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Differentiation & Synergies in Rural Tourism: Evidence from Israel

by

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Abstract

This paper applies a discrete-choice framework with product differentiation to model 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 joint production of farming and rural hospitality, but none in the demand. The differentiation in the industry is vast and is the major contributor to the price-cost margin, which averages 62%. An additional minor cause are 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.

Keywords: Rural tourism, Differentiated goods, Oligopoly markup.
JEL Classification Numbers: Q10, L11; L83.

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1 Introduction

Rural tourism 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 US, in the years 2002-4, 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 are twofold. First, continuous growth in income and leisure consumption juxtaposed 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 in agriculture have induced an exit from farming and a search for alternative sources of income, rural tourism being one of them (of European Communities 1992, Butler, Hall and Jenkins 1998). This transformation has been accompanied by different policy and support measures. For example, currently, the EU is proposing to budget over $17 billion from 2007 to 2013 in support of tourism-related projects in rural areas (Bendz 2004).

The outstanding growth of the industry raises several important questions. Are the current growth rates sustainable and what are the industry's prospects of becoming an important source of livelihood for the rural population? Is rural tourism synergetic to farming or does it compete with it over the same limited resources of family labor and land? What are the impacts of government regulations on the one hand, and support policies on the other? Finally, is the industry characterized by noncompetitive pricing, as some analysts believe, and why? In this paper we address these issues by applying a structural discrete-choice framework with product differentiation to jointly estimate the effect of rural accommodations and farm characteristics on consumer preferences and firms' costs.

Despite the impressive growth of the industry, there is a dearth of rigorous economic analyses of the rural tourism market. Brown (2005) presents a valuable and comprehensive bibliography of rural tourism papers, mostly in noneconomic journals. 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. In recent papers, Vanslembrouck, Huylenbroeck and Meensel (2005), and Fleischer and Tchetchik (2005) estimated hedonic price functions for the Belgian and Israeli rural tourism industries, respectively. Both papers 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, which requires a structural approach.

The rural accommodation market consists of a plethora of firms offering accommodations which vary in their location, amenities and decor. Despite the vast heterogeneity in the accommodation facilities, they can be described by a relatively small number of attributes. To model the differentiation in the industry, while being parsimonious with parameters for estimation and preserving the model's tractability, we adopt the random-utility-based, discrete-choice framework developed by McFadden (1978), Berry (1994), Pakes (1995), Nevo (2001) and others. In particular, we apply the nested logit model which was suggested by McFadden (1978) and Cardell (1997), and was successfully employed for the analysis of related issues, such as demand for recreation and fishing sites (*e.g.* (Hauber and Parsons 2000). However, while the literature on recreation demand focuses mainly on consumer preferences, the current application of this framework, which follows Berry (1994) and Fershtman, Gandal and Markovich (1999), allows a joint estimation of both the demand and cost parameters, using only aggregated firms' level data. Having estimated these parameters, a simulation of the industry's equilibrium is performed.

The simulation results show that the industry has growth potential and demonstrate that the government can play an important role in catalyzing growth via investment subsidization, deregulation of supply and information distribution. We also find evidence of technological synergy in the joint production of farming and rural hospitality. Despite the relatively elastic demand (the estimated demand elasticity equals -1.8), the vast differentiation results in an oligopolistic markup that averages 62% of the price and above the normal rate of return on equity (more than 20%). We estimate that relative to the perfect competition benchmark, the oligopolistic conduct leads to a 70% reduction in the number of tourist nights in rural accommodations and a welfare loss of 46%. Decomposing the markup reveals that the most important source for the price-cost margin is vertical differentiation, contributing 50% of the markup. Second in importance are horizontal differentiation and lack of information. The rest is attributed to government regulations that restrict supply.

The next section of this paper formalizes an economic model of the rural tourism industry. The empirical model and estimation procedure are introduced in the third section,

followed in section 4 by a detailed description of the Israeli rural tourism industry and data. Section 5 presents the estimation results, which are employed in section 6 to simulate alternative industry structures and in section 7 to study the impact of government intervention. Section 8 concludes.

2 Modeling the Rural Tourism Industry

Our presentation of the model follows the exposition of Berry (1994), and Fershtman et al. (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.

2.1 Tourists

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

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

where x_j is a vector of the jth accommodation 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 $r \in \{1, \ldots, R\}$. Finally, ϵ_{ij} represents the ith 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 which are observed by the consumer, but not by the researcher. An alternative explanation might be that some of the product characteristics are unobserved by the consumer at the time of purchase. Thus, ζ_j, ξ_{ir} and ϵ_{ij} are the consumer's utility estimates for the unobserved attributes. This explanation seems especially appropriate in the current context of tourism services, which are often purchased before and away from the time and 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,

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

or equivalently

$$u_{ij^*} \geq u_{ik} \ \forall \ k \neq j. \tag{3}$$

This latter inequality sets the basis for the derivation of the various firms' market shares. The analysis thereof is carried out in the next subsection.

2.2 Population Distribution and Market Shares

To continue the analysis, it is necessary to introduce a few assumptions about the population distribution of the utility components, which are attached by the consumer to the unobserved characteristics. Following the literature (*e.g.* 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 jth firm is denoted δ_j, and given the above distributional assumptions it equals:

$$\delta_j \equiv x_j\beta - \alpha p_j + \zeta_j. \tag{4}$$

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

$$A \equiv \{v_{ij} | \delta^j + v_{ij} \geq \delta^k + v_{ik} \ \forall k \neq j\}. \tag{5}$$

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:

$$s_j(\delta) = \int_A dF(v). \tag{6}$$

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, are 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 towards incoming tourists. Therefore, 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.

Secondly, 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

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

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 iid, 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 which 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:

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

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

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

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

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. It simply means that when choosing an accommodation unit, its geographical location is a very important 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.

2.3 Pricing

The estimation of the parameters of the demand function and preferences distribution could proceed without any behavioral assumptions regarding the rural accommodations firms. However, with the cost of assuming a few common conjectures concerning single-firm technology and behavior and the industry structure of equilibrium, one can jointly estimate demand, behavioral and technological parameters.

Starting with the single firm, it is assumed that it 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, it is assumed 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 firm's short-run behavior can be described as the following maximization problem

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

where $c(z, Ns_j)$ 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:

$$s_j + (p_j - \frac{\partial c(z, Ns_j)}{\partial s_j})\frac{\partial s_j}{\partial p_j} = 0. \tag{10}$$

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

2.4 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

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

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, by Choi and Moon (1997)among others, that the aggregate consumer surplus is given by the following expression:

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

This formula is utilized in the simulations below.

3 Estimation and Simulation

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

3.1 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:

$$log(\frac{s_j}{s_0}) = x_j\beta - \alpha p_j + \sigma log(s_{j/r}) + \zeta_j, \tag{11}$$

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 jth 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:

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

where β, β^n, α and σ are parameters for estimation. The variable $log(n_j)$ 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.

It is left to specify 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:[1]

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

where 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.

3.2 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. Secondly, 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 technical 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 (GMM). 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. The estimation principle is based on the independence of the instrument and the errors, where the population covariances between the error terms and the instruments are replaced with the analogous sample moments.[2] GMM is an iterative procedure, which minimizes the weighted quadratic form of the sample moments. 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

[1] The details of the derivation are available from the authors upon request.

[2] The independence of the errors and the instrument is a necessary condition for the consistency of the estimates.

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 regional dummy, view ranking, dummy for the provision of agrotourism activities, the surveyor impression from the unit, and provision of tourist attractions in the village. The second group consists of the number of other operators and accommodation units in the region and the 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 correlated with price. These include the operator's experience and education, type of agricultural activity on the farm, type of village, breakfast availability and area of cultivated land on the farm.

3.3 Simulations

The estimated parameters of the demand and marginal-cost equations (12) and (13) are employed below to simulate the equilibrium of the rural-accommodations market under a variety of circumstances. We consider changes in policy, information and market structure.

Each simulation involves a numerical solution of a pair of nonlinear equations for each firm in the industry. A total of 392 equations, i.e. 196 demand equations and 196 pricing equations are solved simultaneously. The simultaneous solution requires a program, which employs the Gauss' nonlinear simultaneous-equations subroutine. By solving the demand and pricing equations for each of the 196 firms in the market simultaneously with the equations representing others firms, we can calculate the predicted outputs and prices in equilibrium.

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 tourism industry, focusing on its growth and profitability.

4 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 for the last 20 years (see Figure 1). Currently, the industry consists of 8,000 accommodation units, situated in about 210 villages, semi-cooperatives (Moshavim) and collectives (Kibbuzim), and nonagricultural rural towns. They

Source: Fleischer, Angel and A.Tchetchik (2005)

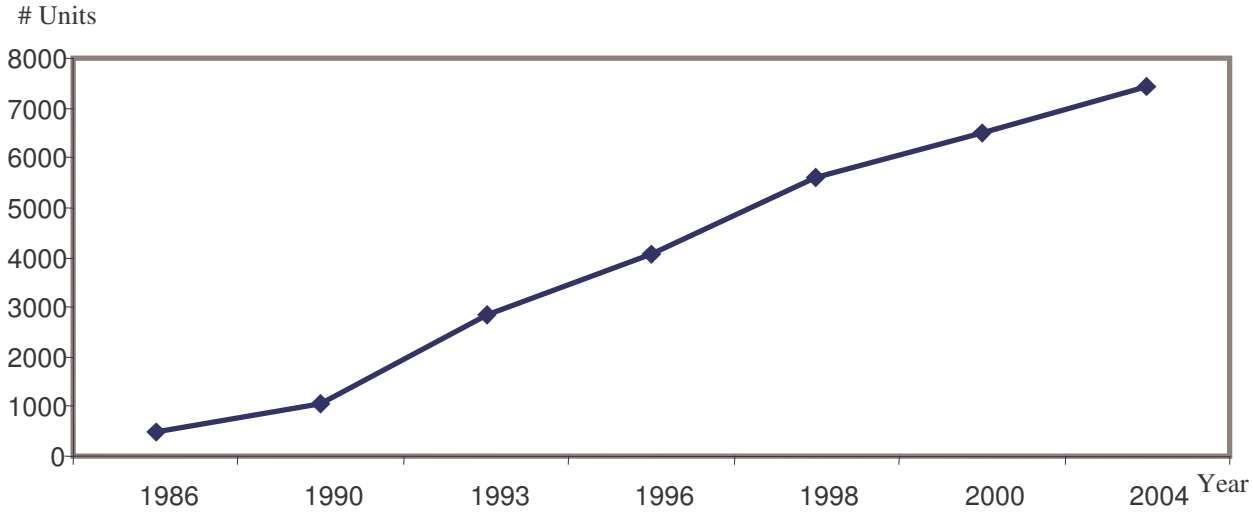

Figure 1: Number of Rural-Accommodation Units

are located in five distinct geographical regions (R=5).

4.1 Data

The data used for our analysis originate from a cross-sectional face-to-face survey of 200 private rural accommodations operators during 2000. The operators who were surveyed 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 employed a stratified sample with regional and village type strata. Within each village, a given proportion of the operators were randomly chosen. Out of a total of 100 communities and 817 operators, we sampled 19 communities and 200 operators: 19 rural communities include nine Moshavim, seven non-cooperative villages and three small rural towns. 198 interviews were completed successfully, i.e. there were no missing observations for the main variables. Table 1 presents the regional distribution of sampled operators. The data were collected by giving the operator a questionnaire and taking a tour of the hospitality units and all other related facilities. The questionnaire included a wide range of questions concerning the characteristics of the hospitality units, the landscape, and the tourist activities related to the hospitality. Other questions referred to the capital and

Table 1: Regional Distribution of the Sample

Region	Operators' Sample Share (%)	Operators' Population Share (%)
Upper Galilee	54	49
Western Galilee	22	23
Sea of Galilee	10	11
Golan Heights	11	14
Arava Desert	3	3

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 2 presents the variables employed in the regression analysis and their descriptive statistics. Table 3 presents the descriptive statistics of the instruments.

4.2 Economic Indicators

The detailed data collected in the sample allowed an assessment of the industry revenue, product, compensation for employees and operators and return to capital. Table 4 shows the "industry-level accounts" for the years 1999 and 2004. Total industry revenue was $76 million in 1999, and $115 million in 2004. The industry net product was $64 million in 1999, and $97 million in 2004. In the latter year, the rural tourism product was about 6.7% of Israel's agricultural product and 10% of Israel's total tourism product.

To gain additional insight into the industry technology, it is instructive to compare the economic performances of a typical rural accommodation unit and an average hotel unit (Table 5). 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. Moreover, when turning to profits (return to equity), the ranking is reversed. The return to equity in rural accommodations is double that in the hotel industry. These differences are explained by the differences in the hospitality technology. Hotel hospitality requires many services beyond the room. Examples are facilities, such as lobby, swimming pool, garden, etc. These amenities are replaced in rural hospitality by the farmer's garden, the farm landscape and the personal relationships, which are by-products of farming and the household residence. 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 in the rural tourism

Table 2: Descriptive Statistics of Regression Variables

Variable	Mean	Standard deviation
Firm market share	0.00093	0.0009
Within region market share	0.03	0.04
Occupancy rate	0.29	0.13
Unit price ($ per night)	70.81	16.36
% Log cabins out of firm's units	0.22	0.39
Value of luxury elements ($)	1313	1067
No. of special amenities (*e.g.* bath oils)	2.68	2.27
No. of units per firm	3.64	2.81
Unit size (square meters)	33.76	11.18
Business age (years)	6.27	5.35
Education (1-elementary, 2-junior, 3-high, 4-B.A. 5-M.A.)	2.97	0.96
No. of agrotourism activities	0.22	0.55
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	

Table 3: Descriptive Statistics of Instruments

Variable	Mean	Standard deviation
No. of other firms in the region	71	39.02
No. of other units in the region	269.81	176.7
Total regional investment in luxury ($)	88,812	42,310
Farm cultivated land (acres)	1.5	3.75
Surveyor rating (1-5)	2.9	0.62
Nonagricultural community (Dummy)	0.18	
Moshav (Dummy)	0.46	
No. of other firms in the village	14.21	7.77
No. of other units in the village	51.9	33.39
Total village investment in luxury ($)	17,715	10,386

Table 4: Industry Level Account (thousands of 2005 US $)

Variable	1999	2004
Aggregate revenue	76,000	115,000
Aggregate value added (VA)	63,000	96,000
Aggregate wages	2,179	3,306
Return to equity and owners' labor	61,000	93,000
Number of accommodation units	6,156	8,105
% VA in agricultural	2.2	6.7
% VA in tourism	11.6	10

Table 5: Comparison With the Hotel Industry (per unit in 1999), (2005 US $)

Variable	Rural-tourism	Hotels*
Occupancy rate	30 %	61.8%
Annual revenue	12,326	24,744
Value added	10,263	13,711
Employees	0.22	0.69
Wages	353	9,998
Return to equity and owners' labor	8,760	2,805
Return to equity	4,285	2,805

*Source: Statistical Abstract of Israel 2000 No. 51

industry (approximately 37%) is much larger than the rate of return in the hotel industry. This explains the rapid growth of the former industry.

4.3 Role in Regional Economies

The above assessment indicates that total revenues from rural tourism make up only a small share of total agricultural or tourism revenues. However, in some regions, especially in the northern regions of Israel (Upper Galilee, Western Galilee and around of the Sea of Galilee), rural tourism has become a significant source of livelihood. This can be seen in Figure 2, which presents the regional distribution of part, and full-time employees in rural tourism, as shares of total regional employment. Moreover, for families who operate a rural accommodations business, the profits from tourism constitute an important source of income. It can be seen from Table 6 that tourism profits make up 50 and 60% of the income of agricultural and nonagricultural households, respectively, while farm profits and wages from off-farm jobs are only secondary contributors to the households' livelihood.

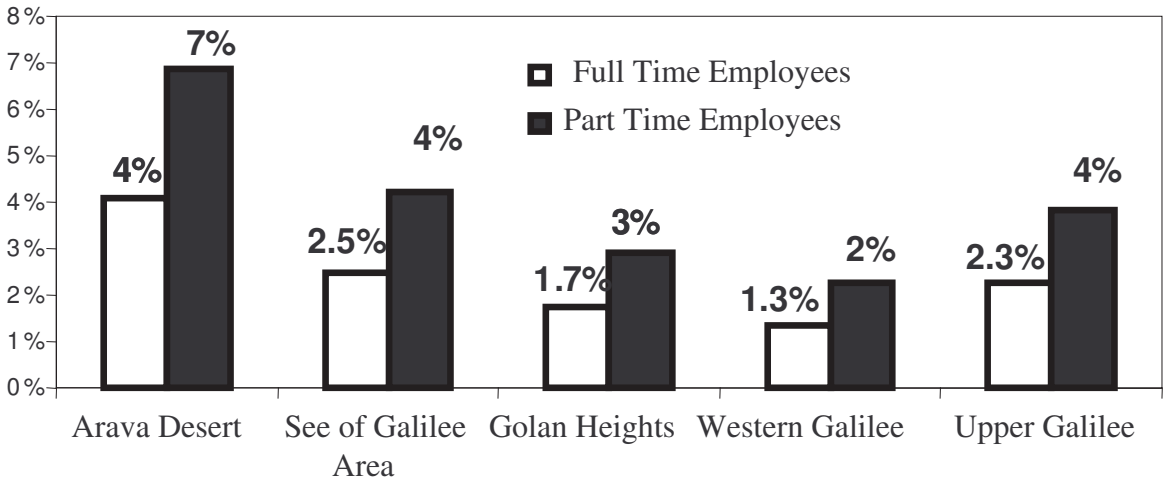

Figure 2: Share of Rural Tourism in Total Regional Employment

Table 6: Income Estimates, Operators of Rural Accommodations (2005 US $)

Income source	Farmers		Non-farmers	
	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) Norms of profit per unit of farming activity-Agricultural Ministry, 2000
(2) Wages by occupation-Statistical Abstract of Israel No 51, 2000

Table 7: GMM Estimates of Demand Parameters

Variable	Coefficients	Standard error	Marginal effect	Elasticity
Constant	-6.4764*	0.3876	—	—
Price (NIS per night)	0.0039*	0.0006	-0.63	-1.76
View ranking	-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 (log)	-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 available	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	0.3465*	0.17315	—	—
GMM criterion 24.32				
Generalized $R^2 = 0.68$				
* Significant at 0.05				

5 Estimation Results

This section presents an econometric estimation of structural equations (12) and (13). The results are used in the following section to assess the impact of product differentiation, the industry's growth prospects, and the potential impacts of government intervention.

5.1 Tourists' Preferences

Table 7 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 fabulous natural reserves and beautiful rural landscape, is found more attractive than the others regions. Accordingly, 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 which are granted this status enjoy government investment in infrastructure and amenities, such as promenades and parks, parking and signage. 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 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 hot-tub, 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 for the up-market.

The interpretation of the coefficient of log(no of accomodation 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 premise may also be one of the factors affecting consumers' preference for the unit. The fact that the coefficient is significantly larger than -1 implies that the average consumer prefers accommodation units which 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 agrotouristic activities by the operator have statistically significantly effects on the attractiveness of the unit to visitors. However, a caveat is in order. The above results should not be interpreted as an indication that rural-farm ambience is not important. Since many active farms are present in any of the five regions in our sample, the econometric analysis does not account for the special atmosphere created by agriculture in rural areas. Moreover, as will be seen below farming is found to be synergic to the production of rural-accommodations services.

5.2 Firms' Pricing

The GMM estimates of the parameters of the marginal cost/pricing equation are reported in Table 8. The most important finding is that the pricing in the rural-tourism industry deviates significantly from a competitive, marginal-cost pricing. The average markup among the 198 sampled units is 62% and is the result of differentiation among the firms, imperfectly

Table 8: GMM Estimates of Marginal Cost Parameters and Markup

Variable	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
Plantation farm	-15.3373*	7.1422	-0.02
Flowers farm	-49.2144*	16.3806	-0.006
Greenhouse farm	-35.8025*	18.9982	-0.002
Experience	-2.3705*	0.6095	-0.05
Breakfast served	28.6219*	7.2568	0.03
Education	-2.1757	2.7872	-0.022
Unit size	5.9067	4.9104	0.07
Generelized $R^2 = 0.22$			

informed consumers and government regulations that restrict supply. Decomposition of the markup into its various components is carried out in the next section.

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 adjoined farm and the third is the attributes of the operator and his/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 is NIS 6 ($1.4) and of served breakfast is NIS 29 ($7).

Operating costs of a rural-accommodations firm with an active farm are lower than for one without the farm. Thus, the analysis identifies a technological synergy in the joint operation of farming and rural accommodations. The estimated regression shows that the cost per night in a business located in on flower farm may be as much as much as 42%lower than a tourism business without a farm. The sources for this synergy are several intrinsic characteristics of an active farm.

The first is related to the operator's labor. Many tasks of the accommodations business, such as taking reservations by phone, can be performed simultaneously with the farm's routines. Moreover, the visitors need the operator in the late morning before they leave for their activities and in the late afternoon when they return. Farmers are flexible with their time and can adjust their work schedule to meet these needs. The second is related to hired labor. Most rural accommodations businesses require only part-time workers, for tasks such

as gardening and maintenance. Laborers who are employed on the farms may perform such duties by exploiting free time, which is available between the farm-work's routines.

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 an accommodation units are charged lower rent by the state for the land.

As aforementioned, an additional set of factors which 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.

5.3 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 (*e.g.* Pesaran and Smith (1994)). One way of assessing the goodness of fit, in such cases, is by comparing the predicted vs. actual distributions of the endogenous variables. Table 9 lists the moments of the two distributions of occupancy rates. The average occupancy rate predicted by the estimated model is 29%, compared with an actual average occupancy rate of 30%.

Table 10 reports the moments of the two distributions of prices. In particular, 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.

We also computed the generalized R^2 statistics for the two equations. The generalized R^2 was shown by Pesaran and Smith (1994) to be 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, supporting

Table 9: Moments of Actual and Predicted Occupancy Rates

	Observed rate (%)	Predicted rate (%)
Mean	30	29
Median	28	25
Maximum	92	98
Minimum	4	13
Std. dev.	13	12
Skewness	1.13	2.07
Kurtosis	2.72	6.61

Table 10: Moments of Actual and Predicted Prices

	Observed price (NIS)	Predicted price (NIS)
Mean	300	296
Median	287	281
Maximum	556	529
Minimum	142	193
Std. dev.	69	62
Skewness	0.9	0.9
Kurtosis	1.7	0.7

the conclusion from the comparison of the moments of the distributions of a satisfactory goodness of fit.

6 Differentiation and Market Structure

It can be seen in Table 2 that the differentiation in the Israeli rural industry is vast. 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. This analysis is carried out in the current and following sections.

6.1 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

Table 11: Equilibrium with Minimal Vertical Differentiation

	Absolute change	Relative change (%)
Aggregate sold nights	104,254	150.7
Average occupancy rate	0.41	143.6
Arava Desert market share	0.0012	-2.3
Sea of Galilee market share	0.01	15.9
West Galilee market share	-0.02	-15.9
Golan Heights market share	-0.02	-16.0
Upper Galilee market share	0.02	3.8
Aggregate consumer surplus (000 $)	19,174	263.8
Aggregate firms' profits (000 $)	4,387	142.1
Aggregate welfare (000 $)	23,561	227.6
Average mark-up	-0.32	-51.7
Average price ($)	68.26	96.7

and quality. This historical progression of the industry has led to substantial vertical differentiation, which is described in Table 2. It can be seen that the coefficient of variation (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%.

In this subsection, we assess the impact of the vast vertical differentiation on the industry equilibrium and its contribution to the price-cost margin. Table 11 reports the results of a simulation in which vertical differentiation is minimized. This was performed by simulating an equilibrium with all firms positioned at the luxury end. That is, we simulate a situation in which all firms offer large and luxurious log cabins and provide all the special amenities. We then examine the impact of this change on industry performance.

As can be seen from the table, these changes have a dramatic effect on the industry. The average occupancy rate and total number of sold nights increase by 150%. 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. On the one hand, the enhanced luxury attributes increase both the demand and marginal cost, leading to a price rise. On the other, the reduction in the differentiation increases competition and decreases the markup by almost 52%. The combined effect is a sharp, 100% hike in the average price. Despite the price increase, the above changes enhance consumer's surplus and welfare, because of the Israeli tourist's preference for quality accommodations. The increase in the luxury and size and the provision of additional amenities more than compensate for the price rise.

Table 12: Changes in Horizontal Differentiation and(or) Information

Percentage change:	5%	10%	15%	20%	25%	Elasticity*
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 C.S. (000$)	476	783	1064	1349	1661	1.04
Aggregate profits (000$)	-82	-126	-176	-220	-272	-0.41
Aggregate welfare ($)	394	657	888	1129	1389	0.61
Average mark-up	-0.01	-0.02	-0.04	-0.05	-0.06	-0.55
Average price ($)	-2	-4	-6	-7.4	-9	-0.38

* Average of arched elasticities

6.2 Horizontal Differentiation and Information

Horizontal differentiation is introduced into the nested logit model by means of the stochastic terms 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 then represents a less horizontally differentiated industry. Technically, one way to implement these changes is by scaling up all the deterministic demand parameters.

Indeed, Table 12 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/rise in information increases competition and reduces the price-cost margin, average price and firms' profits. These changes lead to enhancement of consumers' 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 50%. Thus, horizontal differentiation is a major factor in determining the vast oligopolistic markup in the industry.

7 Government Intervention

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

Secondly, despite the regulations, the government encourages growth of this sector. Recognizing its importance as an alternative source of employment and livelihood for the rural population, the government of Israel operates different support programs that affect rural tourism. The first is a subsidized loan and guarantee program for all rural-accommodations firms. In a second support program, the government provides local public goods that serve rural tourism. It invests in infrastructure and public amenities, such as promenades, parks, roads, parking and signposts. These, in return, increase demand for rural accommodations. The third program, support for infrastructure improvement, is implemented by the Ministry of Agriculture, targeting operators of tourism businesses with active farms. This section compares the various support programs and analyzes the effects of government regulation on the industry equilibrium.

7.1 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. The $2,500,000 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 the Arava. The reason for this exclusion region is that all of the communities that host tourism in the Arava have already been granted "tourism village" status. The investment in public goods is compared to a program that provides subsidized capital for investment in quality elements of the accommodation units. The latter reduces the cost components, which are related to the quality of the unit. Since the competition in the industry is imperfect, such a change has the potential to reduce prices and enhance welfare. Thus, both programs may correct market failures and increase welfare. The simulation allows a comparison of their relative effectiveness.

Table 13: Direct Subsidy *vs.* 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 ($)	402,000	—	402,000	—
Welfare rural market ($)	160,000	1.5	1,267,000	12.2

It is apparent from Table 13 that both programs fulfil their main objective of increasing economic welfare. The upgrading of the local public goods in additional villages increases, on the one hand, demand for rural tourism. On the other, it reduces the vertical differentiation and the markup. The net result is a decrease in the 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, a caveat is in order. This analysis does not take into account 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. These results may be used as guidelines for government intervention.

Table 14: 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

7.2 Synergy With Agriculture

Technological changes, declining terms of trade and economies of scale have led in the last two decades to a sharp decline in the number of active farms in Israel. Almost 60% of Israeli farmers have chosen to exit agriculture, and some of those who stayed have diversified into other activities, among them tourism. In the presence of synergy between farming and rural tourism, exits of farmers can, on the one hand, adversely affect the rural hospitality industry. On the other 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 phenomena, we simulate the equilibrium in the rural tourism industry for the two scenarios. The results are reported in Table 14. In the first scenario, we simulated an extreme case in which all of the operators of rural hospitality businesses quit farming. In the second, a subsidy is granted by the Ministry of Agriculture to operators of rural tourism businesses, who own an active farm. The subsidy is in the amount of $2,500,000, which is identical to the subsidy budget examined in the simulations in the previous section.

As expected in the scenario in which rural accommodation 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 14 is the moderate level of these changes. On average, prices

Table 15: Deregulation of Rural Accommodations Supply

	Adding firms		Adding units per firm	
	Absolute change	Change in %	Absolute change	Change in %
Average price ($)	-0.28	-0.4	1.3	1.8
Average markup	-0.01	-1.3	-0.017	-2.6
Sold nights	32,000	46	17,000	24.50
Average occupancy rate	-0.08	-27	-0.05	-16
Arava share	0.001	2.9	-0.0007	-1.35
Sea of Galilee share	0.000	0.5	-0.0002	-0.24
West Galilee share	0.003	2.0	0.0021	1.58
Golan Heights share	-0.002	-2.1	0.00071	0.74
Upper Galilee share	-0.003	-0.4	-0.00200	-0.31
Consumer surplus	4,836 ,000	67	4,606,000	49
Average firm profits ($)	-4,000	-28	3,881	24
Aggregate firms' profits ($)	1,362,000	44	757,000	24
Welfare rural market ($)	6,198,000	128	5,363,000	43

increase by only 3% and occupancy rates fall by only 2.7%. We should emphasize, however, that the caveat from section 7.1 is still valid and one should not interpret the above 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, which was considered above. The price decrease and increases in occupancy and welfare are on the same order of magnitude as in the case of the general subsidy. However, farmers' profits increase by 25% on average. This may compensate operators for the deterioration in agricultural terms of trade and prevent exit from agriculture.

7.3 Regulations and Growth

The establishment of a rural accommodations business requires approval by the ministries of Agriculture, the Interior and Environmental Quality, and the consent of the Land Authority. Moreover, as already mentioned, the government of Israel regulates the number of accommodation units allowed per firm. Thus, government regulations create entry barriers and may inhibit growth of the industry. Table 15 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 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 recent years. As Table 4 demonstrates, in the last 5 years the number of units have increased by 50% without a significant negative effect on prices. However, while the decline in prices is insignificant, the drop in occupancy rates is sharp. It can be seen from Table 15 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 and consumer surplus and welfare increase. This may be interpreted as an indication that the industry's growth potential has not been completely exploited.

8 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 developed an empirical framework to study the rural-accommodations market which takes into consideration these idiosyncrasies. The model was applied to jointly estimate technology and preferences in the Israeli rural accommodations industry. Evidence was found for synergy in the joint production of agriculture and rural hospitality. However, while agricultural landscape and rural ambience are important elements of the rural tourism experience, the extent and type of agricultural activities on the hosting farm seem to have no significant effect on the demand for accommodations.

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 of the vast oligopolistic markup. These findings suggest that provision of information by the government, for example by some sort of rating system, could potentially increase competition and enhance welfare. The government may also beneficially intervene in the market by investment subsidization and provision of local public goods, such as parks, promenades and improved transportation facilities.

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 answer is positive. The industry may de-

velop 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.

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8.02 Yacov Tsur and Amos Zemel - On Knowledge-Based Economic Growth.

9.02 Yacov Tsur and Amos Zemel - Endangered aquifers: Groundwater management under threats of catastrophic events.

10.02 Uri Shani, Yacov Tsur and Amos Zemel - Optimal Dynamic Irrigation Schemes.

1.03 Yoav Kislev - The Reform in the Prices of Water for Agriculture (Hebrew).

2.03 Yair Mundlak - Economic growth: Lessons from two centuries of American Agriculture.

3.03 Yoav Kislev - Sub-Optimal Allocation of Fresh Water. (Hebrew).

4.03 Dirk J. Bezemer & Zvi Lerman - Rural Livelihoods in Armenia.

5.03 Catherine Benjamin and Ayal Kimhi - Farm Work, Off-Farm Work, and Hired Farm Labor: Estimating a Discrete-Choice Model of French Farm Couples' Labor Decisions.

6.03 Eli Feinerman, Israel Finkelshtain and Iddo Kan - On a Political Solution to the Nimby Conflict.

7.03 Arthur Fishman and Avi Simhon - Can Income Equality Increase Competitiveness?

8.03 Zvika Neeman, Daniele Paserman and Avi Simhon - Corruption and Openness.

9.03 Eric D. Gould, Omer Moav and Avi Simhon - The Mystery of Monogamy.

10.03 Ayal Kimhi - Plot Size and Maize Productivity in Zambia: The Inverse Relationship Re-examined.

11.03 Zvi Lerman and Ivan Stanchin - New Contract Arrangements in Turkmen Agriculture: Impacts on Productivity and Rural Incomes.

12.03 Yoav Kislev and Evgeniya Vaksin - Statistical Atlas of Agriculture in Israel - 2003-Update (Hebrew).

1.04 Sanjaya DeSilva, Robert E. Evenson, Ayal Kimhi - Labor Supervision and Transaction Costs: Evidence from Bicol Rice Farms.

2.04 Ayal Kimhi - Economic Well-Being in Rural Communities in Israel.

3.04 Ayal Kimhi - The Role of Agriculture in Rural Well-Being in Israel.

4.04 Ayal Kimhi - Gender Differences in Health and Nutrition in Southern Ethiopia.

5.04 Aliza Fleischer and Yacov Tsur - The Amenity Value of Agricultural Landscape and Rural-Urban Land Allocation.

6.04 Yacov Tsur and Amos Zemel – Resource Exploitation, Biodiversity and Ecological Events.

7.04 Yacov Tsur and Amos Zemel – Knowledge Spillover, Learning Incentives And Economic Growth.

8.04 Ayal Kimhi – Growth, Inequality and Labor Markets in LDCs: A Survey.

9.04 Ayal Kimhi – Gender and Intrahousehold Food Allocation in Southern Ethiopia

10.04 Yael Kachel, Yoav Kislev & Israel Finkelshtain – Equilibrium Contracts in The Israeli Citrus Industry.

11.04 Zvi Lerman, Csaba Csaki & Gershon Feder – Evolving Farm Structures and Land Use Patterns in Former Socialist Countries.

12.04 Margarita Grazhdaninova and Zvi Lerman – Allocative and Technical Efficiency of Corporate Farms.

13.04 Ruerd Ruben and Zvi Lerman – Why Nicaraguan Peasants Stay in Agricultural Production Cooperatives.

14.04 William M. Liefert, Zvi Lerman, Bruce Gardner and Eugenia Serova - Agricultural Labor in Russia: Efficiency and Profitability.

1.05 Yacov Tsur and Amos Zemel – Resource Exploitation, Biodiversity Loss and Ecological Events.

2.05 Zvi Lerman and Natalya Shagaida – Land Reform and Development of Agricultural Land Markets in Russia.

3.05 Ziv Bar-Shira, Israel Finkelshtain and Avi Simhon – Regulating Irrigation via Block-Rate Pricing: An Econometric Analysis.

4.05 Yacov Tsur and Amos Zemel – Welfare Measurement under Threats of Environmental Catastrophes.

5.05 Avner Ahituv and Ayal Kimhi – The Joint Dynamics of Off-Farm Employment and the Level of Farm Activity.

6.05 Aliza Fleischer and Marcelo Sternberg – The Economic Impact of Global Climate Change on Mediterranean Rangeland Ecosystems: A Space-for-Time Approach.

7.05 Yael Kachel and Israel Finkelshtain – Antitrust in the Agricultural Sector: A Comparative Review of Legislation in Israel, the United States and the European Union.

8.05 Zvi Lerman – Farm Fragmentation and Productivity Evidence from Georgia.

9.05 Zvi Lerman – The Impact of Land Reform on Rural Household Incomes in Transcaucasia and Central Asia.

10.05 Zvi Lerman and Dragos Cimpoies – Land Consolidation as a Factor for Successful Development of Agriculture in Moldova.

11.05 Rimma Glukhikh, Zvi Lerman and Moshe Schwartz – Vulnerability and Risk Management among Turkmen Leaseholders.

12.05 R.Glukhikh, M. Schwartz, and Z. Lerman – Turkmenistan's New Private Farmers: The Effect of Human Capital on Performance.

13.05 Ayal Kimhi and Hila Rekah – The Simultaneous Evolution of Farm Size and Specialization: Dynamic Panel Data Evidence from Israeli Farm Communities.

14.05 Jonathan Lipow and Yakir Plessner - Death (Machines) and Taxes.

1.06 Yacov Tsur and Amos Zemel – Regulating Environmental Threats.

2.06 Yacov Tsur and Amos Zemel - Endogenous Recombinant Growth.

3.06 Yuval Dolev and Ayal Kimhi – Survival and Growth of Family Farms in Israel: 1971-1995.

4.06 Saul Lach, Yaacov Ritov and Avi Simhon – Longevity across Generations.

5.06 Anat Tchetchik, Aliza Fleischer and Israel Finkelshtain – Differentiation & Synergies in Rural Tourism: Evidence from Israel.