Differentiation and Synergies in Rural Tourism: Estimation and Simulation of the Israeli Market

Anat Tchetchik, Aliza Fleischer, and Israel Finkelshtain

This article applies a discrete-choice equilibrium model with product differentiation to study the rural tourism industry in Israel and to jointly estimate the effect of lodging and farm characteristics on consumer preferences and firms' costs. The model accounts for heterogeneity in tastes and technologies and allows for unobservable product characteristics. We find evidence for technological synergy in the joint production of agricultural goods and rural tourism services, but none in the demand. The differentiation in the industry is the major contributor to the price-cost margin, which averages 62%. An additional minor cause is government regulations, which restrict supply. Simulation results demonstrate the growth potential of the industry and show that the government can play an important role in catalyzing growth via investment subsidization, deregulation of supply and information distribution.

Key words: agritourism, differentiated goods, oligopoly markup, rural tourism.

Rural tourism or alternatively, agritourism, is a rapidly growing industry in Europe and North America, experiencing an annual growth rate of 6%. In many rural areas it has become an important source of livelihood for the rural population. For example, the annual proceeds from rural tourism in England amount to $14 billion and it provides 380,000 jobs (Arnold 2004). In Canada, it accounts for 3% of the rural labor force (Bollman 2005). In the United States, in the years 2002–2004, a reported 90 million adults took trips to rural destinations (Brown 2005). In the northern region of Israel, 10% of the rural households are involved in rural tourism. The reasons for the recent emergence of tourism as an important rural economic activity in North America, the EU, and Israel are twofold. First, continuous growth in income and leisure consumption combined with a sharp reduction in transportation costs have increased the demand for rural tourism (Dernoi 1991; Williams and Show 1991; Pompl and Lavery 1993). Second, rapid technological advances in agriculture, accompanied by a sharp decline in the terms of trade, have induced exit from farming and in the past 50 years, about 60% of the farmers in all of these regions have left agriculture (Canada 2001; Gala 2005). Searching for alternative sources of income, many farmers have become entrepreneurs in the rural tourism business (Bryden 1992; Butler, Hall, and Jenkins 1998).

Not only are the developmental patterns of rural tourism in the above industrialized countries alike, so are the forms of public support that have accompanied the transformation process are similar (Kieselbach and Long 1990; Stevens 1990; Bates and Wacker 1996; Fleischer and Felsenstein 2000; Hall and Jenkins 1998). Both Israel and the EU administer direct support policies; for example, the EU is currently proposing to budget over $17 billion from 2007–2013 in support of tourism-related projects in rural areas (Bendz 2004). In the United States and Israel, governmental land policies, such as special zoning ordinances and the setting-aside of lands, enrich the rural ambience and encourage rural tourism (Gartner 2004). Finally, in all three regions, government provision of public infrastructure, such as transportation and communication, catalyzes the development of rural tourism.

The outstanding growth of the rural tourism sector, in particular rural accommodations and public intervention, raises several important questions. Are the current growth rates sustainable and what are the industry's prospects

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The authors thank Ayal Kimhi for valuable suggestions.

Financial support from the Agricultural Economics Research Center, the Agricultural Chief-Scientist fund and the Horovich fund are appreciated.

Amer. J. Agr. Econ. 90 (May 2008): 553–570

DOI: 10.1111/j.1467-8276.2007.01112.x

of becoming an important source of livelihood for the rural population? Are rural tourism and farming synergetic, or do they compete for the same limited resources of family labor and land? What are the impacts of the differentiation, lack of information and government involvement in this market? Finally, do the prices of rural accommodations exceed marginal costs, as some analysts and observers believe, and, if so, why?

Despite the impressive growth of the industry, there is a dearth of rigorous economic analyses of these questions. Brown (2005) presents a valuable and comprehensive bibliography of rural tourism papers. Lindberg, Johnson, and Berrens (1997) employed contingent valuation methods to estimate the negative externalities created by rural tourism to the hosting communities in Oregon. Slee, Farr, and Snowdon (1997) found that rural tourism in Scotland integrates well with the local economies and generates a higher GDP multiplier than other types of tourism. Vanslembrouck, Huylenbroeck, and Meensel (2005), and Fleischer and Tchetchik (2005) estimated hedonic price functions for the Belgian and Israeli rural accommodations industries, respectively. Both articles focused on the impact of agriculture on the equilibrium price for rural accommodations, but did not distinguish the influence of agriculture on production cost from its effect on consumer preferences.

The rural accommodations market consists of a plethora of firms offering accommodations that vary in their location, amenities, and decor. To model the differentiation in the industry, while being parsimonious and preserving the model's tractability, we adopted the nested logit framework, developed by Cardell (1997), McFadden (1978) and others. The nested logit model has been successfully employed for the analysis of related issues, such as demand for recreation and fishing sites (Hauber and Parsons 2000). However, in this article we apply a novel extension of the above framework, developed by Berry (1994), Pakes (1995), Fershtman, Gandal, and Markovich (1999), and Nevo (2001). In this extended framework, consumer-level demands are aggregated to form the market share equations of the various firms and oligopolistic pricing equations are added to form an industrial equilibrium model. The extension allows a joint estimation of both the demand and cost parameters, using only aggregated firms-level data and simulations of the industry's equilibrium, under a variety of policy and market-structure conditions. To the best of our knowledge, this article presents the first application of the equilibrium version of the logit model to rural or environment-related industries.

The article formalizes an economic model of the rural tourism industry, followed by an empirical application to Israel, including simulation of alternative industry structures and government intervention.

Modeling the Rural Tourism Industry

Our presentation of the model follows the exposition of Berry (1994), and Fershtman, Gandal, and Markovich (1999). We begin with the choice of accommodations by a single consumer, continue with the population distribution and the firms' market shares, for given prices, and conclude with the firms' equilibrium-pricing behavior.

Visitor Preferences

Consider a rural tourism industry with L lodging firms located in R geographically distinct regions and serving N potential consumers. The utility of tourist $i \in \{1, \dots, N\}$ from staying at an accommodations firm $j \in \{1, \dots, L\}$ is denoted u_{ij} and depends on the attributes and price of the firm's accommodation units in the following manner:

$$(1) \qquad u_{ij} = x_j\beta - \alpha p_j + \zeta_j + \xi_{ir} + (1-\sigma)\epsilon_{ij}$$

where $\boldsymbol{x}_j$ is a vector of the jth accommodations firm's observed characteristics, p_j is the price per night, α, β, and σ are parameters, and ζ_j, ξ_{ir}, and ϵ_{ij} represent utility components, which are attached by the consumer to unobserved characteristics of the unit. In particular, ζ_j is a firm-specific component, which is common to all consumers, and ξ_{ir} represents the ith tourist's preferences for a specific region $r \in \{1, \dots, R\}$. Finally, ϵ_{ij} represents the i-th tourist's preferences for a specific firm.

The traditional interpretation for ζ_j, ξ_{ir}, and ϵ_{ij} (e.g., Berry 1994) distinguishes between the consumer and the econometrician. According to this distinction, ζ_j, ξ_{ir}, and ϵ_{ij} represent the utility derived from product attributes that are observed by the consumer, but not by the researcher. An alternative explanation might be that ζ_j, ξ_{ir}, and ϵ_{ij} are the consumer's utility estimates for attributes that the consumer could not observe at the time of purchase. This explanation seems especially appropriate in the current context of tourism services, which are often purchased before the time and away from the place of consumption.

For any of these interpretations, a potential tourist i will choose to stay at an accommodations firm j^* that maximizes his/her utility,

$$(2) \qquad j^* = \arg \max_{j \in \{1,\ldots,L\}} u_{ij}$$

or equivalently

$$(3) \qquad u_{ij^*} \geq u_{ik} \; \forall \; k \neq j.$$

This latter inequality sets the basis for the derivation of the various firms' market shares.

Aggregate Demand

It is necessary to introduce a few assumptions about the population distribution of the utility components that are attached to the unobserved characteristics. Following Berry (1994), ζ_j is viewed as the average utility (over all potential tourists) attached by the tourists to the unobserved characteristics of accommodations firm j. Accordingly, the population mean of $v_{ij} \equiv \xi_{ir} + (1 - \sigma)\epsilon_{ij}$ is assumed to be zero and, hence, v_{ij} represents the distribution of preferences around the mean.

The average utility attached by tourists to the j-th firm is denoted δ_j, and given the above distributional assumptions it equals

$$(4) \qquad \delta_j \equiv x_j \beta - \alpha p_j + \zeta_j.$$

The vector of mean utility of all accommodations firms is denoted δ. The inequality in (3) defines a range of utility values, u_{ij}, that ensure that the ith consumer will choose to stay at a unit of firm j from region r. Denoting this set by A, we have

$$(5) \qquad A \equiv \{v_{ij} \,|\, \delta_j + v_{ij} \geq \delta_k + v_{ik} \; \forall k \neq j\}.$$

Denoting the cumulative distribution function of v_{ij} by $F(v)$, we can write an analytical expression for the percentage of tourists that will choose to stay in guest house j,

$$(6) \qquad s_j(\delta) = \int_A dF(v).$$

To complete the theoretical demand framework and to derive a closed-form expression for the market share in (6), two additional assumptions are required. First, we introduce an "outside good." An outside good is one that competes with rural accommodations, but its price is exogenous to the rural tourism economy. A natural candidate, in our case, is nonrural accommodations, i.e., rooms supplied by the hotel industry. The hotel industry is larger by an order of magnitude than the rural accommodations industry and is oriented toward incoming tourist (in Israel most of the rural tourism guests are locals). Therefore, we assume the prices in this industry are not affected by changes in the rural tourism industry. The mean utility of this outside good is normalized to 0, that is, $\delta_0 = 0$, where the subscript 0 denotes the hotel industry.

Second, we have to assume a specific distribution for v_{ij}. Following McFadden (1978) and Cardell (1997), the $v_{ij}s$ are assumed i.i.d, each distributed according to an extreme value distribution. Under these assumptions, the joint distribution of v_{ij} is

$$v \sim \exp\left[-\sum_{r=1}^{R}\left(\sum_{j=1}^{N^r} e^{\frac{v_j}{\sigma}}\right)^{\sigma}\right]$$

where N^r is the number of firms in region r.

The joint distribution of the $v_{ij}s$ determines the substitution patterns of the demand for accommodations. In our case, where the $v_{ij}s$ are i.i.d, the parameter σ determines the substitution patterns between and within regions. If $\sigma > 0$, then the degree of substitution between two accommodation units from the same region is higher than the one between two accommodation units from different regions. Moreover, in the extreme case, where $\sigma \to 1$, the elasticity of substitution between any accommodation units that belong to different regions approaches zero. At the other extreme, if $\sigma \to 0$, then regions do not matter and the elasticity of substitution does not depend on the regional classification.

Employing the above distributional assumptions, the following closed-form expression for firm j's market share is derivable,

$$(7) \; s_j(\delta) = \frac{e^{\frac{\delta_j}{(1-\sigma)}}}{\left(\sum_{j=1}^{N^r} e^{\frac{\delta_j}{(1-\sigma)}}\right)^{\sigma} \sum_{r=1}^{R}\left(\sum_{j=1}^{N^r} e^{\frac{\delta_j}{(1-\sigma)}}\right)^{(1-\sigma)}}.$$

Similarly, the market share of the outside good is given by

$$(8) \qquad s_0(\delta) = \frac{1}{\sum_{r=1}^{R}\left(\sum_{j=1}^{N^r} e^{\frac{\delta_j}{(1-\sigma)}}\right)^{(1-\sigma)}}.$$

The complete model, equations (1)–(8), is known in the literature as the "nested logit" model. As Berry (1994) notes, the nested logit is appropriate when the substitution effects among products depend primarily on predetermined classes of products. In our case of rural tourism, the classification of accommodation units according to their geographical location seems natural and predetermined. The covariances between the error terms associated with units from the same region is likely to be positive. This simply means that when choosing an accommodation unit, its geographical location is a relevant criterion. Therefore, if the price of a unit is rising, a tourist will usually search for a substitute within the same geographical area. In this framework, the undesirable independence of irrelevant alternatives (IIA) is reduced to within the region only.

It is worth emphasizing that the tourist portrayed in the above model does not optimize in a hierarchical manner. On the contrary, he/she compares all the alternative accommodation units simultaneously and chooses the one that entails the highest utility. As a matter of fact, the only difference between the usual logit model and the above-nested model is the structure of the covariance matrix of the error terms. The multinomial logit model maintains the assumption that the covariance matrix is diagonal, while the nested logit model allows testing for the hypothesis of positive covariance between the error terms associated with units from the same region. For additional discussions of this point see Cardell (1997) and Swallow and McGonagle (2005, p. 479).

Pricing

The estimation of the parameters of the demand function and preference distribution could proceed without any behavioral assumptions regarding the rural accommodations firms. However, with the cost of assuming a few common conjectures concerning the single-firm technology and behavior and the industry structure of equilibrium, one can transform the logit model into an equilibrium model that facilitates joint estimation of demand, behavioral and technological parameters, and simulations of governmental policies and changes in the market structure.

We assume that the single firm chooses its price to maximize short-run profits. That is, while in the short run the firm's attributes are given, the price is chosen to maximize profits. At the industry level, we assume that the observed prices reflect a Nash equilibrium in a price game. That is, each firm engages in an oligopolistic price competition and sets its own price to maximize profits, given the prices of other firms.

Equipped with these assumptions, the jth firm's short-run behavior can be described as the following maximization problem:

$$(9) \quad \max_{p_j} \pi_j = p_j s_j(p_1, \ldots, p_N)N - c(z_j, Ns_j)$$

where $c(z_j, Ns_j)$ is the variable cost as a function of the accommodation unit's characteristics, z, and annual occupancy. Note that the characteristics that influence the cost need not be identical to those that affect consumer preferences ($z \neq x$). The necessary condition, characterizing the best response of firm j to the pricing of the other firms, is given by

$$(10) \qquad s_j + \left(p_j - \frac{\partial c(z_j, Ns_j)}{\partial s_j}\right)\frac{\partial s_j}{\partial p_j} = 0.$$

Equation (10) sets the basis for the estimation of the pricing behavior and the effects of the hospitality characteristics on marginal costs.

Welfare Measurement

We measure the social welfare in the rural tourism market by the total economic surplus, where, as usual, producers' surplus is given by their profits. As for the consumers, note that the nested logit model incorporates the assumption that the marginal utility of income is a constant, given by α. It follows that the consumer's surplus can be calculated as

$$CS^i = \frac{1}{\alpha^i} E\left(\max_{j\in\{1,\ldots,L\}} u_{ij}\right)$$

which is the expected utility in monetary terms.

Given the specification of the utility function in equation (1) and the distributional assumptions, it has been shown that the aggregate consumer surplus is given by the following expression (Choi and Moon 1997):

$$W = \frac{\ln\left(\Sigma_r\left(\Sigma_{j\in N^r} e^{\frac{\delta_j}{1-\sigma}}\right)^{1-\sigma}\right)}{\alpha}.$$

This formula is utilized in the simulations in the "Simulating Variations in Product Differentiation" and the "Simulations of Government Intervention" sections.

Estimation and Simulation Procedures

In this section we introduce the equations, discuss the estimation procedure, and propose a list of instruments to overcome the simultaneity and endogeneity of price and market shares. In addition, we outline the simulation procedure.

Empirical Specification

Dividing the natural logs of the market-share expressions from (7) and (8), we receive the log ratio of the market share of each rural accommodations firm divided by the share of the outside good,

$$(11) \quad \ln\left(\frac{s_j}{s_0}\right) = x_j\beta - \alpha p_j + \sigma \ln(s_{j/r}) + \zeta_j$$

where $s_{j/r}$ is the regional market share of accommodations firm j. Treating ζ_j as an error term, equation (11) can be used for estimation. However, since it is customary in the hospitality industry to measure output in terms of occupancy rates and for numerical precision, we rewrite equation (11) in terms of the firm's annual occupancy rate, o_j, instead of its market share. Denoting the number of hospitality units offered by the j-th firm by $n_j, o_j = \frac{Ns_j}{365n_j}$, we obtain the following equation, which is our empirical specification of the demand equation,

$$(12) \ \ln\left(\frac{o_j}{o_0}\right) = x_j\beta - \beta^n \ln(n_j) - \alpha p_j + \sigma \ln(s_{j/r}) + \zeta_j$$

where β, β^n, α, and σ are parameters for estimation. The variable $\ln(n_j)$ is added to the right-hand side of the equation as a result of the transformation of the dependent variables from a market share to an occupancy rate, and also to express the possibility that the number of guest units may affect consumer preferences and demand.

We are left with specifying the estimable pricing equation. To this end, we assume that the marginal cost function is linear in the characteristics of the accommodation unit and the number of units operated by the firm. The latter represents the planned scale of the operation. Incorporating these assumptions, rearranging (10) and substituting for $\frac{\partial s_j}{\partial p_j}$ from the demand equation yield

$$(13) \quad p_j = z_j\gamma + \frac{(1-\sigma)}{\alpha[1 - \sigma s_{j/r}(1-\sigma)s_j]} + \nu_j.$$

Equation (13) comprises two parts: the marginal costs, $z_j\gamma$, and $\frac{(1-\sigma)}{\alpha[1-\sigma s_{j/r}(1-\sigma)s_j]}$, which represents the markup. The error term, ν_j, is added to represent the marginal cost associated with unobserved characteristics of the accommodation unit and the operator's unobserved management skills.

Estimation Procedure and Instruments

The demand equation (12) and the pricing equation (13) make up a system of nonlinear, simultaneous estimable equations. The estimation of this model raises several econometric difficulties. First, the explanatory variables p_j, s_j, and $s_{j/r}$ are endogenous and require instruments. Second, since ζ_j and ν_j are both functions of the unobserved characteristics of an identical accommodation unit, they are expected to be correlated.

This implies that efficiency and hypothesis testing require treating the estimated equations as a system. Additional difficulties include the nonlinearity of equation (13) in σ and α, and the fact that these parameters appear in both equations, and hence cross-equation restrictions are needed.

The system is estimated using the general methods of moments (for details on the GMM estimator see Greene (2000, p. 474) and Hansen (1982)) This estimation procedure handles the aforementioned econometric problems and provides consistent estimates. Moreover, GMM requires no additional assumptions regarding the joint distribution of the error terms, and the limiting distributions of the estimates are known, facilitating hypothesis testing. To carry out the procedure we utilized the NLOGIT 3(LIMDEP) NLSUR procedure.

The procedure requires instruments for the price and market shares. Instruments for the market shares are the characteristics of the accommodation unit that do not affect cost, and characteristics of competing rural accommodation units in the region and village. The first group includes a regional dummy, view ranking, a dummy for the provision of agritourism activities, the surveyor's impression of the unit, and the provision of tourist attractions in the village. The second group consists of the number of other operators and accommodation units in the region and village, and total luxury features in the regional and village accommodations. These variables are correlated with the firm's share, but are independent of the unit's unobserved characteristics.

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 education, type of agricultural activity on the farm, type of village, and area of cultivated land on the farm.

Simulation Procedure

As already mentioned, one of the main advantages of the extended logit framework is its capacity to perform simulations of the industry equilibrium under various exogenous changes. Since the application of the logit-based simulation procedure in the rural/environmental areas is rather novel, we elaborate to facilitate future applications.

The system of market share and pricing equations (12) and (13) for all firms makes up an equilibrium model of the rural tourism industry. The endogenous variables are the prices charged by each of the L firms and the firms' market shares. These, in turn, determine the oligopolistic markup, profits, consumer surplus, and hence total economic welfare. Exogenous to the equilibrium model are the government policies, product differentiation, information level, and the agricultural and natural environments. By solving the share and pricing equations for each of the L firms in the market simultaneously with the equations representing other firms, we can calculate the predicted outputs and prices in equilibrium. Therefore, employing the estimated parameters, the model facilitates simulations of the equilibrium of the rural accommodations market under a variety of circumstances.

In the "Simulating Variations in Product Differentiation" and the "Simulations of Government Intervention" sections of the article, we present the results of simulated variations in market structure and government intervention, respectively. Each simulation involves a numerical solution of a pair of nonlinear equations for each firm in the industry. A total of $2L$ equations (392 equations in our case), i.e., L demand equations (12) and L pricing equations (13), are solved simultaneously. The simultaneous solution requires a computer program, which employs Gauss' nonlinear simultaneous-equations subroutine. Tchetchik, Fleischer, and Finkelshtain (2007) provide the whole program for future users who may employ it to simulate other markets with differentiated products. The next section is devoted to a presentation of descriptive statistics for the variables used in the estimation. In addition, we provide a short description of the Israeli rural accommodations industry, focusing on its growth and profitability.

Rural Tourism in Israel

Exhibiting an annual growth rate of 15%, rural tourism has been the most rapidly growing economic activity in rural areas of Israel in the last 20 years (Fleischer, Engel, and Tchetchik 2005). Currently, the industry consists of 8,000 accommodation units, situated in about 210 rural communities, semi-cooperatives (Moshavim), collectives (Kibbuzim), and nonagricultural rural towns. They are located in five distinct geographical regions ($R = 5$). Most of the visitors are local inhabitants from urban centers. International tourists rarely stay over.

Data

The data originate from a cross-sectional face-to-face survey of 200 private rural accommodations operators taken during the year 2000, and by taking a tour of the hospitality units and related facilities. The surveyed operators represented 23% of the 886 rural accommodations firms in Israel in that year. We excluded 69 firms located in collective communities (the Kibbuzim) and focused on private operators from Moshavim, villages, and small rural towns. Since no official statistics regarding private rural accommodations firms were available, information for the construction of the sample was collected from special guidebooks, regional tourism associations, the yellow pages, and several Internet portals.

We employ a random stratified sample with regional- and village-type strata. Within each village, a given proportion of the operators were randomly chosen. Of a total of 100 communities and 817 operators, we sampled

19 communities and 200 operators: the 19 rural communities included nine Moshavim, seven noncooperative villages, and three small rural towns; 198 interviews were completed successfully, i.e., there were no missing observations for the main variables. The regional distribution of the operators was: Upper Galilee (54%, 49%); Western Galilee (22%, 23%); Sea of Galilee (10%, 11%); Golan Heights (11%, 14%), and Arava Desert (3%, 3%), where the first and second number in each pair represent the regional shares in the sample and population, respectively. It can be seen that the two distributions are very close. We compared our estimate of the number of units in the industry to an independent estimate, derived from a census conducted by the ministries of Tourism and Agriculture. The total number of accommodation units in our sample is 720 and inflating it to the population level, one gets an estimate of the total units in the population of 3,156. This number deviates by only 2.0% from the official number reported by the Israeli Ministry of Agriculture (MOAG 2001).

The operators' questionnaire included a wide range of questions concerning the characteristics of the hospitality units, the landscape, and available tourist activities, the capital and labor inputs of the owners and the annual performance of the business. Owners with an active farm were also asked about the agricultural elements relevant to the accommodations. Finally, owners were asked about their demographic and personal characteristics. Table 1 presents the variables and instruments employed in the regression analysis and their descriptive statistics.

Economic Indicators

The industry's annual revenue and gross product are estimated by aggregating the revenue

Table 1. Descriptive Statistics of Regression Variables and Instruments

Variables	Mean	Std. Dev.	Coeff. of Var.
Firm market share	0.00093	0.0009	0.97
Within-region market share	0.03	0.04	1.33
Occupancy rate	0.30	0.13	0.43
Price ($ per unit per night)	70.81	16.36	0.23
% Log cabins out of firm's units	0.22	0.39	1.77
Value of luxury elements ($)	1313	1067	0.81
No. of special amenities (*e.g.* bath oils)	2.68	2.27	0.84
No. of units (per firm)	3.64	2.81	0.77
Unit size (square meters)	33.76	11.18	0.33
No. of years since establishment of firm	6.27	5.35	0.85
Education[a]	2.97	0.96	0.32
No. of agrotourism activities	0.22	0.55	2.5
Spectacular view (Dummy)	0.46		
Upper Galilee(Dummy)	0.54		
Tourism village status (Dummy)	0.36		
Breakfast included (Dummy)	0.29		
Livestock farm (Dummy)	0.04		
Orchard farm (Dummy)	0.36		
Flower farm (Dummy)	0.02		
Greenhouse farm (Dummy)	0.02		
Active farm (Dummy)	0.41		
Instruments			
No. of other firms in the region	71	39.02	0.55
No. of other units in the region	269.81	176.7	0.65
Total regional investment in luxury ($)	88,812	42,310	0.48
Farm cultivated land (acres)	1.5	3.75	2.5
Surveyor rating (1-5)	2.9	0.62	0.21
Nonagricultural community (Dummy)	0.18		
Moshav (Dummy)	0.46		
No. of other firms in the village	14.21	7.77	0.55
No. of other units in the village	51.9	33.39	0.64
Total village investment in luxury ($)	17,715	10,386	0.59

[a] 1—elementary, 2—junior, 3—high, 4—BA, 5—MA.

Table 2. Comparison with the Hotel Industry (per unit in 1999)

Variables	Rural Tourism	Hotels[a]
Occupancy rate	30%	61.8%
Annual revenue	12,326	24,744
Value added	10,263	13,711
No. of employees	0.04	0.69
Labor cost	353	9,998
Return to equity and owners' labor	8,760	2,805
Return to equity	4,285	2,805

[a]Source: CBS (2000).

and added value of the sampled firms, and then inflating these aggregate values by 4.34 (we sampled 23% of the population, 4.34 = 1/0.23) to represent the whole population. Total revenue for the private owners of rural accommodations (represented by our sample) was $32 million in 1999. Including rural accommodations in collective communities, total industry revenue is estimated at $76 million in 1999 and $115 million in 2004 (Fleischer, Engel, and Tchetchik 2005). The total industry net product was $63 million in 1999 and $96 million in 2004. In 2004, the rural tourism product was about 6.7% of Israel's agricultural product and 7% of Israel's total tourism product.

It is instructive to compare the economic performances of a typical rural accommodation unit and an average hotel unit (table 2). While occupancy rate and revenues in the hotel industry are twice as large, the value added in the hotel industry is only 30% larger than in the rural accommodations industry. In contrast, the return to equity in rural accommodations is 1.5 times larger that in the hotel industry.

Taking into account that the investment in a rural accommodation unit is only $24,000, significantly less than the capital requirements for an average hotel room ($60,000–$100,000), this implies that the rate of return to equity and owners' labor in the rural accommodations industry (approximately 37%) is much larger than the rate of return in the hotel industry. Note, however, that accounting for the alternative cost of the owners' labor, the per unit rate of return to equity as a percentage of the capital investment equals 18%.[1] These figures, specifically the rate of return to equity and owners' labor, far exceed the "normal rate of return" and allude to the existence of imperfect competition in the rural tourism market. Moreover, the ratio of the "return to equity" to revenue, which serves as a proxy of the markup, averages 35%. Since some of the "owner labor," such as time devoted to marketing, does not change with the actual occupancy and therefore should not be considered as part of the marginal cost, the "return to equity" makes a lower bound to the real markup. On the other hand, the ratio of the "return to equity and owner's labor" to revenue, which can be considered as an upper limit of the markup, averages 71%.

Role in Regional Economies

The above assessment indicates that total revenues from rural tourism make up only a small share of the total agricultural or tourism revenues. However, in some rural regions, tourism has become a significant source of livelihood. This is demonstrated by shares of (part- and full-time) rural accommodations employees in the total labor force of the various regions: upper Galilee (6.5%), Western Galilee (3.5%), Golan Heights (5%), the Sea of Galilee and its surroundings (6.5%), and the Arava desert (11%).

To examine whether the profits from tourism constitute an important source of income for families who operate a rural accommodations business, we estimated the agricultural and off-farm incomes of the operators. To evaluate the farm income we collected data regarding the cultivated areas, crop types, and livestock quantity of each operator. These physical units were multiplied by norms of profits per unit of farming activity, taken from Hadas (2003). To estimate off-farm income, we collected data regarding the off-farm occupation and hours of work of each household's member and multiplied these hours by the wage per hour by occupation, from the CBS (2000). Table 3 reports the results. The average income for an active farm is $67,378 and for nonfarmers, $50,204. Revenues from tourism account for half of the household income while the other half is split evenly between agriculture and nonfarm income. The share of income from tourism for the nonfarm household is higher and accounts for 61% of the total income.

Estimation Results

This section presents an econometric estimation of structural equations (12) and (13).

[1] The "return to equity" figure in table 2 equals the revenue minus the variable cost including all materials, wages for hired labor, and the alternative cost of the owner's labor. The latter is calculated based on the operator's alternative occupation and associated wages and reflects the owner's real opportunity cost.

Table 3. Income Estimates, Operators of Rural Accommodations (2005 US $)

	Farmers		Nonfarmers	
Income Source	US 2005 $	% of Family Income	US 2005 $	% of Family Income
Rural tourism	34,182	50.73	30,482	60.72
Agriculture (1)	16,738	24.84	0	0
Off-farm occupation(2)	16,458	24.43	19,722	39.28
Total family income	67,378	100	50,204	100

Sources:
(1) (Hadas 2003).
(2) CBS (2000), Wages by occupation.

The results are used in the following sections to simulate and assess the impact of product differentiation, the industry's growth prospects, and the potential impacts of government intervention.

Tourist Preferences

Table 4 reports the GMM estimates of the demand-equation parameters. For the statistically significant coefficients, we also report the marginal effect of each variable on the number of sold nights and the demand elasticity. We find that the unit characteristics, its price, the region, and the village amenities and infrastructure all have a statistically significant effect on the demand. Not surprisingly, for a good with many close substitutes, the demand for each unit is quite elastic: the price elasticity of the demand equals −1.76. The "nested logit" parameter $\sigma = 0.35$ and is statistically significant, indicating that the degree of substitutability among units within a region is considerably larger than the substitutability among units of different regions.

The Upper Galilee region, which is rich in nature reserves and rural landscapes, is found to be more attractive than the others regions. In comparison to the industry's average occupancy rate, the rate in this region is higher by 275%. However, the effect of the specific unit's view is not significantly different from zero. Tourism village status raises the occupancy rate of the units in the village by 6%. Communities that are granted this status enjoy government investment in infrastructure and amenities, such as promenades and parks, parking, and signposts. These, in return, increase demand.

The variables describing the "quality level" of the unit (luxury elements, amenities, unit size, percentage of log cabins on the premises, and breakfast availability) are all positive and significant. An increase in any of these

Table 4. GMM Estimates of Demand Parameters

Variable	Coefficients	Standard Error	Marginal effect[a]	Elasticity[a]
Constant	−6.4764*	0.3876		
Price[b] (NIS per night)	0.0039*	0.0006	−0.63*	−1.76*
Spectacular view	−0.0509	0.0503		
Luxury elements	0.0847*	0.0150	13.71*	0.71*
Upper Galilee	0.6094*	0.1490	98.70*	0.50*
No. of units (ln)	−0.2481*	0.0790	−40.18*	−0.39*
Agrotourism activities	0.0102	0.0492		
Special amenities	0.0511*	0.0226	8.28*	0.20*
Active farm	−0.0866	0.0639		
Log cabin	0.1918*	0.0779	31.08*	0.06*
Breakfast included	0.2142*	0.048	34.70*	0.19*
Tourism village	0.1331*	0.0573	21.56*	0.070*
Unit size	0.0706*	0.0329	11.43*	0.36*
σ^b	0.3465*	0.17315		
GMM criterion 24.32				
Generalized $R^2 = 0.68$				

[a]Significance was calculated using the Delta Method (for details on the Delta Method see Davidson and Mackinnon (2004, p. 200).
[b]These coefficients are common to both demand and pricing equations.
Note: Significance at 0.05 is denoted by an asterisk (*).

attributes will lead to an increase in the demand for the unit. For example, an addition of NIS 1,000 (or $236) invested in a luxury element, such as a whirlpool bath, increases the occupancy rate by almost 4%. These findings may explain the present trend in the Israeli rural accommodations industry to position the units as luxury units.

The interpretation of the coefficient of ln(no. of units) requires special caution. By the manipulation employed to transform the dependent variable from a market share to an occupancy rate, this coefficient is expected to equal −1. However, the number of units on the premises may also be a factor affecting consumers' preference for the unit. The fact that the coefficient is significantly larger than −1 implies that the average consumer prefers accommodation units that are part of a complex of several units. Considering that the average number of units per firm was 3.6 in 2000, and that rural tourism in this period was based on families accompanied by children, these results are not surprising.

Finally, agriculture does not seem to affect demand for rural accommodations. Neither the presence of an active farm on the premises, nor the offering of agritouristic activities by the operator, have statistically significant effects on the attractiveness of the unit to visitors. However, the above results should not be interpreted as an indication that the rural farm ambience is not important. Since many active farms are present in any of the five regions in our sample, the econometric analysis could not identify the impact of the special atmosphere created by agriculture on the demand for rural accommodations. Moreover, as will be seen further on, farming is found to be synergistic with the production of rural accommodations services.

Firms' Pricing

The GMM estimates of the parameters of the marginal-cost/pricing equation are reported in table 5. The most important finding is that the pricing in the rural tourism industry deviates significantly from a competitive, marginal-cost pricing. Our estimate of the "markup formula" (in equation 13) is significant at 1%[2] and averages 62%. This result is within the range derived from the accounting evidence in table 2. Thus, we can conclude that the industry is characterized by a sizable price-cost margin. We hypothesize that the large markup is the result of differentiation among the firms, imperfectly informed consumers and government regulations that restrict supply. Decomposition of the price-cost margin and identification of the various factors that hinder competition in the rural tourism industry are carried out in the following sections, based on simulations.

The coefficients of the various characteristics reflect the impact of the specific attribute on marginal cost and not on price (Berry, Levinsohn, and Pakes 1995). A positive value means that the attribute is associated with an increase in marginal cost. For example, an increase of one unit of luxury elements (one unit equals $236) results in an increase of NIS 10 ($2.36) in the marginal cost per unit per night. Three sets of factors are found to affect the marginal cost. The first is the quality attributes of the accommodation unit. The second is the characteristics of the adjoining farm, and the third is the attributes of the operator and his or her family. Starting with the first, the estimated equations recover the marginal cost of the quality characteristics. For example, the cost per night of an additional amenity is almost NIS 9 ($2.1), of increasing the unit by 10 square meters, NIS 6 ($1.4) and of serving breakfast, NIS 29 ($7).

The coefficients of the dummy variables for the different types of farms are all negative (the omitted variable is no farm). This result means that the marginal costs of a rural accommodations firm with an active farm are lower than for one without a farm. This result points to the existence of technological synergy in the joint operation of farming and rural accommodations. The estimated regression shows that the cost per night in a business located on a flower farm may be as much as 42% lower than a tourism business without a farm. The sources for this synergy maybe several intrinsic characteristics of an active farm.

First, the operator can perform many tasks, such as taking reservations by phone, simultaneously with the farm routines. Moreover, the visitors need the operator in the early morning before they leave and in the late afternoon when they return. Farmers can adjust their work schedule to meet these needs. Second, most rural accommodations businesses require only part-time workers, for tasks such as cleaning, gardening, and maintenance. Laborers who are employed on the farms may perform such duties by exploiting free time between farm routines.

[2] The significance was calculated using the bootstrapping procedure (for details see Efron 1998).

Table 5. GMM Estimates of Marginal Cost Parameters and Markup

Variables	Coefficients	Standard Error	Elasticity
Constant	46.8598	35.2496	–
Luxury elements	10.2913*	1.2123	0.19
Number of units	3.0930*	0.6753	0.04
Special amenities	8.7987*	1.9065	0.08
Livestock farm	−30.8067*	12.8460	−0.004
Orchard farm	−15.3373*	7.1422	−0.02
Flowers farm	−49.2144*	16.3806	−0.006
Greenhouse farm	−35.8025*	18.9982	−0.002
No. of years since establishment of firm	−2.3705*	0.6095	−0.05
Breakfast included	28.6219*	7.2568	0.03
Education	−2.1757	2.7872	−0.022
Unit size	5.9067	4.9104	0.07
Generalized $R^2 = 0.22$			

Note: significance at 0.05 is denoted by an asterisk (*).

A third reason for the synergy is the common capital employed in both farming and tourism. Examples are gardening equipment, storage facilities, and infrastructure, such as water pipes, sewage and drainage systems, farm roads, and parking. Lastly, but no less important, are governmental regulations that favor farmers. Active farmers are issued permits to employ foreign Thai laborers whose wage rate is considerably lower than that of Israeli employees. In addition, active farms are allocated a water quota for irrigation, for which the price is much cheaper than urban nonagricultural water. Finally, 95% of the land in Israel is state-owned. In comparison to operators of accommodations in nonagricultural settlements, farmers who operate accommodation units are charged lower rent by the state. By comparing labor, water, and land costs between farmers and nonfarmers we found that the subsidies to farmers lower the cost of the tourism operation by $2.25 per unit per night. This means that government regulations and subsidies are responsible for a reduction of 20%, 30%, 27%, and 50% in production costs on the flower, livestock, greenhouse, and orchard farms, respectively. The other 80%, 70%, 73%, and 50%, respectively, of the cost saving stems from the technological synergy and is expected to exist in other regions and countries.

As already mentioned, an additional set of factors that affect marginal cost are the operator's characteristics. More experienced and educated operators run the business more efficiently. An additional year of experience or higher education lowers the cost per night by NIS 2.4 ($ 0.6). Marginal costs are also affected by the planned scale of the operation, measured by the number of units. The positive coefficient indicates an increasing marginal cost in the planned scale of the operation.

Goodness of Fit

Since our estimation procedure is based on instrumental variables, the usual R^2 statistic is inappropriate as both a selection criterion and a measure of goodness of fit (Pesaran and Smith 1994). One way of assessing the goodness of fit, in such cases, is by comparing the predicted *versus* actual distributions of the endogenous variables. Table 6 lists the moments of the two distributions of occupancy rates and prices. The average occupancy rate predicted by the estimated model is 29%, compared with an actual average occupancy rate of 30%. The average predicted price of NIS 296 deviates from the actual average price of NIS 300 by only 1%. In both cases, the moments of the predicted distribution are quite similar to those of the actual one.

Table 6. Moments of Actual and Predicted Distributions

	Observed Rate		Predicted Rate	
	Occupancy (%)	Price (NIS)	Occupancy (%)	Price (NIS)
Mean	30	300	29	296
Median	28	287	25	281
Maximum	92	556	98	529
Minimum	4	142	13	193
Std. dev.	13	69	12	62
Skewness	1.13	0.9	2.07	0.9
Kurtosis	2.72	1.7	6.61	0.7

We also computed the generalized R^2 statistics for the two equations (Pesaran and Smith 1994), which is an asymptotically valid selection criterion for models that are estimated with instrumental variables. The calculated generalized R^2 statistics for the demand and supply equations are 0.68 and 0.22, respectively, providing a reasonable goodness of fit.

Simulating Variations in Product Differentiation

In this and the following section, we employ the estimated parameters to calibrate the share and pricing equations and use the calibrated equations to simulate the equilibrium in the rural tourism industry. This section is devoted to examining the impact of product differentiation and the next section to simulating government interventions.

Table 1 shows large coefficients of variation (CVs) for the quality characteristics of the units: luxury elements, percentage of log cabins, size, and special amenities. These large CVs, ranging from 0.33 to 1.7, demonstrate that the differentiation in the industry is substantial. In the following, we adopt the definitions of horizontal and vertical differentiation from the theoretical and empirical IO literature (e.g., Tirole 1988 and Schmalensee and Willig 1989). The accommodation units are vertically differentiated by the observed quality characteristics, such as "size," "luxury elements," and "special amenities," and are horizontally differentiated by their geographical location, as well as by whether they are located near an active farm or not. The nested logit model that accounts for both vertical and horizontal differentiation allows a simulation of the industry equilibrium with various degrees of differentiation. This facilitates the decomposition of the price-cost margin to its sources: vertical differentiation, horizontal differentiation, and regulations that restrict supply.

Vertical Differentiation

At early stages of the industry's development, accommodation units were based on the renovation of old residential and farm buildings. In later years, units were designed and constructed specifically to serve tourists, gradually turning into luxury units for the up-scale market. A very recent trend is the building of log cabins which, in Israel, are considered a sign of luxury and quality. This historical progression of the industry has led to substantial vertical differentiation (table 1). It can be seen that the CV of unit size equals 33%, and that of the quality characteristics, such as investment in luxury, provision of special amenities, and existence of log cabins is above 80%.

We simulate the impact of vertical differentiation on industry equilibrium and its contribution to the price-cost margin. Table 7 reports the results when vertical differentiation is minimized by simulating an equilibrium with all firms positioned at the 66% mark of the luxury end. That is, we simulate a situation in which 66% of the cabins offered by each firm are log made, the cabins' size is 66% of the largest cabin in the industry, the investment in luxury elements is 66% of the highest investment, and the number of special amenities offered by the firms stands at 66% of largest number of amenities provided by an Israeli rural accommodations firm. We then examine the impact of this change on industry performance.

Table 7. Equilibrium with Minimal Vertical Differentiation

	Absolute Change	Relative Change (%)
Aggregate sold nights	57,514	83.2
Average occupancy rate	0.22	78.3
Arava Desert market share	0.0003	0.6
Sea of Galilee market share	0.01	16.5
West Galilee market share	−0.02	−15.7
Golan Heights market share	−0.02	−15.8
Upper Galilee market share	0.02	3.4
Aggregate consumer surplus (000 $)	8,086	111.3
Aggregate firms' profits (000 $)	2,488	80.6
Aggregate welfare (000 $)	20,912	202.0
Average markup	−0.25	−40.1
Average price ($)	46.62	66.1

Table 7 shows that these changes have a dramatic effect on the industry. The average occupancy rate and total number of sold nights increase by 80%. In terms of the regional distribution, the main beneficiary is the Sea of Galilee area, which is currently characterized by old and elementary units. The losers are the Golan Heights and Western Galilee regions, which are presently positioning their units at the upper end.

The price is affected by two opposite influences. The enhanced luxury attributes increase both the demand and marginal cost, leading to a price rise, whereas the reduction in the differentiation increases competition and decreases the markup by 40%. The combined effect is a 66.1% hike in the average price. Despite the price increase, the above changes enhance the consumer's surplus and welfare. The increase in the luxury and size and the provision of additional amenities more than compensate for the price hike.

Horizontal Differentiation and Information

Horizontal differentiation is introduced into the nested logit model by means of the stochastic term ϵ_{ij}, which represents the idiosyncratic preference of consumers for a specific unit. Since $E(\epsilon_{ij}) = 0$, a possible approach to modeling changes in horizontal differentiation is to add a scale parameter,γ, such that the new error term, $\tilde{\epsilon}_{ij}$, is given by $\tilde{\epsilon}_{ij} = \gamma\epsilon_{ij}$. Since an increase in γ increases the heterogeneity in consumer preferences, a smaller γ represents a less horizontally differentiated industry. Technically, one way to implement these changes is by scaling up all the deterministic demand parameters.

Indeed, table 8 reports the changes in the industry equilibrium with all the deterministic demand parameters scaled up by 5% to 25%, which is equivalent to a reduction of 4.8% to 20% in the standard deviation of ϵ_{ij}. The first five columns present the actual changes and the last column reports the elasticity of each variable with respect to the scale parameter. The simulation can be interpreted as either a decrease in horizontal differentiation or an increase in information, reducing the variance of the stochastic terms of the utility.

As expected, the decrease in differentiation or increase in information raises competition and reduces the price-cost margin, average price, and firms' profits. These changes lead to enhanced consumer surplus and aggregate economic surplus. The reported elasticities provide some indication of the magnitude of these effects. Except for the consumer surplus that increases at the same rate as the increase in information, all other variables change at lower rates. In particular, a 50% decrease in the standard deviation of ϵ_{ij} would reduce the price-cost margin by 55%. Thus, horizontal differentiation is a major factor in determining the oligopolistic markup.

Simulations of Government Intervention

Intervention by the Israeli government in the rural tourism market comprises several dimensions. First, the construction, number, and location of accommodation units is heavily regulated. The government of Israel owns 97% of rural lands and manages them via the Israeli Land Authority. In addition, the local and regional planning committees of the Ministry of the Interior regulate construction and determine the units' design, such as their maximal size.

Despite the regulations, the government encourages growth of this sector. First, government provides a subsidized loan and guarantee program. Second, by declaring the whole village a "tourism village," the government provides local public goods through infrastructure and public amenities, such as promenades,

Table 8. Changes in Horizontal Differentiation and(or) Information

Percentage Change	5%	10%	15%	20%	25%	Elasticity[a]
Aggregate nights	1535	3808	5838	7920	10184	0.54
Average occupancy rate	0.01	0.02	0.03	0.04	0.05	0.64
Aggregate Consumer Surplus (000$)	476	783	1064	1349	1661	1.04
Aggregate profits (000$)	−82	−126	−176	−220	−272	−0.41
Aggregate welfare (000$)	394	657	888	1129	1389	0.61
Average markup	−0.01	−0.02	−0.04	−0.05	−0.06	−0.55
Average price ($)	−2	−4	−6	−7.4	−9	−0.38

[a] Average of arched elasticities.

parks, roads, parking and signposts. Third, the Ministry of Agriculture supports infrastructure improvement targeting operators of tourism businesses with active farms. This section compares the various support programs and analyzes the effects of government regulation on industry equilibrium.

Support Policies

In recent years, the Israeli Tourism Ministry has allocated $2,500,000 annually (2.5% of its development budget) to the support of rural tourism. This budget suffices to grant four additional villages "tourism village" status and upgrade their infrastructures and public amenities. In the simulation below, we consider the investment in four additional tourism villages, one in each region, excluding Arava where all communities that host tourism have already been granted "tourism village" status. We compare the investment in public goods to a program that provides subsidized capital for investment in quality elements of the accommodation units. Since the competition in the industry is imperfect, such a change has the potential to reduce prices and enhance welfare. Thus, both programs may mitigate market failures and increase welfare.

It is apparent from table 9 that both programs fulfill their main objective of increasing economic welfare. The upgrading of the local public goods in additional villages increases demand for rural tourism, although it reduces the vertical differentiation and the markup. The net result is a decrease in prices and an increase in consumer surplus and welfare. The fall in prices shrinks firms' per night profits. However, the increased demand elevates occupancy rates and the net result is a rise in aggregate profits. The increase in economic surplus in the industry is larger than the government expenditure, resulting in a net increase in welfare. However, this analysis omits the general equilibrium effects, such as the potential shrinkage of the nonrural hotel industry. Therefore, the results regarding social welfare should be interpreted with caution.

The direct subsidy reduces marginal cost and although the average markup increases, market prices decrease by almost 10%. This leads to an increase in consumer surplus. The net effect of the fall in prices and increase in occupancy rates on aggregate profits is positive. Once again, since the gain in economic surplus exceeds the government expenditure, the net change in welfare is positive. However, the above caveat also applies here. A comparison of the two support programs reveals the advantage of the direct subsidy over the investment in local public goods.

Synergy with Agriculture

In the presence of synergy between farming and rural tourism, exits from farming can adversely affect the rural hospitality industry. However, agricultural support policies that are intended to preserve small family farms may indirectly benefit the rural tourism industry. To examine the quantitative effect of these

Table 9. Direct Subsidy versus Investment in Local Public Good

	Public Good		Direct Subsidy	
	Absolute Change	(%)	Absolute Change	(%)
Average price	−0.12	−0.2	−6	−8.8
Average markup	−0.001	−0.2	0.6	9.8
Sold nights	1,761	2.5	5,563	8.0
Average occupancy rate	0.01	2.5	0.02	7.9
Arava Desert market share	−0.002	−3.2	0.0002	0.4
Sea of Galilee market share	0.0003	3.1	0.0002	0.2
West Galilee market share	−0.003	−1.9	0.0001	0.1
Golan Heights market share	0.06	6.6	−0.0002	−0.2
Upper Galilee market share	−0.005	−0.8	−0.0004	−0.1
Consumer surplus ($)	490,000	6.7	1,027,000	14.1
Firms' profits ($)	71,000	2.3	240,000	7.8
Government expenditure ($)[a]	402,000		402,000	
Welfare rural market ($)	561,000	1.5	1,267,000	12.2

[a]The total investment of $2,500,000 was adjusted to fit sample size to $402,000.

Table 10. Farming and the Equilibrium in the Rural Tourism Market

	Leaving Agriculture		Supporting Farmers	
	Absolute Change	Change in %	Absolute Change	Change in %
Average price ($)	2.1	3	−6	−7.6
Average markup	−0.023	−3.6	0.09	14.47
Sold nights	−2,200	−3.2	5,442	7.90
Average occupancy rate	−0.008	−2.7	0.02	6
Arava share	−0.0014	−2.7	0.0006	1.2
Sea of Galilee share	−0.0012	−1.4	−0.001	−0.6
West Galilee share	−0.0006	−0.5	−0.004	−3.2
Golan Heights share	0.0004	0.4	0.001	1.2
Upper Galilee share	0.0028	0.4	0.003	0.5
Consumer surplus ($)	−294,000	−4.0	962,000	13
Aggregate firms' profits ($)	−101,000	−3.3	228,000	7.4
Farmer's profits ($)	−101,000	−6.9	374,000	25.8
Welfare rural market ($)	−394,350	−3.8	1,190,000	11.5

phenomena, we simulate the equilibrium in the rural tourism industry for the two scenarios. The results are reported in table 10. In the first scenario, we simulate an extreme case in which all of the operators of rural hospitality businesses quit farming. In the second, a subsidy is granted to operators of rural tourism businesses who own an active farm. The subsidy is of the amount of $2,500,000, which is identical to the subsidy budget examined in the simulations in the previous subsection.

As expected, in the scenario in which rural accommodations operators quit agriculture, farmers no longer enjoy the synergy effect and they face an increase in costs, resulting in an increase in the price of hospitality units and a reduction in occupancy rates and welfare. The surprising result in table 10 is the moderate level of these changes. On average, prices increase by only 3% and occupancy rates fall by only 2.7%. We should emphasize, however, that due to the existence of many active farms in all regions, the econometric analysis could not identify the impact of the farm on demand, so one should not interpret these results as an indication that rural-farm ambience is not important.

The "support for farmers only" program yields results similar to those from the general direct subsidy. The decreasing price and increases in occupancy and welfare are of the same order of magnitude as in the case of the general subsidy. However, farmers' profits increase by 26% on average. This may compensate operators for the deterioration in agricultural terms of trade and prevent exit from agriculture.

Regulations and Growth

Government regulations create entry barriers and may inhibit growth of the industry. Table 11 reports the results of two simulations that describe alternative deregulation schemes. In the first, the number of firms in each region is doubled. In the second, the number of units in each rural tourism business is increased by 50%.

Surprisingly, the sharp increase in supply induced by doubling the number of firms has only a minor impact on prices, which are reduced by only 0.5%. Thus, the simulation results predict a very minor response of prices to the dramatic increase in supply. While this may seem counterintuitive, it is supported by empirical observations on the development of the industry in the last five years. However, while the decline in prices is insignificant, the drop in occupancy rates is sharp. It can be seen from table 11 that the number of sold nights increases by almost 50%, compared to the increase of 100% in the number of firms. This decline in occupancy rate is combined with the reduction in prices and markups to create a 28% drop in average profits. However, although the industry size is doubled and profits decrease, firms continue to make positive profits, and aggregate profits, as well as consumer surplus and welfare increase. This may be interpreted as an indication that the industry's growth potential has not been completely exploited.

Table 11. Deregulation of Rural Accommodations Supply

	Adding Firms		Adding Units Per Firm	
	Absolute Change	Change in %	Absolute Change	Change in %
Average price ($)	−0.28	−0.5	1.3	1.8
Average markup	−0.01	−1.3	−0.017	−2.6
Sold nights	32,000	46	17,000	24.50
Average occupancy rate	−0.08	−27	−0.05	−16
Arava share	0.001	2.9	−0.0007	−1.35
Sea of Galilee share	0.0004	0.5	−0.0002	−0.24
West Galilee share	0.003	2.0	0.0021	1.58
Golan Heights share	−0.002	−2.1	0.00071	0.74
Upper Galilee share	−0.003	−0.4	−0.00200	−0.31
Consumer surplus	4,836,000	67	4,606,000	49
Average firm profits ($)	−4,000	−28	3,881	24
Aggregate firms' profits ($)	4,454,744	44	757,000	24
Welfare rural market ($)	9,284,000	60	5,363,000	43

Concluding Remarks

Tourism is playing an increasingly important role in many rural economies. The heterogeneity of the accommodation units and the coalescence with agriculture are unique features of the rural tourism industry. In this article, we develop a theoretical and empirical framework to study the rural accommodations market that considers these idiosyncrasies. The model is applied to estimate jointly demand and pricing parameters in the Israeli rural accommodations industry. Evidence was found for synergy in the joint production of agriculture and rural hospitality. Since this synergy stems mainly from the joint production technology, the results may apply to other regions and countries with similar conditions. However, on the demand side, the extent and type of agricultural activities on the hosting farm seem to have no significant effect on the demand for accommodations, although agricultural landscape and rural ambience may be important elements of the rural tourism experience. The lack of synergy on the demand side reflects the preferences of the Israeli population. A similar preference structure has been reported by other researchers in different countries, (Nilson 1990; Pearce 1990). It should be noted that these findings regarding the interaction between agriculture and rural accommodations should be treated with caution. Israeli farmers enjoy unique institutional arrangements with regard to land leasing and employment of foreign laborers (Kimhi and Bollman 1999). Our estimates show that about 50% of the cost reduction resulting from joint production of tourism and agriculture is due to these unique arrangements. Moreover, Israeli farms relative to their North American counterparts are smaller and family operated and the visitors are mainly domestic families. Thus, the reported findings are not independent of these special characteristics.

The estimated parameters were employed to simulate the industry equilibrium under a variety of governmental policies and market structures. The simulations demonstrate the key role of vertical and horizontal differentiations and tourists' lack of information as causes for the oligopolistic price-marginal cost margin. These findings suggest that provision of information by the government, for example by some sort of rating system or establishment of web portals for rural tourism, could potentially increase competition and enhance welfare. The government may also beneficially intervene subsidizing local public goods, such as parks, promenades, and improved transportation facilities. As far as we know, this is the first study that applies the nested logit model to simulate changes in the market structure and level of information in the market. Since differentiation and imperfect information are not unique to the rural tourism industry, the developed framework is expected to be applicable to other markets as well.

An important question regarding the rural accommodations industry concerns its potential for growth and for becoming an important source of livelihood in the rural economy. Our simulations show that in the Israeli case, the industry may develop by either increasing the number of businesses or raising the number of accommodation units per business, without a dramatic drop in prices. Even in the extreme case in which the industry is doubled, rural tourism is still profitable. Presently, the industry is heavily regulated and government restrictions create a barrier to entry and development. Thus, the government may catalyze growth by lifting regulations, providing information and local public goods, and implementing support programs.

Finally, we would like to note that the model used in this article can be applied to other studies in agricultural and resource economics, such as the analysis of markets for food specialties, organic foods, and international oligopolistic markets for agricultural commodities, such as coffee. It can be adjusted to the relevant conditions and enable analysis of markets performance.

[Received December 2005; accepted June 2007.]

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