

USING AND DEVELOPING MODELS TO SIMULATE THE FUNCTIONING OF AGRICULTURAL STRUCTURES UNDER CAP REFORM

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Abstract

Using and developing models to simulate the operation of the farm is a tradition and a very extensive practice both in Romania and abroad.

This paper addresses the adjustment of agricultural sector development strategy NE region of Romania, and national level, common agricultural policies, government support measures for supporting agriculture and ways to improve the structural reform of agriculture in international integration processes.

Also described are the main indicators characterizing the technical and economic analysis of agricultural holdings and to solve a problem of optimizing the size of a farm.

Knowledge of national and EU funding for agriculture and rural development, the advantages and constraints that apply to CAP uniform throughout the Community, the requirements of the new CAP reforms in line with market developments, are issues that require constant adjustment of management actions, circumscribed the ultimate goal of all activities, namely the increase of agricultural holdings and thus farmers' incomes.

Key words: models, simulate, agricultural structures, CAP reform

This paper attempts to provide one actual diagnosis of agriculture of Romanian and assess the global implications on the diversification of rural economy and future development potential due to changes in the last years of the implementation of European Union rules.

The agricultural exploitations are presenting the phenomenon of specialization towards the more efficient productions. For the productions which in the new market conditions will become non-performing are expected the accomplishment of some technological changes with European funds;

The analysis of the influence of the financial parameters highlighted the fact that the access to credit is having a more important influence on the farms income as well as and over the structure of crop rotation than the interest rate. This result is supported by the manner in which was produced the absorption FEADR funds.

MATERIAL AND METHOD

The methods consist in use mathematical and economical model. The model constructed is a recursive monopерiodic positive model. With it help, the optimization of the structure of production, the farm crop rotation, the level of

investments, loans and the level of investments was made within six years.

RESULTS AND DISCUSSIONS

For Romania, the agriculture is an absolute priority. As much the commercial grows as a share in the total of the agricultural production, as much as the agriculture as a whole will be more efficient, and the agricultural Romania will be more integrated in the domestic and international economic circuit.

At European level these practices have seen a use and a development of concepts when preparing the CAP reform. In the context of the assessing the impact of the proposed modifications proposed to the agricultural policy on the agricultural production can be observed using of three types of mathematical methods.

The work has resulted in farmers' decision analysis as a result of the CAP policy, the effects of payment schemes on farms in Romania and performance optimization to increase their economic efficiency.

Use and development of models to simulate the operation of the farm has a tradition and a very extensive practice both in Romania and abroad. At European level these practices have had a use and development concepts with the integration of the

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CAP in 2007. Suppose that the researcher wants to analyze how a farmer will react to the distribution of institutional credit in a production branch. Production in the respective branches of agricultural production "and" in terms of land use x_i and two other agricultural inputs can be represented by positive mathematic programming method as follows:

$$y_t = (\beta_t - \delta_t x_t) \min(x_t, a_{t2} x_t, a_{t3} x_t) \quad (1.1);$$

Where β_t and δ_t represent free term, respectively the marginal production function slope culture "i"; Based on these simplifications of the production optimization problem becomes:

$$\max \sum_l P_l (\beta_l - \delta_l x_l) x_l - \sum_{l=1}^3 \varpi_l a_{lj} x_l$$

$$Ax \leq b \text{ respectively } x \geq 0$$

where:

Pl is the price of a unit of production obtained by practicing culture "and".

A is a matrix with elements a_{ij} MXN size representing the consumption of input "j" needed to produce a unit of culture "and". This category of factors is necessary to produce wheat fertilizers in an area of one hectare.

Xl is the area of land allocated to crop farms "i", ;

ϖ_l represent cost from input "j".

Fie următoarea situație simplificată identificată la nivelul unei exploatații agricole la nivelul unui an considerat de bază (table 1):

Table 1

Identified in the simplified situation of agricultural holdings

Unit Name	element Wheat	Wheat	Barley
Production price	euros/t	2,98	2,20
The average cost	Euros/ha	129,62	109,98
Average production	Tons/ha	69	65,9
Gross Margin calculated	Euros/ha	76	35
Land area in the base year	Ha	3	2

At the farm level are to build a simulation model of farm behavior that should be made for example agricultural decision-maker behavior under the agricultural credit policy change.

Using models built in this section shall be made on a firm specializing in vegetable production in the county of Iasi information at this farm were obtained from the Department of Agriculture and Rural Development Iasi in the database built using Accounting Agricultural Information Network (RICA).

Let the following data collected at an agricultural holding:

Form of organization of farm and agricultural land use:

- organizational form: Limited Liability Company (SRL);
- farm type: vegetable farm.
- Land use: 970 ha;
- Type of operation: 970 ha leased.
- Labor force: table 2.

Table 2

Manpower situation used in 2010

Description	Description of annual work	Time worked (hours)
Head of holding	1	2040
Others - time employees	7	14280
Paid temporary workforce	7	14280

Table 3

Statement of labor costs in 2010

Description	ROL
Salaries and social security	242.716,1
Work performed by third parties and rental cars	2.013,9
Routine maintenance of machinery and equipment	122.299,5
Fuels and lubricants for motor	252.585

Table 4

Situation-specific costs incurred in 2010 crops

Description	ROL
Seeds and seedlings purchased or produced in the unit	141.984
Fertilizers and soil conditioners	324.540
Plant Protection Products	152.080
Other specific crop costs	479.225

Table 5

Statement of indirect costs incurred in 2010

Indirect costs for agriculture - total	ROL
Insurance	52.442,5
Taxes and other fees	4.430,9
Other indirect costs for agriculture	250.179,5
Interest and financial charges paid total	158.053,4

Table 6

Situation of crop production in 2010

Crops	Land area ha	Production for the accounting year		Selling in ROL
		Tons	Thousands ROL	
Common wheat	367	1640	737.964,4	102.932,5
Barley	116	363	119.739,8	20.126,1
Corn	20	51	101.590,5	
Rape	37	74	44.323,2	
Sunflower	164	399	289.284,4	317.986,4
Soybean	257	332	234.575,6	
Other	9	1	503,8	
Total	970		1.527.981,7	

Table 7

Gross margin achieved at the industry level in 2010

Crops	Area	Total production	Average price	Value of main production	Subsidies and compensation	Seeds	Fertilizers	Pesticides	Other costs	Gross margin/Ha
	Ha	Tone	ROL/tona	ROL	ROL	ROL	ROL	ROL	ROL	ROL/HA
Common wheat	367	1640	450	737.954,4	60.974,1	96.360	132.120	55.050	420.217,40	259,35
Barley	116	363	330	119.739,8	1.667,7	16.704	41.760	17.400	118.514,90	233,44
Corn	20	51	2.000	101.590,5	0	1.000	7.200	3.000	46.823,10	2178,37
Rape	37	74	600	44.323,2	0	92	6.660	5.550	39.726,30	601,59
Sunflower	164	399	725	289.284,4	11.924,5	10.660	44.280	19.680	189.684,69	225,03
Soybean	257	332	700	234.575,6	8.315,9	16.448	92.520	51.400	316.044,24	136,34
Other	9	1	500	503,8	0	72	0	0	7.646,62	47,98

Using the data presented in previous tables (tables 3,4, 5 and 6) to build a simulation model of farm behavior. Modeling method is used in positive mathematical programming. In this

algorithm supposes three consecutive steps to determine the objective function. After processing performed problem behavior farm simulation becomes (table 8):

Table 8

Simplified presentation of the problem of behavioral simulation

Name of indicator	The units	Common wheat	Barley	Corn	rape	Sunflower	Soybean	Others
Production price	ROL/t	450	330	2000	600	725	700	500
The average cost	ROL/ha	1917,57	813,61	2901,16	598,41	1611,61	808,76	52,29
Average production	tons/ha	4,47	3,13	2,55	2	2,43	1,29	0,11
Gross Margin calculated	ROL/ha	259,35	233,44	2178,37	601,59	225,03	136,34	47,98
Area of land allocated in 2010	ha	367	116	20	37	164	257	9

To examine the impact of policies on resource allocation and agricultural income, we estimate the effect on output price intervention primary factors (ie value-added activities) by explaining the effect of intervention on prices and inputs (consumption), intermediate (marketed

internationally). Value added is defined as the difference between gross production value and value of inputs (consumption) or intermediate in terms of factor payments, the return of land resources of labor and capital. It should be noted that the cost structures available have not been

adjusted for the impact of changes in relative prices of commercial inputs on input matrix (ie assumption of fixed coefficients). Such an adjustment is conceptually possible, but not covered by this study because it requires

sophisticated data input and a clear notion of the relevant production function. The consequence is that the fixed coefficients assumption may overestimate the true relative costs of inputs.

Table 9

Crops plan after optimization

Crops	Common wheat	Barley	Corn	rape	Sunflower	Soybean	Others
Area (ha)	368	116	20	37	164	257	8

After building this model can be seen that the use of other branches of production than those explicitly mentioned in the farm by his declaration RICA is limited by land area held on 8 Ha.

In a free market economy, to business entities is subject to profit - but not in the absolute sense obtain a maximum profit at any cost, but in the context of requirements and requirements to ensure sustainable development of the economy - profitability being a sine-qua-the very existence of non entities. Therefore, the return becomes a tool to substantiate the decision on internal management entities and their relations with the external environment, acquiring the capacity to be an essential criterion for assessing the economic efficiency.

CONCLUSIONS

The work has resulted in farmers' decision analysis as a result of the CAP policy, the effects of payment schemes on farms in Romania and performance optimization to increase their economic efficiency.

Producers will find valuable information in the paper regarding the importance of optimal sizing of farms according to the profile and its need to seek rational and production chain, the optimal structure of crops, crop rotation and identifying the main sources of financing FEADR (EAFRD) funds.

This study must be extended by performing an analysis on a sample of a representative sample of the Romanian agricultural exploitations.

Building such a database is not a goal. The traditional means to that is called in other scientific approaches, such as example the RICA base, are in present in Romania only in an early stage of development.

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