Organic productions and capacity to respond to market signals and policies: an empirical analysis of a sample of FADN farms

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Abstract[*]

The paper approaches the problem of assessing the impacts of market and rural development policies oriented at stimulating the growth and spread of organic farming in Italy. From the methodological perspective, an innovative formulation of Pmp is presented and discussed; it is applied to a set of farms belonging to the FADN sample, specifically located in Emilia Romagna and Sicily. The Pmp model has the capacity to estimate the impact of policies on crops not yet present at the time the farm data was recorded. From the empirical standpoint, various sets of policies are simulated on cluster of farms both conventional and in course of conversion in organic production.

Key words: Organic products, PMP, CAP

JEL classification: Q12, C61, Q18, C38

1. Introduction

Organic farming in Italy is increasingly becoming a structural component of the national agrifood supply for the market segment of high quality products. Its spread demonstrates two aspects that are important and appreciated by consumers and policy makers alike: the supply of particularly healthy food and the tangible possibility to supplement the income of agricultural entrepreneurs.

The impetus towards the growth of organic crops, and hence towards a conversion of the production system from traditional agriculture, is mainly due to two important economic levers: the market and agricultural policy. The first is linked to the greater willingness on the part of consumers to pay for these products while the second influences the behaviour of agricultural entrepreneurs through the effect of specific policies envisaged by the Rural Development Plans which enable direct aid to be provided for organic productions.

The adoption of organic agriculture does not, however, guarantee the same advantage for all types of farms as it depends on the structural characteristics of the farms themselves, on the production system applied and on the costs to be borne in comparison to conventional agriculture. It is due to these reasons that the advantage of adopting a production conversion policy oriented towards organic farming may not be the same from one Italian regions. At the same time an ex-ante evaluation of the various reactions of the agricultural entrepreneurs can be helpful for the policy makers.

The aim of this research is therefore to evaluate the willingness of the farms located in Emilia Romagna and Sicily to adopt organic processes in two different scenarios, namely: a market scenario, that introduces a price premium for organic products and a policy scenario, that entails the implementation of direct support schemes envisaged by the measures contained in Axis 2 of the various Rural Development Plans.

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2. Methodology

The evaluation of the impact of both agricultural policies - price premiums and specific subsidies for organic crops- is carried out using a sample of farms, belonging to the Italian FADN of year 2005, that are "in course of conversion" towards organic farming, for an overall total of 742 farms (Carillo, 2008).

The methodology used to represent the production characteristics of the farms and the impacts of the two groups of scenarios envisaged is that of Positive Mathematical Programming (Pmp). Thanks to its characteristics, this methodology (Paris and Howitt, 1998; Arfini and Paris, 2000; Paris, 2011) is ideal for simulating the impact of the agricultural policy measures applied to the farms collected in FADN, where the available information is not sufficient to describe in detail the technological characteristics of the processes implemented.

The main feature of the Pmp is to carry out a positive analysis based on the situation observed on the farm at the time the data were recorded. This feature has the limitation of not being able to evaluate the impact of policy scenarios on new production processes that were not in existence at the time the farm data were recorded.

Up till now there are very few contributions that suggest using the Pmp adding new productions compared to those already existing in the situation observed (Röhm O, Dabbert S, 2003; Severini, 2008; Judez, 2008). The Pmp model used in this analysis fits into this field of research and proposes a new method compared to those reported in literature using the latent information estimated by the calibration phase, which enables the entrepreneur to change the production processes if the marginal profit of the new processes is higher than at least one basic process.

2.1 The Pmp and the latent information

The literature relative to the development of standard Pmp models involves the performing of three stages, each of which is distinguished by a specific objective: i) the determination of the dual values associated with the calibration constraints of the primal problem of linear programming; ii) the estimate of a variable cost function that incorporates all those costs, over and above the accounting costs, considered by the farmer in the definition of the land allocation; iii) the formulation of a non linear programming problem able to reproduce the initial allocation, but without using the calibration constraints.

The Pmp model designed to consider the impact of policies on non-observed processes, in this case organic processes, (ideally) considers a farm with only two existing types of products ($\mathbf{x}_r, \mathbf{x}_s$), where $\mathbf{x}_r$ represents the quantities of conventional product, while $\mathbf{x}_s$ represents the quantities of organic product; the quantitative levels of the two types processes are known ($\overline{\mathbf{x}}_{r,}\overline{\mathbf{x}}_s$). The activity is subject to limiting factors ($\mathbf{b}$); while the matrix of the technique $\mathbf{A}$ is obtained from the ratio between the value of the factor dedicated to each activity and the corresponding quantity produced. The primal problem of the Pmp is the following:

$$\begin{aligned} \max_{\mathbf{x}} \quad & TR = \mathbf{p}'\mathbf{x} \\ & S.t. \\ & \mathbf{Ax} \leq \mathbf{b} \\ & \mathbf{x} \leq \overline{\mathbf{x}} + \varepsilon \\ & \mathbf{x} \geq 0 \end{aligned} \qquad (1)$$

Breaking down the variables of the problem (1), between organic and conventional products, the following problem can be formulated:

$$\max TP = \sum_{r=1}^{R} \pi_r x_r + \sum_{s=1}^{S} \pi_s x_s$$

$$\begin{aligned} & S.t. \\ & \sum_{r=1}^{R} a_{ri} x_r + \sum_{s=1}^{S} a_{si} x_s \le b_i \quad \forall i \\ & x_r \le \overline{x}_r + \varepsilon \quad \forall r \\ & x_s \le \overline{x}_s + \varepsilon \quad \forall s \\ & x_r, x_s \ge 0 \quad \forall r \forall s \end{aligned} \tag{2a}$$

In matrix form:

$$\begin{aligned} & \max TP = \boldsymbol{\pi}'_r \mathbf{x}_r + \boldsymbol{\pi}'_s \mathbf{x}_s \\ & S.t. \\ & \mathbf{B}\mathbf{x}_r + \mathbf{M}\mathbf{x}_s \le \mathbf{b} \quad (\mathbf{y}) \\ & \mathbf{x}_r \le \mathbf{x}_r + \varepsilon \quad (\boldsymbol{\lambda}_r) \\ & \mathbf{x}_s \le \mathbf{x}_s + \varepsilon \quad (\boldsymbol{\lambda}_s) \\ & \mathbf{x}_r, \mathbf{x}_s \ge 0 \end{aligned} \tag{2b}$$

where, $\boldsymbol{\pi}_r = \mathbf{p}_r - \mathbf{c}_r$ and $\boldsymbol{\pi}_s = \mathbf{p}_s - \mathbf{c}_s$ are the marginal profits of the conventional and organic activities respectively obtained as difference between the vector of prices $\mathbf{p}$ and the vector of explicit costs $\mathbf{c}$. $\mathbf{y}$ is the vector of the shadow prices of the binding resources, while $\boldsymbol{\lambda}_r$ and $\boldsymbol{\lambda}_s$ are the dual values – or also the variable marginal costs of production - of the activities $\mathbf{x}_r$ and $\mathbf{x}_s$. Using the information on the implicit costs in the decision process, the problem described calibrates, or reproduces, the observed allocation choices of the farm under consideration.

In the definition of the problem, the organic crop is added from the first phase, assigning it a production level $\mathbf{x}_s$ equal to a very little value close to zero, while the data relative to the prices are assumed by the market and must guarantee a condition of positive marginal profit. The data relative to the production and technology (yield), are assumed by experts or by other similar crops. The formulation of the linear programming problem (2) redefined through the *Lagrange* function assumes the form:

$$L = \boldsymbol{\pi}'_r \mathbf{x}_r + \boldsymbol{\pi}'_t \mathbf{x}_t + \mathbf{y}'(\mathbf{b} - \mathbf{B}\mathbf{x}_r - \mathbf{M}\mathbf{x}_t) + \boldsymbol{\lambda}'_r (\overline{\mathbf{x}}_r + \varepsilon - \mathbf{x}_r) + \boldsymbol{\lambda}'_s (\overline{\mathbf{x}}_s + \varepsilon - \mathbf{x}_s) \tag{3}$$

Let us assume the positivity of $\mathbf{x}$ vector, and considering that primal and dual problem are equivalent at the optimum, problem (2) can be written according the following form:

$$\max L \tag{4a}$$

submitted to the following first order conditions:

$$\frac{\partial L}{\partial x_r} = \pi_r - \sum_{i=1}^{I} a_{ri} y_i - \lambda_r \le 0 \quad \text{and} \quad \frac{\partial L}{\partial x_r} x_r = 0 \quad \text{for} \quad x_r \ge 0 \tag{4b}$$

$$\frac{\partial L}{\partial x_s} = \pi_s - \sum_{i=1}^{I} a_{si} y_i - \lambda_s \le 0 \quad \text{and} \quad \frac{\partial L}{\partial x_s} x_s = 0 \quad \text{for} \quad x_s \ge 0 \tag{4c}$$

$$\frac{\partial L}{\partial y_i} = b_i - \sum_{r=1}^{R} a_{ri} x_r - \sum_{t=1}^{S} a_{si} x_s \leq 0 \quad \text{and} \quad \frac{\partial L}{\partial y_i} y_i = 0 \quad \text{for} \quad y_i \geq 0 \tag{4d}$$

$$\frac{\partial L}{\partial \lambda_r} = \overline{x}_r + \varepsilon - x_r \leq 0 \quad \text{and} \quad \frac{\partial L}{\partial \lambda_r} \lambda_r = 0 \quad \text{for} \quad \lambda_r \geq 0 \tag{4e}$$

$$\frac{\partial L}{\partial \lambda_s} = \overline{x}_s + \varepsilon - x_s \leq 0 \quad \text{and} \quad \frac{\partial L}{\partial \lambda_t} \lambda_t = 0 \quad \text{for} \quad \lambda_s \geq 0 \tag{4f}$$

At the optimum, the equation (4d) becomes $\mathbf{B}\mathbf{x}_r^* + \mathbf{M}\mathbf{x}_s^* = \mathbf{b}$, and shows the full saturation of factor $\mathbf{b}$. From this relationship we obtain the rate of substitution between the two activities (organic and conventional). Taking the derivative of equation (4d) and by substitution of $\mathbf{x}_r$ with $\mathbf{x}_s$, we obtain:

$$\mathbf{MRS}_{\mathbf{x}_t,\mathbf{x}_r} = \mathbf{M}^{-1}\mathbf{B} \tag{5}$$

The marginal rate of substitution (**MRS**) of (5) shows the “cost” in term of $\mathbf{x}_r$ due to the decision to produce one additional unit of $\mathbf{x}_s$. We can consider it as a measure of the technical efficiency of the two activities. The economic efficiency can be defined as

$$\mathbf{oc} = \left(\mathbf{M}^{-1}\mathbf{B}\right)\boldsymbol{\pi}_r - \boldsymbol{\pi}_s \tag{6}$$

Opportunity cost (**oc**) of $\mathbf{x}_s$ provides the exact measure of the economic convenience of substitution activity $\mathbf{x}_r$ with activity $\mathbf{x}_s$. A negative opportunity cost reveals the convenience to substitute $\mathbf{x}_r$ with $\mathbf{x}_s$. In a traditional LP problem, this condition implies an over specialization of the activity $\mathbf{x}_s$, while the same problem specified with the Pmp principles, the specialization of the most profitable activity is restricted by the constraint $\overline{\mathbf{x}}_s + \varepsilon$. Furthermore, the hypothesis according to which $\mathbf{x}_s$ represents the process that provides the higher profit admits as a consequence the full saturation of the corresponding calibrating constraint. In other terms, the endogenous variable $\mathbf{x}_s$ is hypothesized to have a level equal to $\overline{\mathbf{x}}_s + \varepsilon$, to be considered as the optimum level of the variable. As regards the determination of the optimum level of the variable $\mathbf{x}_r$, the first-order condition of the *Lagrange* function (4) provides the tool for solving the linear problem of the first Pmp stage.

2.2 The Q matrix estimation and the self-selection problem for a sample of farms

The possibility of being able to determine the opportunity cost of the organic activity, that appears as a latent activity, enables the Pmp procedure to calculate a matrix of variable cost in respect to all the production activities on which the entrepreneur has to make an evaluation of economic advantage, irrespective of whether these activities are effectively existing on the farm, or latent.

The calculation of the cost matrix (commonly referred to as the **Q** matrix) represents the second stage of the Pmp methodology and is carried out using the dual information obtained in the previous stage.

In order to enable all the farms included in the sample to use the information relative to all the observed and latent processes, and not to limit production possibilities to the processes effectively practised in their own farms, the marginal cost function, represented as

$\mathbf{mc}(\mathbf{x}) \equiv \bar{\lambda} + \bar{\mathbf{c}} = \mathbf{Q}\bar{\mathbf{x}}$, is considered as a frontier function for the sample of farms in its entirety (Arfini and Paris, 2000). While, the cost functions of each individual farm are expressed as a non-negative deviation from the frontier function. So, the marginal cost function of the *nth* farm is represented as $\mathbf{mc}(\mathbf{x}_n) \equiv \mathbf{c}_n + \boldsymbol{\lambda}_n = \mathbf{Q}\mathbf{x}_n + \mathbf{u}_n$, where the non-negative vector $\mathbf{u_n}$ corresponds to the deviations of the *nth* farm (Arfini and Paris, 2000).

This formulation assumes a special significance as it enables all the activities present in the territory to be considered in the production plan of an entrepreneur even if not effectively practised by the farm in question at the time of accounting. In order to allow for this behaviour on the part of the farmers, the marginal costs of each business are further specified, distinguishing the activities effectively practised from those which have not been implemented. This objective is achieved by formulating two sets of constraints for the *nth* farm. The first is connected with the existing crops, which will have a marginal cost given by the **Q** matrix specified for the frontier cost multiplied by the observed productions and by a (positive) deviation component with respect to the frontier itself. In this case, the relation between the two marginal costs can be described in the following equation:

$cm_{nk}| \mathbf{x_{Rk}} > 0$: $\lambda_{\mathbf{nk}} + \mathbf{c_{nk}} = \mathbf{Q_k}\mathbf{x_{Rn}} + \mathbf{u_{nk}}$, if the **k** activity - is produced, $\mathbf{k} = 1, \ldots, \mathbf{J_n}$. (7)

The second set of constraints concerns the activities not implemented by the *nth* farm. In this case the marginal cost of the non-implemented process could be less than or equal to that specified for the frontier. In the second case, the relationship between the marginal costs can be represented as a weak inequality compared to the marginal cost level of that activity in the context of the sample:

$cm_{nk}| x_{Rk} = 0$: $\bar{\lambda}_k + \bar{c}_k \leq Q_k x_{Rn} + u_{nk}$, if the *k* activity is not produced, $\mathbf{k} = 1, \ldots, \mathbf{J} - \mathbf{J_n}$. (8)

If one assumes to for simplicity that the sample is characterized by 2 conventional crops and 2 organic crops the Q matrix estimated for this farm appears as follows:

$$\hat{Q} = \begin{bmatrix} q_{r1,r1} & q_{r1,r2} & q_{r1,s1} & q_{r1,s2} \\ q_{r2,r1} & q_{r2,r2} & q_{r2,s1} & q_{r2,s2} \\ q_{s1,r1} & q_{s1,r2} & q_{s1,s1} & q_{s1,s2} \\ q_{s2,r1} & q_{s2,r2} & q_{s2,s1} & q_{s2,s2} \end{bmatrix} \quad (9)$$

The Q matrix maintains all the information on substitution and complementarity relationships between conventional and organic production processes even if organic production is not yet present in the farm plan. As a consequences, during the simulation phase, modifications can occur with respect to the initial production organization by including also those new processes, that exist in latent form, if they economic return is greater than the existing one.

2.3 The simulation model

The estimation of the cost function according to the approach described above guarantees the reproduction of the existing land allocation without calibrating constraints as in the first stage. The resulting non linear model appears as follows:

$$\begin{aligned} \max_{\mathbf{x}_r, \mathbf{x}_s} \quad & \mathbf{p}_r^{'}\mathbf{x}_r + \mathbf{p}_s^{'}\mathbf{x}_s - \frac{1}{2}\begin{bmatrix}\mathbf{x}_r & \mathbf{x}_s\end{bmatrix}\mathbf{Q}\begin{bmatrix}\mathbf{x}_r \\ \mathbf{x}_s\end{bmatrix} \\ & \mathbf{B}\mathbf{x}_r + \mathbf{M}\mathbf{x}_s \leq \mathbf{b} \\ & \mathbf{x}_r \geq 0 \\ & \mathbf{x}_s \geq 0 \end{aligned} \quad (10)$$

The cost function takes the place of the calibration constraints of the problem (2), applying an economic threshold to the activity allocation choice.

3. Agricultural policy scenarios and results obtained

For the purposes of the research, two types of scenario have been defined: the market scenario and the rural development scenario. The first type aims to evaluate the production responses of farmers to variations in prices of organic products. The second type, on the other hand, focuses on an evaluation of the effects of direct aid for farms coupled with the organic processes. The latter scenario refers to the measures envisaged by Axis 2 of the Rural Development Plans used to sustain and promote multifunctional agriculture through the Rural Development Plan.

The analysis was carried out considering the farms belonging to FADN in the year 2005 that is considered as the baseline. The information contained in the FADN of that year already reflect the initial consequences of the Fischler reform and, in particular, those of the decoupling of the direct aid enforced as of 1 January 2005. In the various simulations, the model takes into account the mechanisms contained in the 2003 reform, such as decoupling and modulation.

The simulations are developed for all the farms registered in the FADN of Emilia Romagna and Sicily (in total 913 Farms), grouped into two categories: organic farms and farms in course of conversion towards organic agriculture. Each farm category will have the information related to all the activities that are present in the group of farms even if they are not implemented.

The market scenarios envisage different levels of price variations for organic products, from -10% to +30%, in order to be able to assess which price signals could generate a significant change in the productions of organic agricultural products. More precisely, the hypothesis of price variation assumed in different scenarios are:

- S1: variation in the price of organic products compared to 2005 of -10%;
- S2: variation in the price of organic products compared to 2005 of +30%;

The evaluation of the effects of the rural development policy measures in favour of organic agriculture have been developed considering a single-analysis scenario for which direct intervention in favour of organic productions has been hypothesized. The aid in question is a coupled payment of 150 Euros/hectares for organic crops, the overall sum of which is limited to 5,000 Euros per farm[1].

3.1 Impact of the price variations on the land area allocated to organic farming

The analysis relative to the market scenarios was carried out on a national scale but, in the interests of brevity, the paper presents the results for two regions only, in which organic crops are particularly widespread: Emilia-Romagna and Sicily (Carillo, 2008).

The first rather important aspect is represented by the different level of sensitivity of the two regions to the variation in market prices (Tab. 1). Examining the values recorded for the two groups of crops[2] and concentrating on the percentage variation of the land areas allocated, it may be observed that the price variations for the two scenarios had a moderate effect on the allocation choices of the farms. In S1, the 10% diminution in the prices of organic products push toward a consequent 1.6% reduction in the land area dedicated to organic products in Emilia-Romagna while, in Sicily, there was no variation in production. In contrast, scenario S2 , with increasing of price by 30%,would have very poor effects on organic crop in Emilia-Romagna (+1.33%) and more significant effects in Sicily (+8%).

[1] The justification of this intervention is the covering of the costs borne by the farm for the conversion to organic agriculture and in order to reinforce organic productions in the farms already converted.

[2] The crops have been grouped in two categories, “organic” and "non organic”, with a view, for the time being, to collecting synthetic information able to identify the general trend in the various regions analysed

Table 1 – Variation in the land area allocated to organic farming

Name of region	Processes	Land area allocated in the base scenario (ha)	Percentage variation of the land area allocated (%)	
			S1	S2
Emilia-Romagna	*Organic*	2,636.89	-1.62	1.33
	Non organic	14,299.06	0.30	-0.25
Sicily	*Organic*	1,316.58	0.00	8.00
	Non organic	13,114.94	0.00	-0.80

Given the trend, which highlights the presence of a low elasticity of supply of organic products with respect to price variations, the breakdown of the sample by Farm Type (FT) provides further elements of evaluation (Tab. 2).

Table 2 – Variation in the land area allocated to organic farming by farm type

Farm Type	Processes	Land area allocated in the base scenario (ha)	Percentage variation of the land area allocated (%)	
			S1	S2
Emilia-Romagna				
Arable crops	*Organic*	1,273.69	-0.00	1.66
	Non organic	5,012.77	0.00	-0.42
Fruit and Vegetables	*Organic*	116.67	-24.39	11.98
	Non organic	672.52	4.23	-2.08
Animal productions	*Organic*	1,233.04	-1.15	0.00
	Non organic	5,507.41	0.26	0.00
Mixed crops	*Organic*	13.49	0.00	0.00
	Non organic	2,434.37	0.00	-0.00
Sicily				
Arable crops	*Organic*	616.63	0.00	17.09
	Non organic	6,135.22	0.00	-1.72
Fruit & Vegetables	*Organic*	59.65	0.00	0.00
	Non organic	1,075.78	0.00	0.00
Animal productions	*Organic*	53.45	0.00	0.00
	Non organic	2,085.73	-0.00	0.00
Mixed crops	*Organic*	240.05	-0.00	0.00
	Non organic	1,940.72	0.00	0.00
Mixed Crops and livestock	*Organic*	346.80	0.00	0.00
	Non organic	1,648.61	0.00	0.00

As far as Emilia-Romagna is concerned, of the four FTs considered (Arable Crops, Fruit & Vegetables, Animal Productions and Mixed Crops), only the farms in the FT Fruit & Vegetables seems to respond significantly to price variations (-24% and + 12%, respectively) while the FTs arable crop and animal production appear much more rigid. In contrast, in Sicily only the farms belonging to the FT Arable Crops seem to respond to the price variations conjectured by scenario S2 (+ 17%) induced, first and foremost, by the low conversion costs.

The allocation effects described are the direct consequences of the variation in the relative economic advantage between processes and altogether for the farms. With reference to the FTs that proved to be sensitive to price variations (Tab. 3), it may be observed that even the best of hypotheses (S2) would bring about a Gross Margin increase of little more than 5%.

Table 3 – Variation in economic variables by Farm Type

Farm Type	Variables	Value in the base scenario (€/ha)	Percentage variation of the economic variables (%)	
			S1	S2
Arable Crops (Emilia-Romagna)	**Gross sealable production**	912.8	-1.9	6.2
	Payments	285.3	0.0	0.0
	Variable Costs	385.6	-0.1	0.9
	Gross margin	925.9	-1.8	5.5
Fruit & Vegetables (Emilia-Romagna)	**Gross sealable production**	773.2	-0.7	4.1
	Payments	248.5	0.0	0.0
	Variable Costs	420.5	0.4	0.4
	Gross margin	614.5	-1.2	4.9
Animal Productions (Emilia-Romagna)	**Gross sealable production**	815.4	-2.0	5.3
	Payments	175.1	-0.1	0.0
	Variable Costs	361.7	-0.7	0.5
	Gross margin	630.0	-2.2	6.6
Arable Crops (Sicily)	**Gross sealable production**	550.4	-2.1	9.3
	Payments	114.4	0.0	0.0
	Variable Costs	260.4	-1.1	7.7
	Gross margin	445.5	-2.0	7.0

3.2 Impact of the rural development scenarios on the land areas allocated to organic farming

The application of aid coupled with organic productions generates a positive impact on these processes both in terms of income and acreage. With reference to the two regions analysed (Emilia Romagna and Sicily) and to the FT Arable crops (Carillo, 2008), the different intensity of the effects produced on production systems - similar in terms of orientation but different in terms of production characteristics and cost-effectiveness - is clearly evident (Tabs. 4 and 5). In particular, it is important to observe that the cultivation of organic cereals would appear to be particularly important in Emilia-Romagna (+76%) as opposed to Sicily (+ 39%). On the other hand, it is of major interest to observe how a reorganization of production would generate a reduction in the Gross Saleable Product (Gsp) and an increase in the Gross Margin in both regions (+ 15% e + 8%, respectively) following the increase in premiums and the reduction in production costs.

Table 4 – Land surface variations in the Arable crops Farm Type

Processes	Status quo	S_RDP	S_RDP
	(ha)		Var. %
Emilia-Romagna			
Conventional cereals	2.299	2.348	2,1
Organic cereals	809	1.430	76,7
Conventional oilseeds	187	181	-3,3
Organic oilseeds	109	142	30,5
Conventional fodder crops	171	137	-19,8
Organic fodder crops	0	7	
Other conventional crops	1.082	468	-56,7
Other organic crops	62	5	-92,6
Conventional Crops	3.739	3.134	-16,2
Organic Crops	980	1.584	61,7
Sicily			
Conventional cereals	4.288	4.256	-0,7
Organic cereals	368	512	39,1
Conventional fodder crops	953	865	-9,3
Organic fodder crops	348	341	-2,0
Other conventional crops	1.044	1.027	-1,6
Other organic crops	0	0	
Conventional Crops	6.285	6.148	-2,2
Organic Crops	716	853	19,2

Table 5 – Variation in gross income and its main components per Arable Crop Farm Type

Regions	Economic variables	Status quo (euro/ha)	S_RDP (€/ha)	S_RDP (Var. %)
Emilia-Romagna	**GSP**	1.319	1.036	-21,5
	Aid	234	367	56,5
	Variable Costs	679	418	-38,4
	Gross Margin	936	1.076	15,0
Sicily	**GSP**	792	752	-5,1
	Aid	107	141	31,4
	Variable Costs	437	390	-10,6
	Gross Margin	476	514	8,1

4. Conclusions

The main question that springs to the mind of entrepreneurs and public decision makers is whether organic crops can really offer a valid alternative to conventional productions also from the economic standpoint. In particular, the questions to be asked are, on the one hand, how reactive are the farms to market signals and, on the other, to what extent does aid in the

form of direct subsidies constitute an efficacious tool for increasing the farming land areas allocated for use according to the techniques of organic farming.
The results, obtained through a Pmp model applied to a sample of FADN farms, showed a limited response to price signals. Their behaviour is conditioned on the basis of geographical location and production specialization (FTs).
On the other hand, the possible recourse to coupled subsidies provided for by the Rural Development Program (RDP) for the purpose of increasing organic crops, could produce extremely significant effects in terms of a price premium with considerable growth rates for cereals, oilseeds and fodder crops. The economic impact of the specific subsidy would be just as significant inasmuch as the gross margin would increase, on average, by 16% in Emilia-Romagna and by 6% in Sicily. In this context, it is important to point out that not all farms behave in the same way. In Emilia Romagna the farms most interested in a conversion process are small and medium farms. In contrast, in Sicily the transition to organic agriculture would be of interest only for a lower number of farms and where organic crops are not present, their spread would be limited to a few percentage points.
The present paper demonstrates how it is possible and useful to make an ex ante evaluation of the policy measures oriented towards the achievement of rural development objectives, finalized to promote specific multifunctional production systems, in production settings that are highly differentiated as regards territorial environment and product specialization.

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