the first column's major headings, one can see that there are specific roles for national, state, local/regional, and individual participants. In essence, these roles, responsibilities, and associated activities characterize the operational plan for MarketMaker as a whole. Failure to accomplish these operations will likely have deleterious effects on the achievement of desired outcomes. This diagram can serve as a diagnostic tool for troubleshooting problems in the overall system and as a guide for allocating appropriate resources and encouraging desirable behavior at many levels. How these roles and associated activities are distributed across these parties might differ for other web-based food system platforms.

This particular logic model was developed for producer-users of MarketMaker. Other similar models were also developed for other user groups including farmers markets, chefs/restaurants, food retailers, food wholesalers, and food consumers (Cite final report, phase one). Since MarketMaker has been developed for all of these audiences simultaneously, most of the left side of these diagrams appears nearly identical, generally with differences beginning to appear as one moves right.

MarketMaker Producer Logic Model



If increased profitability is the desired long-term outcome for producers using MarketMaker, how can we know if this result is being achieved? In order to gain insights, we need to decide upon measurable goals and objectives and set about collecting appropriate data. Some useful data about the use of the site can be obtained through embedded tools directly in the site that collect user data (e.g. Google Analytics). However, this information is only partially useful as it generally reflects how well the overall system is performing along those items identified in the left-hand side of the diagram, primarily “activities”, but also some of the short-term outcomes (e.g. increase in number of site visits).

Measuring intermediate and long-term outcomes requires the collection of data directly from producers. Even so, producers likely do not fully understand the connections between their use of the MarketMaker site and increased revenues or reduced costs unless they have experienced some specific event that they can clearly attribute to its use. Further complicating measurement, MarketMaker essentially serves as a match-making service between businesses and consumers all along the supply chain. Even if MarketMaker facilitates a business transaction, multiple subsequent transactions might occur from that point forward with no further need for MarketMaker to be involved. Or, additional business contacts might be generated through the new MarketMaker-facilitated primary relationship. How much of these secondary effects should be included in any estimation of impact

remains an unresolved issue. Efforts to accurately measure the long-term effects of the use of MarketMaker on long-term outcomes (increased profitability) will be hindered by such matters. So research results should likely be interpreted as being quite conservative relative to the overall true value of the MarketMaker application.

For our project, metrics based upon this logic model were developed and survey research was conducted in an attempt to better understand producer perceptions of the value of using MarketMaker. Survey results indicate that the perceived impact of MarketMaker on various producer business outcomes—increased sales, new customers, and marketing contacts—are presently relatively modest. The results of this study also demonstrates that the effectiveness of MarketMaker, or likely any internet-based tool, is strongly linked with how it is actually used by producers. For instance, producers who registered themselves on the MarketMaker website received nearly twice as many additional contacts and customers than those who were registered by someone else. So, it makes strategic sense to actively promote having producers register themselves directly rather than relying on intermediaries to do it for them. Another interesting finding is the positive relation between the amount of time spent on the site and the perceived impact of MarketMaker. The challenge is that only about 13% of registered producers seem to be active users. Typically, producers don't spend enough time on activities associated with MarketMaker (21.3 minutes per month) to gain its full benefits.

As a result of their participation with MarketMaker, producers have received an average of 2.9 marketing contacts, and have gained an average of 1.6 new customers. Additionally, MarketMaker has assisted farmers and fishermen in increasing their annual sales by an average of \$152. Individual consumers are the main type of customers targeted through MarketMaker activities.

Nearly 87% of producers registered in MarketMaker participate in direct marketing to individual consumers and wholesale buyers. MarketMaker has helped these producers receive an average of 2.9 marketing contacts seeking information about their direct-market activities. Also, due to participation in MarketMaker, producers have increased their annual direct sales to individual consumers by 1.1% and to wholesale buyers by 0.8% on average.

Since these findings are based on the survey questions that only reflect perceived impacts, it is not certain to what extent these perceptions reflect reality. For example, MarketMaker does not currently allow buying and selling of products through the website, thus the only approach to obtain sales data is through producer surveys. In any case, producer support for the site will likely be based on its perceived impact on their businesses. So, it is recommended that MarketMaker state and national leaders more actively seek strategies to improve the visibility and perceived impact of their sites, as well as user training based on best practices.

As the logic models indicate, the development of the MarketMaker website is a necessary, but not sufficient condition for the success of MarketMaker. Marketing, promotion, and training that integrate MarketMaker into a broader strategic decision-making context for users are also needed. As states consider the adoption of MarketMaker, they should consider providing dedicated resources not only for site development and maintenance, but also for programmatic development and

delivery. This will require some combination of state-level reallocation of existing resources or identification of new resources to deliver more directed training and promotion.

In addition, MarketMaker website development should focus on encouraging initial registration by users themselves and on providing good reasons for users to return to the site to benefit from the additional features that MarketMaker offers. Focus groups conducted with MarketMaker users suggest that the current site could benefit from efforts to package carefully selected elements of the current MarketMaker site to specific user groups to make it more “user-friendly” (Lamie et al., 2011). The current configuration of the site is, perhaps, most useful to user groups that can devote time to the effort. Therein lies a conundrum because household consumers and other direct marketing targets are the least likely to invest time in learning how to use the site, yet producers overwhelmingly hope to use MarketMaker to reach them.

The MarketMaker project seems to be at a crossroads in many respects. Though the long-term desired results of increased profitability are largely yet to be seen, there is great optimism that increased allocations of time and energy toward website enhancements, training, and promotion will produce better results. In an age of fiscal austerity, agencies and organizations looking to reduce their costs would be expected to seek out opportunities to collaborate on such activities as data collection, training, and marketing. The MarketMaker program seems to represent an opportunity for such collaboration. Evidence from one state (Colorado) where the state department of agriculture has decided to jettison other efforts (in favor of using MarketMaker, collaborating with others, including Colorado State University) to collect and maintain producer and other food sector business data has resulted in substantially increased traffic to their MarketMaker site (when compared to other states that have not done so). Such approaches require substantial trust and increased inter-organizational management and sharing of resources and cultivating such working relationships is not always easy.

The development and maintenance of the MarketMaker state and national level websites requires a modest investment of resources. Building educational programs and marketing campaigns around these sites is a necessity that will require even more resources. Given current consumer interest in the transparency of the food supply chain, the source of funding for moving such a project to the “next level” is a highly sensitive matter, due substantial consideration and deliberation.

Public investment in this “cyber-infrastructure” project implies that the benefits should largely accrue to the public through increased access to a healthy, nutritious food supply brought to them by a more efficient, transparent, and robust supply chain, likely enabled by profit-seeking private firms. But, bringing sufficient public investment to truly bring this project to scale for such a seemingly deserving project is difficult in this era of fiscal austerity. If this project were fully privately funded by an individual food supply business, most would expect that consumer acceptance and producer participation would likely be thwarted. Funding through a collection of associations that represent private interests is a possible alternative, so long as these associations represent a broad cross-section of food supply chain

businesses and possibly even consumers. The University of Illinois, who provides leadership to the MarketMaker network of states, has discussed licensing of the site with various public-private and non-profit groups over the course of the past few years. Identifying and securing strong partners with appropriately aligned missions, solid reputations, technical savvy, and sufficient resources to bring this promising model to scale is probably a good idea so long as the network of state partners is respected in any transition process and sufficient resources are made available to enable robust training, marketing, and promotion activities at both the state and national levels. Of course, there are no certainties that producers and consumers will make sufficient use of these investments to warrant the cost. Then again, we will never truly know unless we make the attempt.

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