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Is Agriculture Important to Agritourism?: An Analysis of the Agritourism Attraction Market in Israel

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Abstract

Establishing agritourism attractions is a favored practice for farm diversification among farmers and policy makers who support rural development. Despite the fact that they are all grouped under the category of agritourism, it appears that some of these attractions are based on the active farm, while others are based on rural ambience. In this study, we want to provide answers to the following questions. From a welfare perspective, which type of attraction—one based on the active farm or one based on rural ambience— should a farmer be incentivized to diversify to? Which type of support scheme in this market should be pursued for enhancing welfare? We modeled the agritourism attractions as a differentiated goods market and applied it to data collected from a sample of attractions in the Israeli market. We used the estimated model to simulate a scenario in which all farmers based their attraction on an active farm. We show that in comparison to the present situation, in which only some farmers base their attraction on their active farm, the market would suffer a decrease in the welfare of both consumers and producers. Thus, farmers are better off basing the attractions on rural ambience. We also show, by simulating the market under two support schemes, that an indirect support measure such as infrastructure improvement has a stronger impact on the welfare of consumers and producers in the Israeli market than a direct scheme such as capital subsidization.

Keywords: agritourism attractions; differentiated goods; oligopoly markup; constant expenditure model

Agritourism is one of many terms that describe the phenomenon of farm tourism activities. It includes agricultural-based recreational activities, hospitality services, agricultural education, and a variety of rural-based outdoor recreation opportunities (Barbieri, 2014). Some of these tourism activities are offshoots of active farms (e.g., pick-your-own ventures, harvest festivals) and some are based on rural ambience (e.g., bed and breakfasts, outdoor recreation activities). Agritourism has increased in popularity in the last several decades (Cordell, 2008; Arroyo, Barbieri, and Rich, 2013; Ollenburg and Buckley, 2007; Sotomayor et al., 2014). In the United States, agritourism-related receipts showed a 600 million USD increase between 2002 and 2012 (USDA: NASS, 2014, 2009). It also accounts for 566 million USD in additional farm income (Brinkley, 2012). In China, according to Yang, Cai and Sliuzas (2010) agritourism attractions receive and entertain more than 300 million tourists per year, creating 40 billion RMB in revenue. In the UK, a third of all farm operations are engaged in agritourism activities (BernardoValentin and Leatherman, 2004).

Agritourism has emerged due to the decline in income incurred by farmers in many rural areas and the consequent need for an auxiliary income. Due to reasons that will be described in the next section, farmers and policy makers readily adopted agritourism as one of several diversifying strategies in order to remain economically viable. In the mid-nineteen-eighties, the EU, for example, shifted its Common Policy in Agriculture (CAP) from encouraging agricultural production to restraining it and encouraging rural development. Accordingly, economic diversification became the most dominant policy strategy for rural development, and within this context, tourism has emerged as an important element (Tchetchik, Fleischer, and Finkelshtain, 2008).

Similarly, in the United States, the Farm Bill (Farm Security and Rural Investment Act of 2002 Public Law 107-171, May 2002) creates a series of economic incentives to encourage farm diversification. Nevertheless, it is not clear whether, at the individual farm level, agricultural production synergizes with the tourism activity or, rather, imposes negative externalities on it. While many agritourism studies have accumulated since the nineteen eighties, they have largely neglected to provide an economic analysis of the agritourism attraction market that explicitly distinguishes between farm-based and rural-based tourism attractions. This is an important issue, because if the agricultural activity plays an important role in keeping the tourism businesses viable, a complete exit from farming has the potential to negatively affect the agritourism market.

Another related issue that has been ignored in the literature is the effectiveness of the numerous policy instruments used and the large budgets allocated to promote agritourism as a mechanism for rural development. As explained below, while some studies evaluated specific support schemes, they did not provide economic analysis that compares the effectiveness of different support methods.

In this paper, we provide an economic analysis of the agritourism attraction market in Israel while distinguishing between farm-based and rural-based tourism attractions. We drew up an economic model of the agritourism industry based on the premise of oligopolistic price competition between firms that produce differentiated goods. This is followed by an empirical application to Israel's agritourism attraction market using a nested logit model on data collected by a face-to-face survey of 90 attraction operators. Using the empirical estimates, we were able to simulate different market equilibrium scenarios in order to provide answers to the above-mentioned research questions.

We found that this is a highly differentiated goods market, as reflected by a markup of 45.4%. We show that although agricultural-based activities have an advantage

in terms of production technology over other activities, their disadvantage in terms of demand is dominant, resulting in their inferior position compared to non-agricultural-based activities. That is, a scenario in which all agritourism attraction firms are based merely on active farms revealed that compared to the current situation, the market would suffer from a drop both in number of visitors and in price, leading to a loss of profit and consumer surplus, and consequently a loss of total welfare. In another two scenarios, we simulated two types of support schemes—an infrastructure improvement grant on the regional level and a capital support scheme at the entrepreneurial level. We found that in these specific cases of government intervention, the indirect support of infrastructure improvement seems to be more effective and to achieve a greater increase in total welfare.

Literature Review

The emergence of agritourism is commonly described in the literature as the outcome of economic changes on both sides of the market—farmers as producers and households as consumers. On the supply side, farmers who face a decline in agriculture's terms of trade are constantly seeking new activities to generate auxiliary or even alternative sources of income. On the demand side, increase in income and leisure time juxtaposed with income elasticity greater than one of tourism in general, as well as urbanization and growing awareness of the environment, have resulted in an increased demand for leisure activities in rural areas (Fleischer and Pizam, 1997). In many countries, these two trends have laid the foundation for the advent of agritourism markets. Yet, many of the studies on agritourism tend to analyze only one side of the market, overlooking the merits of analyzing the market as a whole. A group of papers looked at the supply side only, analyzing motivation and factors that affect farmers' decision to diversify to agritourism (Bagi and Reeder, 2012; Khanal and Mishra, 2014; McGehee and Kim, 2004) or

examining the economic benefits and performance of agritourism enterprises (Joo, Khanal and Mishra, 2013; Barbieri and Mshenga, 2008; Veeck et al., 2016). Another group of papers addressed the demand side by identifying and quantifying the effects of different factors that influence visitors' decisions to engage in agritourism (Carpio, Wohlgenant, and Boonsaeng, 2008; Santermo, 2015). Only a small number of papers looked at both sides of the market in order to understand the full impact of the different characteristics of agritourism firms (including their linkage to the active farm) on their economic performance (Tchetchik, Fleischer, and Finkelshtain, 2008).

We also identified a dearth of empirical literature that explicitly distinguishes between farm-based and rural-based agritourism, while on a conceptual level some papers define the difference between the two types of agritourism activities. In that vein, Clarke (1996) claims that there is a difference between "tourism-on-the-farm" and "farm tourism." In "farm tourism," the attractions are divorced from the farm environment, while in "tourism on the farm," the farm environment and its essence are incorporated into the product (e.g., participating in farm work and picking your own produce). Busby and Rendle (2000) describe the transition from "tourism on the farm" to "farm tourism" that takes place as farmers who become engaged in tourism on their farms gradually divorce themselves from agricultural activities. With this transition, farm activities cease to be a necessary component of the agritourism enterprise. Clough (1997) extends this argument by claiming that most visitors would be happy not to see the working farm at all. These observations lead to the conclusion that there is a range of links between agriculture and tourism and that these links are becoming weaker, especially from the visitor's point of view. Nevertheless, the aforementioned studies were mainly conceptual and did not include empirical economic analyses that compared different types of agritourism attractions.

Other group of studies stressed the benefits of diversifying to agritourism due to the use of unemployed or idle farm production factors or the reliance on other characteristics of the farm (Schilling, Sullivan, and Komar, 2012; Barbieri, Mahoney, and Butler, 2008). Most of the studies in this group did not differentiate between agritourism firms based on farm activity and those based on rural amenities. Basing the agritourism business on the active farm might seem efficient on the production side because it can use otherwise idle production factors. However, this approach ignores the demand side. Visitors might prefer rural-based over farm-based agritourism attractions. Thus, basing the attraction on active farm assets might not be the optimal choice. Despite their accumulation in different world regions, these agritourism studies have largely neglected to consider how the decision to base agritourism activity on the active farm as opposed to rural amenities affects the viability of the activity.

In their study of the rural accommodation market, Tchetchik, Fleischer, and Finkelshtain (2008) found that rural accommodation operators who are also active farmers enjoy more efficient production technology of farm accommodation services and that the proximity to the active farm is not an important attribute for visitors. Nevertheless, their findings on the farm accommodation market cannot be immediately applied to all other agritourism markets, since rural accommodations, unlike some agritourism attractions, are not based intrinsically on farm activity. This paper seeks to reveal a solution to a dilemma that may face both diversifying farmers and policy makers designing incentives schemes—whether it is preferable to establish an agritourism attraction based mainly on farm activities or one based on rural ambience. The study was conducted within the context of a partial equilibrium analysis, which includes both demand and supply sides.

The economic analysis of support schemes for agritourism is another issue dealt sparsely with in the literature. Governments use a plethora of policy instruments to

promote agritourism. These include regulatory instruments, voluntary instruments, financial incentives, general and tourism-specific infrastructure improvement, among others (Hall and Jenkins, 1997). Despite the fact that evaluations of the effectiveness of public support for small tourism businesses are patchy and sporadic (Thomas, 1997), decision-makers and practitioners alike perceive agritourism as an appropriate development path and thus design policy instruments that are not always anchored in economic evaluation. Some studies evaluated ex-post specific support measures (Fleischer and Felsenstein, 2000 in Israel; Hwang and Lee, 2015 in South Korea). Yet, it is difficult to find studies that point out which type of support scheme for agritourism is more effective in terms of economic welfare. There are two reasons for this lack of understanding of the differential effectiveness of different support measures. The first is that studies on the economic impacts of small-scale tourism firms tend to overlook the contribution of the support programs they enjoy. The second is that analyses of public policy, including support measures for small tourist enterprises, do not always evaluate all of the economic impacts of these policies and measures. Both types of investigations generally overlook issues of welfare and distribution that arise from public support of small tourist firms. In this paper we seek to bridge these gaps in the literature.

Modeling the agritourism attraction industry

Based on Tchetchik, Fleischer, and Finkelshtain (2008) and Björnerstedt and Verboven (2016), we developed theoretical and empirical models for the demand and pricing equations of the agritourism attraction market. Tchetchik and colleagues (2008) model for rural accommodations quantified output in terms of occupancy rate. Nevertheless, similar quantification is not possible in the case of the firms studied in the agritourism market (e.g., pick-your-own ventures or visitors' centers at wineries), which sell different products/services that cannot be aggregated in terms of numbers of units. Therefore, we

adopted Björnerstedt and Verboven's (2016) variation on Berry's (1994) nested logit model for the demand function. In their discrete choice specification, the consumer does not choose to buy one unit of goods from firm *j*, but rather to spend a constant portion of his/her income on a particular good. Consequently, the empirical aggregate demand equation is expressed in monetary terms, i.e., revenue share.

The visitor

Consider an agritourism attraction market with *J* attractions, *j=1,..,J*, and *N* potential visitor *i=1…N*. A one-level nest is specified where the different nests are defined as the different geographical regions. Underlying this one-level nesting is the assumption that due to common unobserved variables such as regional climate or a region's specific ecosystem conditions, the degree of substitution between two attractions from the same region is higher than the one between two attractions from different regions.

Departing from Berry's (1994) one-level nested logit demand model, the utility of visitor *i* from visiting attraction *j* is:

(1) $u_{ij} = x_j\beta + \xi_j + \alpha f(y_i, p_j) + \zeta_{ig} + (1-\sigma)\varepsilon_{ij}$

where x_j is a vector of observed characteristics of attraction *j*, y_i is individual *i*'s income, and p_j is the price of visiting attraction *j*. ξ_j captures the average utility (over all potential visitors) attached by the visitor to the unobserved characteristics of attraction *j*. These attributes are assumed to be observed by the visitors and firms, but unobserved by the researcher. In the case of tourism attractions, they might include the characteristics of the service providers (politeness, friendliness, helpfulness, etc.). ζ_{ig} is the ith visitor's preferences for specific region *g*, ε_{ij} is the visitor's i^{th} idiosyncratic preference for attraction *j*. The parameter σ is the substitution pattern between and within regions. If σ >

0, the substitution between any two attractions from the same region is higher than the one between two attractions from different regions.

We adopt Björnerstedt and Verboven's (2016) constant expenditure model, which allows for income and price to enter non-additively, specifically

(2) $f(y_{i,}p_j) = \gamma^{-1} \ln y_i - \ln p_j$

where γ is the fraction of a consumer's budget allocated to agritourism attractions. Note that by substituting expression (2) into equation (1) the mean utility level attached to attraction *j* (common to all visitors) is defined as:

(3) $\delta_j \equiv x_j \beta - \alpha \ln p_j + \xi_j$

Following Roy's identity, conditional on visiting attraction *j*, an individual *i*'s demand for attraction *j* , d_{ij} is:

(4) $d_{ij} = -\frac{\frac{\partial f(y_{i,}p_j)}{\partial p_j}}{\frac{\partial f(y_{i,}p_j)}{\partial y_i}}$

By substituting (2) in (4) it is simple to show that,

(5) $d_{ij} = \gamma \frac{y_i}{p_j}$.

Equation (5) specifies that an individual, conditional on choosing *j*, will spend a constant fraction γ of his/her budget.

Visitor *i* will choose to visit an attraction j^* that maximizes his/her utility,

(6) $u_{ij^*} \geq u_{ik} \forall k \in \{1, \dots, J\}, k \neq j.$

Inequality (6) sets the basis for the derivation of the probabilities to choose each of the *J* attractions.

Aggregate Demand

In order to continue with the analysis, several more assumptions are required regarding the population distribution of the utility components attached to the unobserved characteristics. Following Berry's (1994) assumptions, $v_{ij} \equiv \zeta_{ig} + (1-\sigma)\varepsilon_{ij}$ is i.i.d. and its population mean is zero. Hence, the range of utility values, v_{ij}, for whom visitor *i* chooses attraction *j* from region *g*. is denoted by *A*:

$$A \equiv \{v_{ij} \middle| \delta_j + v_{ij} \geq \delta_k + v_{ik} \quad \forall k \neq j\}$$

Denoting the cumulative distribution function of v_{ij} by $F(v)$, the analytical expression for the probability that a consumer *i* will choose attraction *j* is given by:

$$\int_A dF(v)$$

To complete the theoretical aggregate demand framework and to derive a closed form expression for the probability of choosing attraction *j*, we introduce an outside good, J_0 , whose mean utility is normalized to zero, i.e., $\delta_0 = 0$. In our case, the outside good is all other attractions that do not qualify as agritourism attractions.

Following Cardell (1997), it can be shown that the joint distribution of v_{ij} is given by:

$v \sim \exp\left[-\sum_{l=1}^{G}\left(\sum_{j=1}^{G_g} e^{\frac{v_j}{\sigma}}\right)^{\sigma}\right]$ where G_g is the number of attractions in region g.

Employing the above distributional assumptions, the familiar closed form expression for the probability that a consumer *i* will choose attraction *j* in region *g* is:

$$(7)\ s_j(\delta,\sigma) = \frac{e^{\delta_j/(1-\sigma)}}{\left(\sum_{j\in Gg} e^{\delta_j/(1-\sigma)}\right)^{\sigma}\left[\sum_{g}\left(\sum_{j\in Gg} e^{\delta_j/(1-\sigma)}\right)^{(1-\sigma)}\right]} \quad .$$

The aggregate demand for attraction *j* is obtained by multiplying the demand for attraction *j* , d_{ij} by the probability $s_j(\delta,\sigma)$,

(8) $\sum_{i=1}^{I} s_j(\delta,\sigma)d_{ij} = \sum_{i=1}^{I} s_j(\delta,\sigma)\gamma\frac{y_i}{p_j} = s_j(\delta,\sigma)\frac{B}{p_j}$,

where B is the potential visitors' total expenditures allocated to visiting attractions, including the outside good, as a constant share, γ, of the total income of the potential visitors.

With $\sum_{j\in J_0} e^{\delta_0/(1-\sigma)} = 1$ an analytical expression can be derived for s_0:

(9) $$s_o(\delta,\sigma) = \frac{1}{\sum_g \left(\sum_{j\in Gg} e^{\delta_j/(1-\sigma)} \right)^{(1-\sigma)}}$$

As shown in Berry (1994) in order to obtain the empirical expression of demand, we divided (7) by (9) and received the log ratio of the market share of each attraction divided by the share of the outside good:

(10) $\ln(s_j/s_0) = x_j\beta - \alpha\ln p_j + \sigma\ln(s_{j/g}) + \xi_j$,

where as defined in Björnerstedt & Verboven (2016) in terms of observables:

$s_j = \frac{p_j q_j}{B}$, $s_{j/g} = \frac{p_j q_j}{\sum_{j\in G_g} p_j q_j}$ and $s_0 = \frac{B - \sum_{j=1}^{J} q_j p_j}{B}$.

Expression (10) is similar to the empirical specification of the demand equation in the familiar unit demand nested logit model, but the market share of attraction j is expressed in terms of revenues and not quantities, and price appears in its natural logarithm.

Pricing

It is assumed that a single-product firm maximizes profits. In the short run, the decision variable is the price, while other characteristics of the attraction's activity remain fixed. Each firm is assumed to set prices that maximize its profit given its product's attributes

and the prices and attributes of the competing attractions. We assume that a Nash equilibrium for this pricing game exists and that the equilibrium prices are at the interior of the firm's strategy sets.

The estimation of the parameters of the above demand function and preference distribution can proceed without any behavioral assumptions regarding firms in the agritourism attraction industry. Nonetheless, we can use the information embodied in the first order conditions for the equilibrium prices and jointly estimate demand and pricing parameters.

In order to obtain the empirical pricing specification, we rearranged the first order conditions to receive:

$$p_j = mc_j - \frac{q_j}{\partial q_j / \partial p_j} \quad ,$$

where mc_j is the marginal cost of attraction j.

Stated differently, we received the following expression for the markup:

$$\text{(11)} \qquad \frac{p_j - mc_j}{p_j} = \frac{1}{e_{jj}},$$

where e_{jj} is the absolute value of the own-price elasticity.

As shown in Björnerstedt and Verboven (2016), the constant expenditure specification generates simple analytic expressions for the aggregate own-price elasticity of demand:

$$\text{(12)} \qquad e_{jj} = -\frac{\partial q_j}{\partial p_j}\frac{p_j}{q_j} = \frac{\alpha\left[1 - \sigma s_{j/g} - (1-\sigma)s_j\right] + 1 - \sigma}{1-\sigma}$$

Note that own-price elasticities in the constant expenditures demand specification are quasi-constant in prices. This property of the demand elasticity in the constant expenditures specification poses a challenge in the pricing equation.

Substituting (12) into (11) results in the following absolute markup expression:

$$p_j - mc_j = \frac{p_j(1-\sigma)}{\alpha\left[1-\sigma s_{j/g} - (1-\sigma)s_j\right] + 1 - \sigma}.$$

As can be seen, the absolute markup is an explicit function of the price.

Rearranging (11) and taking the natural log from both sides results in:

$$\text{(13)} \qquad \ln\left(p_j\left(1-\frac{1}{e_{jj}}\right)\right) = \ln(mc_j) \Leftrightarrow \ln(p_j) = \ln(mc_j) - \ln\left(1-\frac{1}{e_{jj}}\right),$$

where $-\ln\left(1-\frac{1}{e_{jj}}\right)$ represents the markup. For $e_{jj} > 1$, the markup is always positive.

Substituting (12) in (13) results in:

$$\ln(p_j) = \ln(mc_j) - \ln\left(1 - \frac{1-\sigma}{\alpha\left[1-\sigma s_{j/g} - (1-\sigma)s_j\right] + 1 - \sigma}\right).$$

We assume that the marginal cost is log linear in the vector of cost attributes (Berry, Levinsohn, and Pakes, 1995) $\ln(mc_j) = W_j\gamma + \omega_j$, and we obtain the following estimable pricing equation:

$$\text{(14)} \qquad \ln(p_j) = W_j\gamma - \ln\left(\frac{\alpha\left[1-\sigma s_{j/g} - (1-\sigma)s_j\right]}{\alpha\left[1-\sigma s_{j/g} - (1-\sigma)s_j\right] + 1 - \sigma}\right) + \omega_j,$$

which is our empirical pricing equation. The expression of the markup in the large brackets is a positive fraction between zero and one.

If σ=0, only the market share, s_j, affects the markup. Conversely, as σ approaches one, only the nest share (regional share in our case) matters. Thus, the relationships in the data between the prices, market shares, and regional revenue shares will assist in identifying the substitution parameter, σ.

Estimation Procedure and Instruments

The demand and pricing empirical equations, (10) and (14), respectively, consist of a system of nonlinear, simultaneous equations that can be estimated. The estimation of this system raises several econometric difficulties. First, the explanatory variables $q_j, p_j,$ and $s_{j/g}$ are endogenous, which means that instruments are required. Second, since the error terms ξ_j and ω_j are both functions of the unobserved characteristics of the same attraction, they might be correlated. This implies that efficiency and hypothesis testing require treating the estimated equations as a system. Additional difficulties include the nonlinearity of the equations, and the fact that cross-equation restrictions are needed since the parameters σ and α appear in both equations. To address these difficulties, the equations are estimated as a system using the generalized method of moments (GMM). The GMM estimator accounts for the above econometric problems and provides consistent estimates of the above system. Moreover, GMM requires no additional assumptions regarding the joint distribution of the error terms. It also allows for heteroscedasticity of all kinds, as well as for combining more moments than required and thus exploiting most of the sample's information. To carry on with the procedure, GMM (Stata 14.1) command was utilized. Instruments are required to overcome the simultaneity and endogeneity of price and quantities. Instruments for the quantities are the characteristics of the rural attraction unit that do not affect cost, and characteristics of competing rural attractions in the same region. These include the number of other

operators in the region, the region's dummy, and so on. Instruments for the price are cost shifters that do not appear in the demand equation and other exogenous variables that are not included in the model, but are found to be correlated with price. These include the operator's experience and, for attraction operators who are farmers, the area of cultivated land, number of years practicing agricultural production, and so on.

Agritourism in Israel

The phenomenon of agritourism in Israel emerged in the late nineteen-eighties and concentrated mainly on rural accommodations (Fleischer and Pizam, 1997). The rise of accompanying activities such as attractions and food services began later. In 2012, the Ministry of Agriculture and Rural Development conducted a census in which 2,604 agritourism attractions, not including accommodations, were documented. The attractions are located in some 200 rural communities in various regions of Israel. Of the 2,604 attractions, only 550 are based on farm activity or rural amenities. They include pick-your-own fruit activities, food processing activities (e.g., cheese, honey), visitors' centers, farm tours, and outdoor recreation in rural areas. The rest of the attractions are not directly linked to the rural area or the farm, and include arts and crafts stores, galleries, and restaurants. All the attractions enjoy the support of the Ministry of Agriculture and Rural Development. In 2014, the Reinforcement of National Policy and Tools for Implementing Rural Development in Israel plan was prepared in a cooperative "twinning" project between Israel and the European Union. In the framework of the five-year plan for 2015 to 2020, 46 million USD were allocated specifically for the support of agritourism attractions (MOAG, 2014). This plan and the shift of funds from agricultural support to support of agritourism reflect the change in the Ministry's perception of the importance of agritourism in rural development. There are support schemes at the regional, village, and entrepreneurial level. At the regional level, support is given for the

preservation of farm heritage sites with the potential to attract visitors to the whole region as well as for infrastructure improvement. At the village level, funds are allocated for the improvement of village infrastructure and appearance and the establishment of visitors' centers. The average support scheme provides approximately 125,000 USD for improving regional tourism infrastructure. At the entrepreneurial level, small business capital subsidies are offered for investments in establishing agritourism attractions. Entrepreneurs can receive investment subsidies of up to 25,000 USD. So far, no study has examined how each of the support schemes affects the market and which is most effective and contributes most to economic welfare.

Data

The data was collected via a cross-sectional survey among agritourism attraction owners. The survey was conducted in 2014 and 2015 and referred to the business year 2013. It included face-to-face interviews in which owners of attractions were asked to respond to a questionnaire, as well as tours of the rural attractions and related facilities.

The questionnaire consists of a wide range of questions concerning the characteristics of the attraction and the operator. The questions that referred to the attraction include its type (specifically, a distinction was made between agriculture-based attractions, nature/rural-based activity attractions, and visitors' centers), size, capacity, the services it offers, including guided tours, food, and beverages. Other questions referred to the performance of the attraction and concerned the number of visitors, capital and labor inputs, and marketing efforts. Finally, owners were asked about their demographic and personal characteristics. Owners who also operate a farm were asked about their agricultural activity and whether and how it relates to the attraction they operate. Variables, descriptions, and summary statistics appear in Table 1.

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Sample Construction

For the construction of the sample, we took advantage of the aforementioned comprehensive nationwide census conducted by the Israeli Ministry of Agriculture and Rural Development in 2012, which mapped the entire supply of rural attractions in Israel. The census included details about each site's name, its geographical affiliation, classification, area of activity, and contact details. Several categories were removed from the 2,604 documented attractions, mainly because their main business was selling products or services not related to the farm or rural environment or because they were not private businesses (e.g., museums and information centers). We remained with a population size of 550 attractions scattered across four distinct geographical regions. We conducted a stratified sampling with regional strata. The regions included the Upper Galilee, the Golan Heights, the Arava (the southern section of the Jordan Rift Valley) and the country's central region (hereafter, the Center). The ratio of the sampled attractions across regions was kept as similar as possible to their ratio in the population.

Within each region, the choice of rural attractions was random. A total of 90 questionnaires were satisfactorily filled out. Of these, 30% qualified as agricultural activities (e.g., pick-your-own fruit and tour the farm), 57% as visitors' centers, and 13% as nature/rural-based activities (e.g., kayaking, horseback riding).

Results

Table 2 presents the estimated parameters of the structural equation system

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The goodness-of-fit measures are 0.16 and 0.56 for the demand and pricing equations, respectively.[1] The test for overidentifying restriction is not significant, indicating that the estimated system does not suffer from overidentification. The nested logit parameter σ and the price parameter α, which appear in both equations, are significant and have the expected values. Furthermore, $\sigma = 0.35$ and its significance indicates that the degree of substitution between attractions within regions is larger than between regions. Based on the α coefficient, the calculated own-price elasticity at the mean value is -2.2. The elastic demand is as expected for a product with many close substitutes. Another important result is that the markup is estimated to be 45.4%. This demonstrates that the agritourism attraction market deviates from competitive pricing, in which price equals marginal cost.

Demand - Visitors' Preferences

In order to answer the research question on the importance of the active farm to the agritourism attraction, we defined three types of attractions—farm-based, rural/nature-based, and visitors' centers—by dummy variables wherein the farm-based attractions constitute the reference group. The coefficients of the dummy variables 'rural_based_actvities' and 'visitor_center' are both positive and significant, suggesting that, from the demand side, basing attractions on rural and natural ambience can be more advantageous than basing them on farm activities. It seems that attractions that base their activities on the active farm face smaller revenue shares than the other two types of attractions. Nevertheless, this gives us only a partial answer, from the demand side, to the research question on the importance of the link of the attraction to the active farm. For a full picture, the estimates of the pricing equation are required.

[1] We computed the generalized R^2 statistics for the two equations (Pesaran and Smith, 1994). This constitutes an asymptotically valid selection criterion for models that are estimated with instrumental variables.

An examination of the significant coefficients of the control variables in Table 2 reveals that, as expected, selling agricultural produce, food, and beverages increases the revenue share of the attraction. The attributes 'access' and 'Upper Galilee' have similar effects. These later results indicate that better infrastructure, reflected in better access to the attraction, is important to the success of the firm. Likewise, location plays an important role; the location of attractions in the Upper Galilee, a region rich in nature reserves, beautiful rural landscapes, and a high concentration of rural tourism activities, has a positive effect on demand.

Firms' pricing

The estimated parameters of the price equation are presented in Table 2. It should be noted that the coefficients should be interpreted as the impact of the different attributes on the marginal cost, and not on price (Berry, Levinsohn, and Pakes 1995). Accordingly, the positive coefficients of 'rural_based_activities' and 'visitor_center' in the pricing equations indicate that attractions based on active farms (the reference group) result in a lower marginal cost than other attractions. These results seem to confirm the aforementioned beliefs stated in the literature that it is more cost-efficient for the farmer to diversify to tourism attractions that are linked to the active farm. However, we receive an ambiguous answer to our research question. From the demand side, it is more advantageous not to base the attraction on the active farm, whereas from the production side, farmers who base their tourist attraction on the active farm enjoy lower marginal costs. Following these two opposing forces, the full answer appears in the following section, which depicts the simulations.

The control variables for additional sales (food, beverages, and farm produce) at the attraction venue have positive coefficients. This is not surprising, since the sales activities incur additional costs. A further finding is that larger attractions with higher

initial investments face lower marginal costs. Better access to the attraction does not have a significant impact on the marginal cost. Finally, the more capital invested in an attraction, the lower the marginal costs, suggesting that better-equipped attractions incur lower marginal costs.

Simulations

Using simulation mechanisms, the estimation results are employed in order to achieve further understanding of the agritourism attraction industry. Three simulations were conducted. The first one aimed at estimating the total impact of basing the attraction on an active farm, as we could not derive a conclusive answer from the estimated parameters. In the second and third simulations, we analyzed the effects of government intervention in the agritourism attraction industry. Two types of support schemes employed in Israel were examined: a 125,000 USD grant for infrastructure improvement at the regional level and a 25,000 USD capital grant for individual entrepreneurs. These are relatively small grants, and in our case, with four regions and 90 entrepreneurs, the infrastructure grant comes to a total of 0.5 to 0.75 million USD and the capital grant to 2.25 million USD.

We employed the Excel Solver module, in which we permit firms to adjust prices and allow for changes in the number of visitors. Each equation represents equality between demand and supply (received by substituting p_j in the demand equation with the expression of the pricing equation). The unknown variable in each equation is the annual revenue shares. Thus, the solution for this system yields the equilibrium revenue shares for each of the firms. Once we have the equilibrium revenue shares, the equilibrium number of visitors and prices are immediately calculated. Using the simulation mechanism enables us to determine how prices, number of visitors, and distribution of

profits and consumer surplus change in response to policy measures and other external changes.

Basing all the agritourism firms on farms

We simulated equilibrium in the agritourism market for the extreme scenario in which all firms base their activity on active farms. The aim of this simulation is to assess the aforementioned perception that it is more efficient for farmers to base their tourism activity on working farms. The results presented in Table 3 reveal that the visitors' strong

----------put Table 3 here----------

preference for non-agricultural-based activities dominates the market equilibrium solution. Under the simulated conditions, number of visitors and average price decreased by 23% and 20%, respectively. Although we saw that farm-based firms were more efficient in production, the strong decrease in number of visitors and prices led to a 52% reduction in profits. Consumer surplus (see the appendix for the formulation of consumer surplus in the constant expenditure model) also decreases by 60% and, accordingly, the total decline in welfare in the market is 57%.

Comparing support schemes

As mentioned above, there are two dominant support schemes for agritourism attractions in Israel: grants at the regional level for infrastructure improvement and capital grants at the entrepreneurial level. Both types of grants are relatively small compared to total revenue, so we do not expect them to have a strong impact on the market. Nonetheless, it is important to assess which one is more effective. In the scenario of 0.5 to 0.75 million USD in infrastructure improvement allocated equally among the regions, the number of visitors increased by 3.4% and price decreased by 0.3%, which led to an increase of 3.3%

in profit, a 2.7% increase in consumer surplus, and a 2.9% increase in total welfare. The case of individual capital support equally allocated to each operator for a total of 2.25 million USD yielded less favorable results, although it incurred higher public expenses. The number of visitors increased by 1.3%, while price decreased by 0.5%. Profits, consumer surplus, and total welfare increased by 1.4%, 1.5%, and 1.5%, respectively.

These differences might indicate that infrastructure improvement has a higher impact than capital support. In both cases, the changes are small, as expected from the low level of support. Nevertheless, if we take into consideration the higher public expenses in the capital support scheme, we can conclude that the indirect support scheme of infrastructure has an advantage over direct support of the individual entrepreneur.

Concluding Remarks

In this study, we showed the necessity of using a partial equilibrium model of the whole industry in order to analyze the agritourism market and the relative effectiveness of different policy measures used to support it. Using this analytical framework, we sought to determine whether, from a welfare perspective, farmers who establish agritourism attractions as a means of diversification should base their attractions on their farm or on rural ambience. While it is common to see arguments in the literature that farmers can keep their farms viable by using existing active farms to diversify, there is evidence that over time agritourism firms eventually divorce themselves from farm activity. By developing a partial equilibrium model, applying it to the agritourism attraction market in Israel and conducting simulations, we were able to provide an explanation for these contradictory observations. Our analysis confirms that agritourism attractions based on farmers' active farms are more cost-efficient. However, visitors have a strong preference for visitors' centers and rural-based activities. Thus, the overall effect as reflected in the simulation in which all the attractions are based on active farms is a decline in total

welfare. This provides at least a partial explanation of the phenomenon of tourism divorcing from the farm (Busby and Clough, 2000) in the UK and other countries. That is, this phenomenon is actually a market-power-based economic process of farmers who seek more profitable diversification ventures. While starting with what farmers already have on their farm requires less effort and carries less risk, as the business continues to grow, they probably realize that diversifying to agritourism activities that are removed from the active farm is more profitable.

Additionally, in the market simulations of two dominating support schemes in Israel—infrastructure improvement and capital subsidy—the former was found to have a stronger impact on welfare. In our specific case, an attraction with better access enjoys an increase in demand that dominates market impact as a whole. Without the partial equilibrium framework, it is difficult to capture the full impact of the support scheme. Note that this is in contrast to Tchetchik et al.'s (2008) results where simulations of the rural accommodation market demonstrated that direct support in capital subsidies is superior to indirect support in infrastructure. While we can only speculate about the reason underlying these opposing results, a possible explanation could be that visitors in rural accommodations have high preferences for luxurious and accessorized facilities which warrant greater investments in the facility subsidized by direct capital support. However, we can conclude, based on these results, that support policies cannot treat the rural accommodation market and the agritourism attraction market under the umbrella of a unified single rural/agri tourism market.

It is possible that farmers who cease basing their tourism activity on the farm will eventually exit completely from farming as they are profiting from tourism. This can affect the nature, landscape, and other environmental amenities of rural areas that eventually may have a counter-effect on the demand for agritourism attractions. This

study should be expanded further to analyze this dynamic process on the agritourism markets.

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Appendix

Consumer Surplus in the Nested Logit Constant Expenditure Demand Model

Equation (7) can be rewritten as:

$$s_j(\delta,\sigma)=\frac{e^{\frac{\delta_j}{1-\sigma}}}{\left[\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right]^{\sigma}\cdot\sum_{g}\left[\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right]^{1-\sigma}}=\frac{e^{\frac{\delta_j}{1-\sigma}}}{\left[\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right]^{\sigma}\cdot\left[1+\sum_{g=1}^{G}\left[\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right]^{1-\sigma}\right]}=\frac{e^{\frac{\delta_j}{1-\sigma}}\cdot e^{I_{G_g}}}{e^{\frac{I_{G_g}}{1-\sigma}}\cdot e^{I}}=\frac{e^{\frac{\delta_j}{1-\sigma}}}{e^{\frac{\sigma}{1-\sigma}I_{G_g}}\cdot e^{I}}$$

where G_g denotes the set of attractions that belong to region g and I_{G_g}, I denotes the "inclusive values" defined by:

$$I_{G_g}=(1-\sigma)\ln\left(\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right)=\ln\left(\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right)^{1-\sigma}$$

$$I=\ln\left(1+\sum_{g=1}^{G}e^{I_{G_g}}\right)$$

The expected utility of a random consumer *i* in utiles is:

$$EU_i=E\left(\max_{j\in J}u_{ij}\right)=\ln\left(1+\sum_{g=1}^{G}e^{I_{G_g}}\right)=I$$

Following Train (2003), we convert utiles to monetary terms by dividing the expected utility EU_i by the marginal utility of income $\partial u_{ij}/\partial y_i$ to get consumer surplus:

$$CS_i=\frac{EU_i}{\partial u_{ij}/\partial y_i}=\frac{EU_i}{\alpha/\gamma y_i}=\frac{\ln\left(1+\sum_{g=1}^{G}\left[\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right]^{1-\sigma}\right)}{\alpha/\gamma y_i}=\frac{\ln\left(1+\sum_{g=1}^{G}\left[\sum_{j\in G_g}e^{\frac{\delta_j}{1-\sigma}}\right]^{1-\sigma}\right)}{\alpha}\cdot\gamma y_i\,.$$

Define $Y=\sum_{i=1}^{N}y_i$ as the total income of all *N* consumers in the economy. Following Björnerstedt and Verboven (2016), we define $B=\gamma Y$ as the total potential budget allocated to the differentiated attractions in the economy. Therefore, the total consumer surplus is:

$$CS = \sum_{i=1}^{N} CS_i = \frac{\ln\left(1 + \sum_{g=1}^{G}\left[\sum_{j \in G_g} e^{\frac{\delta_j}{1-\sigma}}\right]^{1-\sigma}\right)}{\alpha} \cdot \gamma Y = \frac{\ln\left(1 + \sum_{g=1}^{G}\left[\sum_{j \in G_g} e^{\frac{\delta_j}{1-\sigma}}\right]^{1-\sigma}\right)}{\alpha} \cdot B$$

Table 1: Description and Summary Statistics of Variables and Instruments Employed in the Model Estimation

Variable	Description	Mean	SD
Visitors' center	=1 if the attraction is classified as a visitors' center	56.7%	
Rural-based activities	=1 if the attraction offers activities based on rural ambience	13.3%	
Agri-based activities	=1 if the attraction offers activities based on the active farm	30.0%	
Agri-sales	=1 if agricultural products are offered for sale	70.0%	
Food sales	=1 if food and beverages are offered for sale	72.2%	
Guided activity	=1 if the activity in the attraction is guided	58.9%	
Investment	= total investment in the attraction in 0000' USD	24.65	37.90
Access	= accessibility level to attraction between 1 and 5	3.99	0.61
Upper Galilee	=1 of the attraction is located in the Upper Galilee	25.6%	
Activity size	the size in 00' square meters that serves the visitors	0.81	5.39
Instruments			
Public marketing	=1 if the owner is engaged in marketing activities	77.8%	
Attract region	=no. of attractions in geographic cluster	7.77	2.2

Farm land	For farmers, what is the size of agricultural land in 00' sq. meters?	8.04	22.4
Family work	= 1 if family members work at the attraction	46.7%	
Capacity	Number of visitors the site can accommodate in 00'	3.46	8.57
Agri senior	For farmers, how many years practicing agricultural production?	27.08	17.15
Salary	Annual salary of temporary workers in 000' USD	32.11	130.93
Established attraction	Number of years since the attraction was established	11.69	8.05
Websoc net	=1 if the owner is engaged is social networking	87.80%	

Table 2: GMM Estimates of Demand and Marginal Cost Parameters

	Coef.	Std. Err.	Elasticity[1]
Demand			
Constant	-8.719***	1.577	
Rural-based activities	2.825***	0.659	0.54***
Visitors' center	0.706***	0.237	0.57***
Agri-produce sale	0.963***	0.369	0.97***
Food sales	1.168***	0.261	1.18***
Guided act	-0.563**	0.247	-0.47**
Investment scaled	0.0003	0.0007	0.03
Access	0.632***	0.217	3.58***
Upper Galilee	0.657***	0.263	0.23***
Pricing			
Constant	3.581***	0.518	
Rural-based activities	1.296***	0.180	0.001***
Visitors' center	0.327***	0.117	0.01***
Agri-produce sale	0.475***	0.143	0.01***
Food sales	0.348***	0.129	0.004***
Guided act	0.064	0.127	0.0006
Investment scaled	-0.0005*	0.0003	-0.003*
Access	-0.027	0.136	-0.003
Activity size scaled	-0.016***	0.006	-0.0002***
Alpha	0.837**	0.375	-2.2
Sigma	0.351***	0.129	

Asterisks (*,**,***) indicate that the coefficient is significantly different from zero at the 10%, 5%, and 1% levels, respectively.

[1] Significance was calculated using the delta method.

Table 3: Simulation Results

		All attractions are based on an active farm		Infrastructure Improvement – regional level		Capital Support – individual level	
	Current State	**Absolute change**	**Change in %**	**Absolute change**	**Change in %**	**Absolute change**	**Change in %**
Average Price (USD)	16.9	-3.34	-19.75	-0.05	-0.29	-0.94	-0.56
Total Visitors	2,344,350	-532,432	-22.71	81,551	3.48	49,735	2.12
Consumer Surplus[1] (million of USD)	35.5	-21.3	-60.17	0.94	2.70	0.55	1.55
Producer Surplus (millions of USD)	17.2	-9.44	-54.96	0.55	3.32	0.23	1.40
Welfare (millions of USD)	52.7	-30.8	-58.47	1.52	2.90	0.78	1.50

[1] See the appendix for details