ENDOGENOUS RURAL DEVELOPMENT: EVIDENCE FROM A TYPICAL GREEK REGION

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The current financial and institutional crisis in Greece has brought far-reaching consequences for the whole economy including rural development. Nevertheless, farmers and rural residents can profit from the opportunities and synergies offered by other activities that are complementary and alternative to agriculture and thus they can liberate themselves from the unique role of producers. Rural residents, farmers and entrepreneurs in less favored Greek areas play an essential role in the valorization of endogenous resources of the area where they are operating. This paper aims to examine the willingness of the residents of a typical Greek region to accept and support a local factor such as a union of agricultural cooperatives and to reveal the foremost reasons thereof. To that effect, a survey of 500 rural residents was performed using both summary statistics and multivariate analysis while a categorical regression analysis was applied to determine the relation between the respondents’ socioeconomic characteristics and their willingness to adopt the endogenous potential. The survey findings indicate the success of the Union investment project and the confidence of the local community in a local cooperative organization. Thus, this local business initiative can significantly reduce the impact of the economic crisis on Greek rural residents by generating additional income from indigenous resources.

Keywords: agricultural cooperative, categorical regression, endogenous potentials, local investment, rural development.

JEL: C420, D190, R510, H540

Introduction

According to Ray (1999), the endogenous approach towards the socio-economic development of rural areas focusing on both local population and local resources has been gaining widespread acceptance as a more effective way towards a robust sustainable development policy compared to its sectoral, exogenous counterpart. Actually, under the circumstances of the ongoing global economic crisis, in the fields of rural development and the resulting urban regeneration, emphasis is increasingly placed on the adoption of an endogenous approach. A number of academics who have explored the theory of endogenous rural development (Lowe et al., 1995; Philo, 1993; Murdoch and Pratt, 1993) suggested that any analysis of development activities should focus on the interface between the local and the extra-local rather than just on localities and their resources. The main assumption of the theory says that the well-being of a local economy can be best animated by basing the development action on the resources that are indigenous to that locality (Lowe et al., 1998).

On the other hand, European policies and rural development strategies mainly refer to areas with natural and geographical deficiencies, such as mountainous, insular and less favored localities (Risko-Norja et al., 2011). Despite the shift of the European Common Agricultural Policy (CAP) towards strengthening the pillar of rural development, the results of those policies are generally characterized as positive even though they have a limited range and concern specific areas (Galdeano-Gómez et al., 2011).

Given the current market-oriented development framework, the local social and economic development level may present a challenge and a potential opportunity for specific rural regions. In this context, endogenous local investments towards capitalization on local primary products can stimulate the development of a region. The Union of Agricultural Cooperatives of Amyndeon (UA-CA) located in the rural area of West Macedonia (NUTS 2) is a good example of such practice. The UACA represents a socioeconomic pivot of the region supporting local income and employment through various activities.
related to rural sectors. Since the region is one of the least developed areas in Greece suffering serious economic problems, it has the highest unemployment rate (15%) in the region and highly depends on specific economic activities such as mining, power generation, and agriculture.

Animal husbandry is one of the most important sectors in the region, which is among the leading areas in Greece in terms of livestock numbers and milk production volumes. Nevertheless, the last decade saw a fall in the income of livestock producers who have lost their market power due to the milk sector structure in Greece. The sector is dominated by an oligopolistic structure with a small number of large establishments and a common price policy. Five major brands with a market share of approximately 80% dominate the market. Accordingly, the UACA, as a local player in rural activities, which is trusted by the local population, anticipates its important role in the development of the region and hence it has decided to investigate the feasibility of marketing local dairy products produced by the regional industry.

In regard thereto, the current analysis aims to examine the willingness of the population of the region to admit and support a local player such as the UACA. In particular, it addresses people who would support the efforts of the UACA to establish a dairy business that would use and exploit local resources and hence to support endogenously the development of the region. By accepting and preferring to purchase the products of the forming local investment, the local people foster the development of their region.

Technically, the main research objectives of this paper include: (a) exploring the reasons for recognizing and supporting the UACA, (b) revealing the key factors affecting the rural residents’ decision to adopt the UACA, and (c) examining the behavior of the key factors affecting the rural residents’ decision to approve of the UACA.

To achieve the above objectives, the paper employs a combination of summary statistics and multivariate analysis: (a) summary statistics is used to achieve the first objective, (c) categorical regression (CATREG) is chosen to obtain the second objective, and (c) transformation CATREG diagrams are employed to accomplish the third research objective.

Methodological Background

Data collection

To collect the data, survey of 500 rural residents was performed in November 2009. The respondents were randomly selected from a list of the residents of the region compiled by the national telecommunication organization.

The survey, which was based on a sample of randomly selected residents, sought a revealing insight into issues related to rural life and especially the parameters of acceptance of the dairy products of the new UACA establishment. In particular, part of the survey was designed to elicit data on the respondents’ attitudes towards the new UACA industry and their views on several prospective changes, whether desirable or not. This study employs both descriptive statistics and multivariate analysis methods to examine the acceptance or non-acceptance of dairy products by the local residents. Categorical regression was specifically used to handle optimally transformed categorical variables in order to disclose possible relations between a dependent variable and a set of selected independent ones. Figure 1 presents the general methodological framework for data collection, statistical analysis, and the obtained results.
Methodology

This paper strives to investigate the possible dependency relationships among the variables of the questionnaire which reflect the willingness to purchase dairy products from the Amynteon Agricultural Cooperative (a dependent variable) and the independent variables. In particular, it investigates how individual characteristics of the consumers affect their willingness to purchase. The interpretation of the contribution of each independent variable to the dependent variables will assist in the determination of the factors affecting the respondents’ willingness to purchase and will contribute to estimating the fitness of the model for the research data.

Categorical regression is chosen as the most relevant methodology and it is used when some of the variables are non-numeric (equispaced or proportional) or when the relationships among the variables are suspected to be non-linear (Siardos, 2002).

Categorical regression quantifies the data of categorical variables by assigning numerical values to the categories, resulting in an optimal linear regression equation for the transformed variables (Kooij and Meulman, 1997). Thus it becomes possible to predict the values of a dependent variable for any combination of independent variables (SPSS, 2007).

The quantification used for the categories of the variables maximizes the squared coefficient of multiple correlations between a dependent variable and a group of independent variables. The effect of each independent variable on the response is described by the value of a corresponding correlation coefficient while the direction of the dependent variable change is depicted by the sign of the correlation coefficient.

In categorical regression, the categories of variables have to be codified by using integer numbers. Siardos (2002) states that successive integers are generally used irrespective of whether the variables are ordinal or nominal, as opposed to a larger number of restrictions for numeric variables. Hence, any codification must observe the differences between successive categories after their quantification.

Any variable can be analyzed using one of the three scaling types: numerical (equispaced or analogical), nominal or ordinal. With the numerical scale, the categories are held to be ordinal and equispaced while the differences between the category values as well as the original rank of the variable categories are maintained after the quantification (SPSS, 2007). With the nominal scale, observations falling under the same category take the same quantitative value, whereas with the ordinal scale the rank of the quantified variable categories is maintained.

For the purpose of the dependent variable quantification, it is advisable to adopt its own scale (generally numerical). Thus, the likelihood of the differences among the dependent variable categories being ignored is excluded whereas the properties of its categories reappear after the transformation (Siardos, 2002).

As regards the independent variables, it is essential to investigate a suitable measurement scale. If a nominal scale is adopted for all of them, a high value of the coefficient of multiple determinations ($R^2$) is usually expected since their nominal treatment does not impose restrictions on the quantifications of the variable categories. However, in such cases the interpretation of the results becomes very difficult.

It is worth mentioning that the graphs of the transformed variables rather than the values or signs of the correlation coefficients are most helpful when choosing a suitable transformation scale. Moreover, the transformation of the variables aims to change the non-linear relationship between the original dependent variable and the independent ones into a linear relationship between the transformed variables.

The transformed values of the variables are used to calculate the variance-covariance matrix of the variables in order to assess the presence of multicollinearity in the regression, the multiple determination coefficient $R^2$, which indicates the fit between the model and the transformed data, the multiple correlation coefficient $R$, which measures the strength of the relationship between the transformed dependent and independent variables, and finally the adapted multiple determination coefficient $\bar{R}^2$.

Furthermore, the typical regression coefficients $\beta$, typical errors, and simple correlation coefficients of zero grade, which express the correlation between the transformed variable $Y$ and variable $X$ (after having removed the linear effects of the remaining independent variables on both $X$ and $Y$), are calculated. Analysis is performed to control the relationship between the dependent variable and a group of independent variables with the allocation of the variance of its predicted values that are attributed to the regression and the variance non-attributed there to (errors – residuals). Then the relative measures of importance (the relative Pratt Index, 1987) and measures of tolerance are calculated for assessing the presence of multicollinearity, the quantifications for each category of variables, and the quantified values of the original observations. Finally, residual analysis of the transformed data and their graphical plots (scattergrams) in relation to the quantified variable values is performed to check the forecasting capacity of each independent variable resulting from their transformation.

The choice of the methodologies rests on the following rationale: (a) according to SPSS (Ver. 17), ordinal and nominal variables can undermine the traditional regression including stepwise and logistic, (b) for ordinal variables, the scale is arbitrary and yet different scales yield disparate findings, (c) for nominal variables, the output is difficult to interpret and it may fail to provide
information on all the relevant comparisons, (d) fortunately, categorical regression analysis, one of the recent options in SPSS, circumvents those problems, (e) essentially, categorical regression converts nominal and ordinal variables to interval scales, and (f) this conversion is designed to maximize the relationship between each predictor and a dependent variable.

Area profile

The West Macedonia region is one of thirteen Greek regions located in the northwest part of Greece, the western district of Macedonia. The region of West Macedonia includes four separate prefectures: (a) Florina, (b) Grevena, (c) Kastoria, and (d) Kozani. Geographically, the West Macedonia region holds a central position in the West Balkans and it represents a natural gateway of Greece to the northwest borders, Albania and the Former Yugoslavian Republic of Macedonia (FYROM) in particular. Other Greek regions bordering the West Macedonia region include the region of Thessaly in the south, the region of Central Macedonia in the east, and the region of Epirus in the west. The landscape of the region is dominated by highlands (69.2%), forest areas (26.0%), rangelands (43.0%), and cultivated or fallow areas (24.0%). The West Macedonia region covers 9,451.6 km² or 7.2% of the total area of Greece (NSSG, 2003). Figure 2 shows the location of the West Macedonia Region as well as the four Prefectures within the study area.

Findings

In theoretical terms (Lowe et al., 1995), the main principles of endogenous rural development include (a) dependency on local resources, (b) meeting local needs, (c) independence and decentralization, (d) capitalization on inherited experience and local knowledge, and (e) links between the focal project, other production, and market forces. This section aims to analyze the above theories and conceptions of the endogenous rural development principles and to couple them with the research findings. In this regard, the main research findings are presented in three sections consistent with the research objectives: (a) reasons for accepting and supporting the UACA, (b) factors affecting the rural residents’ decision to opt for the UACA, and (c) behavior of the most important factors affecting the rural residents’ decision to accept the UACA.

To use the large quantities of milk in the region and to facilitate the income of the farmers, the proposed project is designed to set up a dairy industry to produce good quality milk and dairy products. In fact, a large percentage (45.20%) of the population are willing to buy dairy products from the proposed company while a large number of others (40.60%) are willing to replace their dairy products with those of the proposed company. In the prefecture of Florina women consumers, retired residents, and consumers aged over 65 were found to be more eager to purchase those products than other potential customers. Furthermore, it should be noted that 75% of the respondents are willing to pay more than usual and some respondents (10.81%) are even ready to pay a price that is more than 50% higher than the regular price for dairy products. The survey results demonstrate the success of the investment project of the Union and the confidence of the local community in a local cooperative organization.

Table 1 presents the main reasons for rural residents to accept and support a local factor like the UACA. In particular, the most important reason for potentially accepting the UACA project (mean value=1.839) is the fact that the proposed project will support the income of the farmers in the Western Macedonia Region.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Mean Values*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The proposed project will support the income of farmers throughout the Western Macedonia Region</td>
<td>1.839</td>
</tr>
<tr>
<td>2. The proposed project will support farmers’ income and thus the income of other rural residents</td>
<td>2.000</td>
</tr>
<tr>
<td>3. The raw material (milk) is an excellent product</td>
<td>2.129</td>
</tr>
<tr>
<td>4. The proposed project will generate cooperative products</td>
<td>2.286</td>
</tr>
<tr>
<td>5. Originated from a family of cattle-breeders and therefore support the proposed project</td>
<td>3.263</td>
</tr>
</tbody>
</table>

*Likert scale: 1=strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree

Furthermore, many of those, who are potentially going to support the initiative, indicated that the proposed project...
will facilitate the farmers’ income and consequently the income of other rural residents (mean value=2.000), that the raw material (milk) is an excellent product (mean value=2.129), that the proposed project would generate cooperative products (mean value=2.286), and that they come from a family of cattle-breeders and therefore support the proposed project (mean value=3.263). Those were the most important reasons for adopting a local factor like the UACA. That suggests that most of those who are potentially going to support the local project face mostly the same challenges in supporting local projects, their own income, and the income of other rural residents accordingly.

Furthermore, to investigate the willingness of the 500 questionnaire participants to consume dairy products of the Amynteon Cooperative, we included data referring to 10 variables. Following control for unusual statistical residuals (>|±3|), the number of questionnaires that were finally included in the categorical regression analysis was reduced by nine (N=491). The co-correlations between the independent transformed variables gave values of simple correlation coefficients close to zero, thus indicating the absence of multicollinearity problems.

The multiple determination coefficient of the categorical regression $R^2$ assumed a value of 0.827 which signifies that 82.7% of the variation of the transformed dependent variable is explained by the transformed independent variables participating in the regression equation. Moreover, the relevant variation analysis gave a value of $F=1.218$ which corresponds to a zero statistical significance level and thus indicates a good fit of the categorical regression model to the statistical data.

Regarding the standardized correlation coefficients of the independent variables (Table 2), the occupation variable (with a negative sign) shows the highest value, followed by the age and gender variables with a positive sign.

Among the zero-order coefficients (Table 2), the highest coefficients were found to be those corresponding to the gender ($r=0.282$), the prefecture ($r=0.219$), and the occupation ($r=0.204$), indicating a bilateral relationship (positive in the first and negative in the other two cases), which couples each independent variable with a dependent one if all the other dependent variables are excluded.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Standardized coefficients</th>
<th>Correlations</th>
<th>Relative importance</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.236</td>
<td>8.060</td>
<td>0.282</td>
<td>0.228</td>
</tr>
<tr>
<td>Age</td>
<td>0.259</td>
<td>9.033</td>
<td>0.111</td>
<td>0.264</td>
</tr>
<tr>
<td>Marital status</td>
<td>0.112</td>
<td>2.014</td>
<td>0.097</td>
<td>0.128</td>
</tr>
<tr>
<td>Occupation</td>
<td>-0.293</td>
<td>11.694</td>
<td>-0.204</td>
<td>-0.297</td>
</tr>
<tr>
<td>Adult members of household</td>
<td>0.120</td>
<td>2.145</td>
<td>0.080</td>
<td>0.132</td>
</tr>
<tr>
<td>Minor members of household</td>
<td>-0.115</td>
<td>2.063</td>
<td>-0.117</td>
<td>-0.129</td>
</tr>
<tr>
<td>Educational status</td>
<td>-0.187</td>
<td>5.528</td>
<td>-0.126</td>
<td>-0.209</td>
</tr>
<tr>
<td>Monthly income</td>
<td>0.132</td>
<td>2.616</td>
<td>0.059</td>
<td>0.145</td>
</tr>
<tr>
<td>Prefecture</td>
<td>-0.227</td>
<td>8.210</td>
<td>-0.219</td>
<td>-0.252</td>
</tr>
<tr>
<td>Urbanization</td>
<td>-0.027</td>
<td>0.117</td>
<td>-0.040</td>
<td>-0.031</td>
</tr>
</tbody>
</table>

After the linear relationship of the remaining variables with a particular independent and a dependent variable is removed, the partial correlation coefficients present the highest value for the occupation variable, followed by the variables accounting for the gender and the prefecture. Specifically, the value -0.297 of the partial correlation coefficient explains 8.82% [(−0.297)$^2$] of the variation of the tactical values of the dependent variable when the effects of all the other independent variables are removed.

With regard to the coefficients of partial correlation, the highest value corresponds to the correlation between the dependent variable and the occupation variable. The square of this coefficient expresses the variance proportion of the dependent variable that can be explained by the quality, relative to the total, once the effects of all the other variables on the specific independent variable are removed.

In particular, after the effect of all the other variables on the occupation are removed, the resulting percentage explains 7.02% of the variance of the dependent variable.

The relative importance of the independent variables appears greater for the gender variable, followed by the occupation variable, the prefecture and the age variables. Altogether, those variables account for 75.4% of the aggregate importance. The absence of multicollinearity becomes apparent from the very high tolerance values of the independent variables that express the participation of each independent variable variance, which cannot be explained by the remaining independent variables.

Figure 3 reflects the transformation diagrams of the dependent variable on the one hand and the four independent variables of the categorical regression that presented high values of the relative importance coefficients on the
other. The transformation diagrams of the independent variables in conjunction with the sign of the typical correlation coefficient $\beta$ in Table 2 explain the willingness of the respondents to purchase/consume dairy products from the Amynteon cooperative relative to each category of independent variables and simultaneously highlight possible differentiations among the categories.

Figure 3. Diagrams of the main CATREG independent variable transformation

Once the main research findings are coupled with the theory and principles of endogenous rural development, it can be concluded that: (a) although the attitude of dependency on governmental development efforts is strongly embedded in the socio-psychological outlook of the Greek farmer, a vast majority of the rural residents covered by the study area are very enthusiastic about participating in new local development initiatives, (b) employment and profit represent the main driving forces behind this project, (c) this project does not need highly sophisticated opinions of external or international parties and therefore it constitutes a relatively independent activity, (d) the project requires neither sophisticated technologies nor non-familiar approaches, and (e) through transportation, distribution and market services, the project is expected to create new urban employment opportunities. Thus, the competitive prices of milk supplied by the project may help to stabilize and reduce the retail prices of milk in regular stores of the local market.

Conclusions

Presently rural areas call for reinforcement of the rural development process through investments and support of domestic production. As a matter of fact, several cooperative organizations involved in processing and marketing of branded products have failed to generate positive financial results and to contribute to the local economy and development. This paper analyzes survey information from rural residents using a categorical regression model and descriptive statistics analysis in order to identify the differential extent of endogenous project acceptance and use by residents of a typical Greek rural area.

Concerning the adoption of local endogenous projects, rural residents, farmers, and entrepreneurs covered by the study area increasingly tend to appreciate local projects like the UACA, suggesting that such projects can help them to pursue integrated rural development, social and economic gains. On the other hand, the most important motivation for adopting the UACA project is the
contribution of the proposed project to the income of farmers in the study area.

Furthermore, the acceptance of endogenous projects is significantly related to such supporting factors as ‘gender’, ‘occupation’, ‘prefecture’, and ‘age’. The above empirical findings support Rogers’ (1995) socio-economic generalizations about early adopters.

Moreover, judging by the economic performance of the largest dairy cooperatives, the Greek dairy sector seems to have a good potential. On the other hand, local cooperatives strive to gain from the opportunities offered by the industry and to address the distortions created by the dominance of large players in the market (reduced producer prices, cartels, sales channels, etc.) and thus they further investments into new dairy and cheese businesses and modernization of the existing ones.

Eventually, the majority of rural residents within the study area are willing to launch new local development initiatives while local employment and local development represent the main driving forces behind this project. Moreover, the proposed project neither requires sophisticated technologies nor non-familiar approaches and no particularly sophisticated opinions originating from external or international parties are necessary for this project. Thus, it is more than likely that the project will offer new urban employment opportunities through transportation, distribution, and market services.

Consequently, this study provides interesting preliminary observations and demonstrates their verifiability. However, as a first systematic attempt to assess the parameters of accepting endogenous rural development projects, our study was limited to a rather small region and a rather restrained amount of time for the observations. Therefore, our study does not provide sufficient generalizability. Nevertheless, the current observations make a good start for further research, which could extend the investigation to a more representative sample. For example, extending the questionnaire and the analysis beyond the study area would be an interesting subject for further investigations. It would be practical to explore whether launching a particular production facility could affect the demand in a larger area and in the whole country. In this case, the research could deal with the potential distribution channels, pricing policy scenarios, marketing strategy, packaging, etc. An optimization model using linear programming methodology could be employed for further research into the findings of the present study before and after the implementation of the project in order to find an optimal combination of production capabilities.

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