

DETERMINATION OF THE ECONOMIC VIABILITY LEVEL OF AGRICULTURAL HOLDINGS BASED ON SOCIO-ECONOMIC PARAMETERS

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Abstract

The aim of the present paper is to describe, through the creation of a specific model, the way in which the socio-economic parameters affect the formulation of the viability level of holdings. Six socio-economic parameters were used to construct the model, which also constitute the criteria for the inclusion of farmers in the funding programme. Categorical Regression is the applied methodology. According to the results, there is a significant multiple correlation between the level of economic viability and the socio-economic criteria. The conclusions of the research will assist in the formulation of proposals and agricultural policy measures for the improvement of the agricultural holdings viability level, according to the effect of the socio-economic parameters.

Introduction

Greek agriculture is presently faced with the challenge of adapting to a particularly harsh, ever-changing international environment. The development of business structures in agriculture requires the presence of young capable farmers, armed with additional business incentives and mainly more knowledge than past generations, who are therefore called upon to provide products of a higher quality, that will meet the new competitive standards of the marketplace. Through these business incentives for young farmers and various other parallel programmes, an attempt is being made to substantially develop the agricultural sector. A major part of the investments made by Greek agricultural holdings are financed by national resources, and the structural funds of the European Union. In order to be eligible for financial aid, agricultural holdings must fulfill basic preconditions of economic viability (Commission of the European Community, 1985; Tsiboukas et al., 2000; Galanopoulos, *et al.*, 2004). The following parameters are primarily used to determine the economic viability of agricultural holdings (JMD 451/2001, JMD 532/2003):

- Farm family income (FFI) per fully employed member of the agricultural family.
- The family labour used at the holding, measured in Human Labour Units (HLU).

Based on the above-mentioned indicators, farms are divided into the following categories (Fennel, 1999 and Tsiboukas *et al.*, 2000):

- a). *Viable farms*, that render an FFI per used family HLU higher than the reference income (the Ministry of Agricultural Development annually determines the reference income as equal to approximately 80% of the comparable income) and use one HLU of family labour. Based on the percentage of the subsidies in the formulation of their FFI, viable farms are split into two types:
- b). *Potentially viable farms*, in which the FFI per HLU, ranges between 80 and 100% of the reference income, while it is estimated that at least (1) family HLU is used.
- c). *Declining farms with signs of economic recovery*, in which the FFI per HLU is less than 80% of the reference income.
- d). In addition, *small farms* can also receive financial support, as long as their owners are “new farmers” and it has been less than three years since their first crop.

One of the most important programmes for the development of business structures in agriculture is the funding programme for Young Farmers. More specifically, the financial assistance for Young Farmers is included in Priority Axis 3 of the Operational Programme "Rural Development–Restructuring of the Countryside 2000-2006", which involves measures for improving the age composition of the rural population. In particular, two measures of financial aid are included: a lump sum subsidy for the installation of young farmers and financial support for them to handle the expenses resulting from this installation.

The implementation of this programme aims at:

- renewing the age composition of the rural population,
- installing young farmers in regions characterized by a population decline and intense demographic problems, such as mountainous, disadvantaged and island regions,
- improving the economic status of the farmers and their families
- improving the operation of the agricultural holdings and the living standards of the livestock while protecting the environment.

The basic preconditions for inclusion in the subsidy regime of the programme are the following:

- the permanent place of residence, where three regional categories are defined (mountainous, less favoured, standard). The level of financial aid is determined according to the population and the category of each region.
- the age of the beneficiaries, that should not exceed 40 years.
- the proprietary status of the agricultural holding. The land belonging to the agricultural holding should either be privately-owned or leased for a minimum of 10 years; the livestock must be privately-owned. It is also mentioned that the initial installation must have taken place at least 12 months prior to the inclusion in the funding programme.
- the amount of family income. The total family income must not exceed 150% of the reference income (set at 22,500€).
- the needs of the holding calculated in human labour units (HLU, 1 HLU = 1750 hours of work per year) must be at least equal to half a HLU (0.5). The financial aid is determined according to the size of the holdings based on the amount of labour and in combination with the regional category of the beneficiaries' permanent place of residence.
- the improvement of the viability level of the holding, according to the EU criteria of economic viability (Commission of the European Community, 1985; Hill, 1996). A precondition for the inclusion of young farmers in the funding programme is that it will lead to an economically viable holding or at least that it will maintain the viability level of the holding, in the case of potentially viable holdings.
- the type of agricultural activity, with a particular focus on animal husbandry and mixed holdings. More specifically, the production of certified high-quality agricultural products and production based on integrated management, both constitute criteria for inclusion and determine the amount of financial assistance provided.

The purpose of this paper is to describe the effect of certain socio-economic parameters on the formulation of the viability level of holdings. Its outcome is a model that will interpret the relation between these parameters and the economic viability level of the agricultural holdings.

Materials and method

For the purposes of the research, investment plans (Improvement Plans) were selected that are related to the lump sum subsidy provided for the installation of young farmers, that were submitted to the Region of Central Macedonia in 2006, within the framework of the Operational Programme "Rural Development – Restructuring of the Countryside 2000- 2006". The sampling method used to determine the sample was proportionate stratified sampling (Farmakis, 1994; Apostolopoulos *et al.*, 2001; Mamalis *et al.*, 2005). The size of the sample was set at 103 Improvement Plans, which is equal to 18.72% of the total number of improvement plans submitted to the Region of Central Macedonia.

In order to check the effect of the socio-economic parameters on the economic viability level of the holdings, we applied Categorical Regression (Pratt, 1987; Gifi, 1996; Meulman, 2004). Categorical Regression, also known as regression with optimal scaling, quantifies the categorical variable data by assigning numerical values to the variable categories. The variable categories are thus quantified so that the square of the multiple correlation coefficient between the dependent variable and the group of independent variables is the maximum one, based on the available data (Kooij and Meulman, 1997; Meulman *et al.*, 2002). Through this quantification, it is possible to predict the values of the dependent variable for any combination of independent variables. The effect of each independent variable on the dependent one is described by the relevant regression coefficient.

The resulting model provides us with a version of the relation between the factors that directly influence the formulation of the economic viability level of the agricultural holdings.

In order to construct the model, the following parameters were used, which also constitute the basic criteria for the inclusion of young farmers in funding programmes:

- the gender of the beneficiaries from the holdings,
- the age of the beneficiaries,
- their educational level,
- their permanent place of residence,
- the number of HLUs and
- the type of agricultural activity.

These parameters are also the criteria for the inclusion of young farmers in the funding programme and are linked to the fulfillment of certain financial, demographic and social standards, which are related to the exploitation of the region's social capital (Baron *et al.*, 2001).

The applied method is suitable for the development of the model, due to the categorical-qualitative nature of the available variables. In particular, the viability level (dependent variable) was denoted in the model as a variable on an ordinal scale, just as the independent variables concerning the "educational level", "age" and "number of HLUs". The remaining independent variables, i.e. "gender", "permanent place of residence" and "type of agricultural activity", were denoted as variables on a nominal scale.

Results

The analysis has shown a statistically significant multiple correlation between the level of economic viability of the agricultural holdings and the independent variables. Therefore, 72.3% of the generalized variance of the economic viability level of the agricultural holdings can be explained by the combined effect of the independent variables ($R=0.850$, $p=0.000$, $R^2=0.723$).

In Table 1 we observe that the gender of the beneficiaries does not have a statistically significant effect, in the presence of the other independent variables, on the economic viability level of the agricultural holdings. For the remaining variables, the relevant Beta coefficients were found to be statistically significant at a significance level $\alpha=0.10$. The highest relative effect, seems to be associated to the variables "no of HLUs" (Beta=0.866) and "age" (Beta=0.134). The lowest relative effect seems to be that of the variables "type of agricultural activity", (Beta=-0.089) and "permanent place of residence" (Beta=-0.155). Such a result is justified by the fact that holdings with a high intensity of labour have higher levels of viability, since the intensification of labour is related to achieving high productivity results. In addition, the age of the beneficiaries is related to increased productivity in agricultural holdings. Young producers have more knowledge and more opportunities for business growth than the previous generations, and can therefore respond to the new competitive market conditions (Kasimis *et al.*, 1998; Lianos *et al.*, 1997; Sarris and Zografakis, 1996).

Table 1. Assessment of independent variable coefficients in the categorical regression model.

Coefficients	Standardized Coefficients		df	F	P	Pratt Index
	Beta	Std. Error				
Gender	-0.066	0.060	1	1.187	0.279	0.020
Age	0.134	0.057	2	5.482	0.006	0.020
Educational level	0.090	0.060	4	2.214	0.074	-0.023
Permanent place of residence	-0.155	0.058	2	7.128	0.001	0.001
No of HLUs	0.866	0.061	2	199.74	0.000	0.978
Type of agricultural activity	-0.089	0.058	3	2.369	0.076	0.004

If we assess the relation between the independent variables and the dependent variable, based on the Pratt index of relative importance, we observe once again that the number of HLUs has the highest relative importance for predicting the level of economic viability of the agricultural holdings (importance=0.978), while the lowest relative importance is assigned to the permanent place of residence of the beneficiaries (importance=0.001).

Based on the optimum values of the variable categories presented in Table 2 and from their representation on a single axis of values (diagram 1), we observe that:

The small holdings are characterized by labour demands ranging between 0.5 to 1 H.L.U., and the beneficiaries are mainly men, who have completed Lower Secondary school, aged 26-35 yrs, live in less favoured regions, and seem to be oriented towards horticultural crops. The small holdings present a low labour intensity coefficient, are located in less favoured regions and try to improve their viability level through intensive crops (horticulture-greenhouses).

The declining holdings are characterized by labour demands ranging between 0.5 to 1 H.L.U., the beneficiaries of the holdings are aged 26-35 yrs, live in disadvantaged regions, and are oriented towards Large crops and beekeeping.

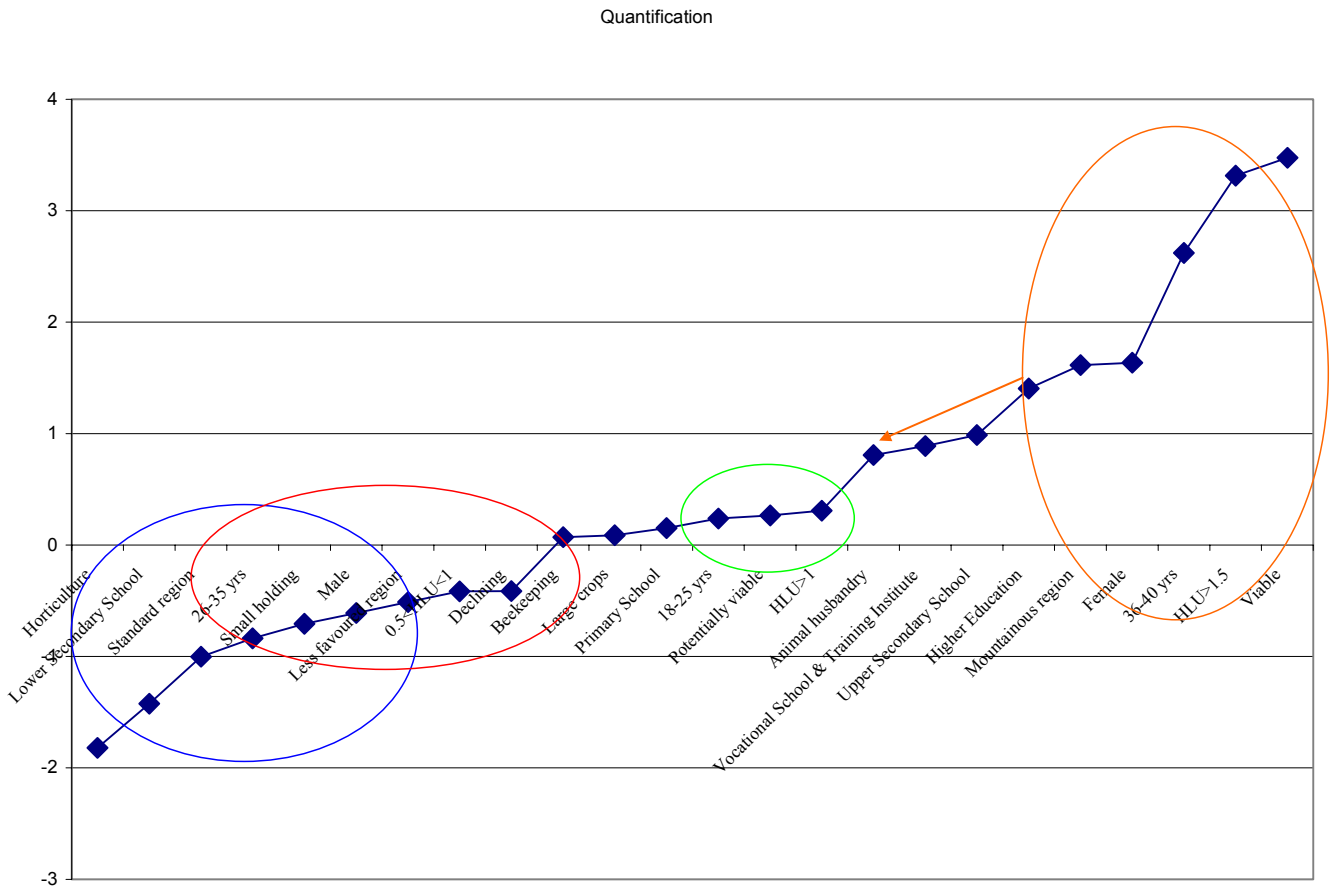
The potentially viable holdings are characterized by labour demands that are over 1 H.L.U., the beneficiaries of the holdings are aged 18-25 yrs, the majority have completed Primary education and are oriented towards animal husbandry. The potentially viable holdings are characterized by beneficiaries with the lowest age composition, who have either completed Primary education and have now taken over the family holdings, or have graduated from vocational schools and training institutes with the intention of entering the agricultural profession.

The viable holdings are characterized by labour demands that exceed 1.5 H.L.U. These holdings are dominated by women beneficiaries, aged 36-40 yrs, who are higher education graduates, live in mountainous regions, and seem to be involved in animal husbandry. The beneficiaries of the viable holdings are relatively older women, who consciously choose to take on and exploit their mountainous holdings through animal husbandry.

Table 2. Optimum quantification of the variable categories

Variables		Frequency	Optimum value
Level of economic viability			
	Small holding	15 (14.56%)	-0.708
	Declining	52 (50.48%)	-0.412
	Potentially viable	29 (28.15%)	0.266
	Viable	7 (6.79%)	3.476
Gender			
	Male	75 (72.81%)	-0.611
	Female	28 (27.18%)	1.637
Age			
	18-25 yrs	48 (46.6%)	0.239
	26-35 yrs	45 (43.68%)	-0.837
	36-40 yrs	10 (9.7%)	2.622
Educational level			
	Primary School	32 (31.06%)	0.151
	Lower Secondary School	31 (30.09%)	-1.425
	Upper Secondary School	23 (22.33%)	0.986
	Vocational School & Training Institute	14 (13.59%)	0.888
	Higher Education	3 (2.91%)	1.404
Permanent place of residence			
	Standard region	14 (13.59)	-1.002
	Mountainous region	28 (27.18%)	1.615
	Less favoured region	61 (59.22%)	-0.511
No of HLUs			
	0.5<HLU<1	77 (74.75%)	-0.416
	HLU>1	18 (17.47%)	0.308
	HLU>1.5	8 (7.76%)	3.3
Type of agricultural production			
	Horticulture	22 (21.35%)	-1.820
	Large crops	27 (26.21%)	0.088
	Animal husbandry	46 (44.66%)	0.806
	Beekeeping	8 (7.76%)	0.071

Diagram 1. Representation of the quantified values of all independent variables on a single axis



Conclusions

From the model used to interpret the relation between the factors that directly affect the formulation of the economic viability level of the agricultural holdings, it appears that the greatest relative effect is linked to the number of HLUs and the age of the beneficiaries, while the smallest relative effect is attributed to the type of agricultural activity and the permanent place of residence.

After studying the model, we conclude that:

- The agricultural holdings in mountainous areas achieve a high level of economic viability by being involved in animal husbandry.
- Young farmers, who are beneficiaries of holdings and have a high educational level, choose to be active in dynamic holdings, particularly related to animal husbandry.
- Women with a high educational level (higher education graduates) choose to get involved in animal husbandry, and manage to reach a high viability level in their holdings.
- The holdings which present low intensity as regards the labour coefficient, also present a low level of economic viability.
- The agricultural production of holdings that present a low level of economic viability is mainly oriented towards horticultural crops and beekeeping.

The formulated model is of particular importance, since it leads to a real representation of the effect of socio-economic parameters on the formulation of the viability level of the holdings. In this way, groups of holdings with a similar socio-economic profile and respective problems

and weaknesses are formed, that can be addressed through the implementation of flexible agricultural or financial policy measures or actions that will enhance their relevant structures.

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