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Production and Off-Farm Employment Decisions of Greek and Hungarian Farmers in the Light of the Last CAP Reform

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Abstract

Using field survey data from Hungarian and Greek farmers, an evaluation was attempted of their perceptions and intentions concerning the last major CAP reform. In particular farmers' future intentions concerning their farm investments, crop mix and off-farm work are explored. Empirical findings suggest that although investment decisions are similar across countries, there are differences concerning crop-mix and off-farm work. Hungarian farmers are more willing to adjust their crop mix focusing in their farming businesses and therefore less willing to increase off-farm work. For the sample of Greek farmers the opposite is observed. The level of information concerning CAP measures as well as the farm's size, the type of crop and farm specialization play an important role in these individual decisions.

Keywords: *CAP Reform, farmers' intentions, information levels and sources, ordered probit, Hungary, Greece.*

Introduction

During the last decade the agricultural sector in the European Union is undergoing a big change after the last radical reform of the CAP in 2003. The justification behind this reform was to put an end to the overproduction of agricultural products that was the result of the substantial support payments European farmers were receiving from other sectors in the economy and to enhance the competitiveness of farming activities throughout the EU. At the same time financial resources will move support payments to rural development measures providing aid to the necessary restructuring of rural areas. To that end, the CAP reform changed drastically the perspective under which the EU faces the agricultural sector trying to make it more market oriented. In effect, while the sector has traditionally been the greatest beneficiary of domestic support, it is forced to adapt into a new situation where farm payments are decoupled from farm production. This different perspective has already significantly affected European agriculture and it will continue to have an impact on farming for the next decades for both new and old member states. After almost three decades of the extensive blind support of farm incomes, the adaptation to the new policy conditions is expected to take significant time to conclude.

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The new reform shifted the weight from direct aids (Pillar 1) towards rural development measures (Pillar 2) that evolve around the following three axes:

- Axis 1 measures: Their main objective is to improve the competitiveness of farming and forestry. They involve training, investment aids and measures in general which aim at improving farm-level productivity.
- Axis 2 measures: Their objective is to promote environmental quality and sustainable land management and soil quality.
- Axis 3 measures: Their objective is to improve the quality of life in rural areas. They involve the support of local development strategies such as micro-enterprises, rural tourism so that diversification of economic activities in rural areas increases, sustaining thus, rural incomes.

In addition, the reform introduced the concept of cross-compliance making the receipt of farm payments contingent on *good practice* with respect to environmental, food safety and animal standards. By decoupling farm payments and shifting agricultural policy towards rural development measures it is expected that the agricultural sector will undergo a structural reorganization whereas farmers whose existence depended in the past on direct supports and not on market conditions, will adapt to the new situation and become more market oriented. On the other hand, the rural development measures by targeting the development of rural areas as the main objective, could act as an incentive to young farmers to get involved in agricultural production and other economic activities in the countryside enhancing rural employment opportunities. The final effect that these two forces can have on farming businesses and their production decisions is not clear at the outset (Anton and Sckokai, 2006) neither is the effect on the employment levels in rural areas .

On the one hand, the introduction of decoupled payments reduces the incentive to overproduce leading some farmers to restrain or even abandon their farming businesses. At the same time it provides room for changing traditional cropping mixes prevailing for many years in European regions, as farmers will seek to cultivate more profitable crops in order to sustain their income. Furthermore, farmers' investment levels could be enhanced by the introduction of the SFP (single farm payment) due to the generation of wealth effects (Hennessy, 1998), as shown in the study of Kallas et. al (2012) when analyzing partial decoupling in the case of Spain.

A number of studies have addressed farmers' intentions in response to the 2003 CAP reform with mixed results. For instance, Breen et al. (2005) analyze farmers' production intentions in Ireland and find that the majority declare they will continue the same farming practices in spite of decoupling while Genius and Tzouvelekas (2011), when analyzing production and output mix intentions using survey data for Greece, Hungary and The Netherlands, find that in the case of Greece only 36.3 per cent will keep the same level of production and 41.3 per cent the same mix. Tranter et al. (2007) find that 30 per cent of the surveyed farmers would alter their crop mix under decoupling in the case of Germany, Portugal and the UK which coincides with the results of Genius and Tzouvelekas (2011) for the case of Hungary and The Netherlands. Gallerani et al. (2008) combine data collected from farmers' surveys and dynamic programming methods to simulate responses to policy and price scenarios for a number of countries which include Hungary and Greece. Their results show that in general reactions of farmers to decoupling are minor. With respect to the effects of the reform on off-farm labour, Corsi

and Salvioni (2012) note that empirical studies dealing with this issue are scarce. Moreover their ex-post study using FADN panel data for Italian farms for the period 2003-2007 finds evidence that the effect of the reform on off-farm labour is rather weak.

It is therefore the case that after ten years of implementation of the new regime, the overall effect of this reform on the structure and organization of farming activities is not clear yet in many European regions. More importantly for the new member states that didn't enjoy the protective policy scheme of the past, the impact of the reform will be quite different bringing substantial changes to farming activities that are difficult to predict (Gohin, 2006).

Along these lines, the objective of the present study is to learn directly from farmers what their perceptions about the effects of the CAP reform and rural development measures are as well as their intentions in the future, especially with respect to farming restructuring and employment opportunities. More specifically, farmers' intentions related to capital investment plans, the introduction of new crops and their employment off-farm are the focus of the present study. A major difference with the aforementioned intention surveys is that in the present case farmers were requested to make probabilistic statements about their future actions and therefore it allowed for uncertain response options. The analysis is based on survey data collected directly from farmers in the spring and summer of 2007 within the context of the CARERA project². Since then many things have changed in the world markets for agricultural products with extremely high prices and food scarcity being the characteristics of the present food markets.

Although it was not possible at the time of collecting the data to predict the current situation in the food markets, farmers were asked about their intentions giving thus some valuable insights with respect to the present and future situation. For comparison purposes data were collected for two regions: Anatoliki Makedonia and Thraki in Greece and the Southern Great Plain in Hungary, while the target crops and livestock were cotton, tobacco and sheep for Greece and fresh vegetables, corn and pigs for Hungary.

Survey Details

Case Studies

The Region of Anatoliki Makedonia and Thraki

The region of *Anatoliki Makedonia and Thraki* comprises the north-eastern part of the country including eastern Macedonia and Thrace. It has a land area of 1,403,400 ha (11 per cent of the total land area of Greece) and borders in the west with the region of Kentriki Makedonia, in the north with Bulgaria and in the east with Turkey. According to the data published by the Greek Statistical Service (NSSG, 2013) the share of gross value added in the region generated by agriculture was 6 percent in 2010, against 3 per cent nationally. Rural population accounts for almost the 60 per cent of total regional population indicating the importance of farming activities for the economic prosperity of the region.

The region produces 7 per cent of the national agricultural output and 4.1 percent of

² More information about the CARERA project can be found at <http://www.eng.auth.gr/mattas/carera>

the total national gross added value. In addition, it occupies one of the last places in the regional classification of regions based on per capita gross domestic product, with EUR14,931 in 2010, representing 76 percent of the national average and 66 percent of the EU-27 average (NSSG, 2013; Eurostat, 2012). The main cultivated products are cereals (mostly wheat), tobacco, cotton, tomatoes, potatoes, olive oil and apples. Milk production is also important due to the regional development of livestock farming.

The agricultural sector is the leader in terms of employment although its share in total employment has been declining, going from 34.3 per cent in 2000 to 23.7 per cent in 2004 and 20.9 per cent in 2010 (NSSG, 2012). Of some importance is the manufacturing sector whose share has gone from 11.9 per cent to 13.6 per cent in the same time period and mainly comprises food processing and tobacco industries. The unemployment rate is higher than the national average as it was around 11.6 per cent in 2010 (NSSG, 2011) and with a much higher incidence of female unemployment.

The Region of the Southern Great Plain

The *Southern Great Plain*, the largest region in Hungary (19.9 per cent of total Hungary's territory), is located in the south and south-east of Hungary. Most of the region's land (85 per cent) is suitable for agriculture and it is predominantly flat, while the total agricultural land of the region exceeds the 1.3 million ha of which about 1.0 million ha are arable land. According to the last census available, 13.4 per cent of the Hungarian population lives in the *Southern Great Plain* (HCSO, 2006).

Almost 65 per cent of the population in the region is involved in rural activities, notably fresh vegetables, corn and pigs. During the last two decades this share of rural population followed an increasing trend indicating the significance of farming activities for the economic growth of the region. According to data provided by the Hungarian Central Statistical Office (HCSO 2005) the employment rate for people aged between 15 and 64 years in the *Southern Great Plain* (56.9 per cent in 2005) corresponds to the average employment rate in the ten new member states. However, it is significantly lower than the rate of 64 per cent of the EU-15.

Although, the Southern Great Plain accounts for only 9 per cent of the total Gross Domestic Product (GDP) of Hungary, it accounts for 25 per cent of the agricultural GDP. The per capita GDP of the region is below the national average and represented in 2010 42 percent of the EU-27 figure (Eurostat, 2012). The employment level in the agricultural sector was 14.4 per cent in 2010, while employment levels in the processing sector are also significant. This indicates the importance for the regional development of food processing which is the most evident sector in manufacturing. Finally, the vast majority of farming business (67 per cent) are small family owned based on a single crop for their prosperity.

Questionnaire, Probabilistic Intentions and Data Description

The main purpose of the questionnaire was to elicit farmers' future intentions in the light of the recent CAP reform and the associated rural development measures. Future intentions about the continuation of farming activities, input use, labour use, size of business, investment levels and output diversification were addressed and information on farmers' perceptions about the effects of the reform on socio-economic and demographic characteristics was collected. A brief overview of the contents of the question-

naire is provided below. A more thorough description is given in Genius and Tzouvelekas (2011).

The questionnaire was divided in five parts. The first part dealt with the current farming activity level of the respondent and, in the case of Greek farmers, past experience with previous CAP reforms. Part two collected information on the level and sources of information about the 2003 CAP reform, while information on the respondent's perceptions about the potential effects of the reform were the subject matter of part three. In part four each respondent was presented with a brief summary of the new SFP regime applying to his/her specific crops and country and subsequently asked about future intentions in a five year time horizon. The first section of part four asked respondents which action they would choose among "abandoning farming activity", "increasing production", "decreasing production" and "maintainig the same production" under different future scenarios for the prices of their outputs, while those respondents who selected to keep their farming activity were further asked about whether they would modify their crop mix. The reader can find an analysis of the results of the aforementioned section in Genius and Tzouvelekas (2011).

The second section of part four of the questionnaire, which is the basis for the present analysis, required respondents to make probabilistic statements about a number of potential actions in a five year time horizon. Included in this section were questions about the likelihood of introducing new crops, increasing off-farm labour activities, increasing capital investment, changing the amount of labour used in the farm as well as the possible uses of the SFP payments between investment and leisure. As opposed to section one where respondents were forced into choosing a specific alternative, section two allowed for respondents to attach a probability to their future actions and therefore allowed respondents to express uncertainty about future choices. The exact wording of the questions are given in the next section where an econometric model that can deal with probabilistic responses is presented.

The majority of intentions surveys force respondents to choose a specific alternative among a set of predetermined alternatives or to give a Yes/No answer to a specific action, thus assuming that respondents can make up their minds at the time of the interview about what their actions will be in the future. A more realistic approach would be to assume that even if respondents can resolve part of the uncertainty by forming expectations, the fact remains that they have no prior experience with the new environment that the SFP is going to create for their farming business. This in turn means that it is very unlikely that respondents are in a position to give clear Yes/No answers about their future plans and room should be given for the expression of uncertainty in their answers. Therefore, respondents in our survey were allowed to express how likely they were to take a particular action in the future.

Finally, the last part of the questionnaire was related to some important socio-economic characteristics such as the age and education of the head of the household, the number of family members, their experience in farming and off-farm income sources.

The target crops and livestock for the study in the case of Greece were cotton and tobacco together with sheep breeding, sectors in which *Anatoliki Makedonia and Thraki* is specialized. For the *Southern Great Plain* the investigated activities were corn, fresh vegetable and pig production.

The initial sample of farmers was randomly selected using the information provided

by the local agricultural directorates and it was 176 for *Anatoliki Makedonia and Thraki* and 225 for the *Southern Great Plain*. Some of the collected questionnaires were incomplete as farmers were not able or willing to answer all the included questions. Therefore the final sample sizes used in the present study were 160 for Greece and 153 for Hungary and we summarize below some of the basic findings from both surveys.

The average age of the respondents was 48 for Greece and 51 for Hungary while the average level of specialization differed across countries with the *Herfindahl* index being 0.78 for Greece and 0.46 for Hungary. The analysis of farmers' responses by country shows some interesting facts with respect to the lack of information about the CAP reform. In the case of Greece, although almost one third of the farmers declare having participated in some structural program in the past, less than one third considers they have at least a fair level of information about the 2003 CAP reform, only 34 per cent have a fair knowledge of the requirements for direct farm supports while more than 30 per cent declare they are not familiar with the terms *single farm payment* and *cross-compliance*. This lack of information can be explained from the sources of information that farmers declared. The main source consisted of private agricultural extension agents that regularly visit their farms (78.4 per cent), other farmers (77.5 per cent) and from various media like TV or newspapers (73.3 per cent) and only 35 per cent mentioned the local authorities. The above response pattern reveals the lack or weakness of an organized information campaign from both local and central governmental authorities as well as from farm cooperatives.

When asked about their perceptions on the changes the CAP reform is going to have in their region, 89.4 per cent of the questioned farmers agree that the agricultural production in their region will decrease after the implementation of the new regime. With regard to the crop they cultivate the share believing production will decrease is also high (86.2 per cent). Only 29.3 per cent of the respondents believe that the new policy will increase job opportunities outside farming, whereas 39.4 per cent strongly disagree this will be so. Most respondents strongly disagree (83.1 per cent) that employment levels will increase in their specific farming activity in the next five years. Finally, only 2.5 per cent think that farm income arising from the specific crops that they cultivate will increase as a result of the decoupled farm payments. Almost 70 per cent of the farmers responded they will use the single farm payment for investment, around 20 per cent still don't know how they will use the SFP and the rest will use it for leisure. Of those farmers planning to invest the single farm payment, the majority intends to invest it in the farm.

On the other hand, for Hungary, only 12 per cent of respondents declare to have at least a fair amount of information about the CAP reform (21.6 per cent declared they knew nothing as opposed to 5 per cent for Greece) and the corresponding figure for knowing the requirements for direct farm supports is 28 per cent. In addition 82 per cent of the farmers are not familiar with the term *cross-compliance* and 32 per cent with the term *single farm payment*. Concerning their perceptions about the effects of the CAP reform, these are not very positive since 39.9 per cent believe agricultural production will decrease, while only 15.7 per cent think there will be new jobs created outside of agriculture. Almost half of the farmers will use their single farm payment for investment (47.1 per cent) while the rest still don't know, and all of the former are planning to invest inside their farms.

Econometric Model

Using the information provided by the questionnaire, three discrete dependent variables, (namely, *pinvt*, *pnewcrop* and *pofffarm*) were created from the farmers' responses to the following three questions,

- Q1:** In general what is the percentage chance you will increase your capital investment over the next five years? (*pinvt*)
- Q2:** What is the percentage chance that in the next five years you introduce new crops that are not already in your crop mix? (*pnewcrop*)
- Q3:** What is the percentage chance you will increase your off-farm labor activities the next five years? (*pofffarm*)

as follows,

$$pinvt / pnewcrop / pofffarm = \begin{cases} 0 & \text{if the answer is certainly not} \\ 1 & \text{if respondent is uncertain} \\ 2 & \text{if the answer is certainly yes} \end{cases} \quad (1)$$

The responses to the above questions in the questionnaire were numbers from 0% (most unlikely) to 100% (most likely). In order to create the above mentioned dependent variables these responses have been recoded as follows. When the response is 0% then it is recoded to 0 and interpreted as "certainly not", if the response is a number greater than 0% and below 100% it is recoded as 1 and interpreted as "uncertain" and finally when the answer is 100% it is recoded as 2 which corresponds to "certainly yes".

In order to analyze the determinants of the three dependent variables the following three ordered probit models given by equations (2), (3) and (4) were estimated for both Hungary and Greece following Genius *et al.*, (2006) by maximum likelihood methods:

$$pinvt = \begin{cases} 0 & \text{if } \beta'_1 x_1 + u_1 \leq \alpha_1 \\ 1 & \text{if } \alpha_1 < \beta'_1 x_1 + u_1 \leq \alpha_2 \\ 2 & \text{if } \beta'_1 x_1 + u_1 > \alpha_2 \end{cases} \quad (2)$$

$$pnewcrop = \begin{cases} 0 & \text{if } \beta'_2 x_2 + u_2 \leq \gamma_1 \\ 1 & \text{if } \gamma_1 < \beta'_2 x_2 + u_2 \leq \gamma_2 \\ 2 & \text{if } \beta'_2 x_2 + u_2 > \gamma_2 \end{cases} \quad (3)$$

$$pofffarm = \begin{cases} 0 & \text{if } \beta'_3 x_3 + u_3 \leq \delta_1 \\ 1 & \text{if } \delta_1 < \beta'_3 x_3 + u_3 \leq \delta_2 \\ 2 & \text{if } \beta'_3 x_3 + u_3 > \delta_2 \end{cases} \quad (4)$$

where $x_j, j = 1, 2, 3$ is a vector of explanatory variables, $\beta_j, j = 1, 2, 3$ is a vector of parameters to be estimated, $u_j, j = 1, 2, 3$ are independent, standard normal error terms and α_k, γ_k , and $\delta_k, k = 1, 2$ are the threshold constants of the three ordered probit models.

Empirical Results

The explanatory variables included in the x -vectors above, were based on data availability and on *prior* expectations about the factors that affect individual farmers' intentions. The definitions of these variables are presented in Table 1, while their descriptive

Table 1: Variable Definitions

| <i>Variable</i> | <i>Definition</i> |
|-----------------|--|
| PINVT | Discrete variable indicating farm investment intentions (0: certainly not, 1: uncertain and 2: certainly yes) |
| PNEWCROP | Discrete variable indicating new crop cultivation intentions (0: certainly not, 1: uncertain and 2: certainly yes) |
| POFFFARM | Discrete variable indicating off-farm work intentions (0: certainly not, 1: uncertain and 2: certainly yes) |
| SATISF | Dummy variable indicating farmers' level of satisfaction with current situation of his/her farming business (0: very dissatisfied, 1: otherwise) |
| HDAGE | Age of household head in years |
| INFOFARM | Dummy variable indicating whether farmers were informed about CAP reform from other farmers (1: yes, 0: no) |
| INFOINT | Dummy variable indicating whether he/she was informed about CAP reform from the internet (1: yes, 0: no) |
| INFOPASS | Dummy variable indicating whether farmers were informed from passive sources of Information about Cap Reform (a: Agricultural experts, b: Farmers' coops, c: Banks, d: Local unions, d: Local authorities, e: Farmers' unions, f: Extension agents, g: Other). Takes value 1 for yes and 0 for No. |
| EDUC | Dummy variable indicating education level up to secondary school (1: yes, 0: no) |
| CROPONL | Dummy variable indicating only crop activity (no livestock production) (1: yes, 0: no) |
| SIZE | Dummy variable indicating small farms (1: yes, 0: no) |
| INFLEVEL | Dummy variable indicating farmers own perceptions about their level of information about the CAP reform (1: well informed, 0: otherwise) |
| FAMSIZ | Family size in number of persons |
| STRUCTPR | Dummy variable indicating participation in previous farm structural programs (1: yes, 0: no) |
| DCOTTON | Dummy variable indicating cotton cultivation (1: yes, 0: no) |
| DTOBACC | Dummy variable indicating tobacco cultivation (1: yes, 0: no) |
| DVEGETA | Dummy indicating vegetables cultivation (1: yes, 0: no) |
| FARMINC | Family farm income in thousands of euros |
| SPEC | Degree of specialization using Herfindhal index (0-100) |
| EXPER | Years in farming |
| OFFFARM | Dummy variable indicating off-farm employment (1: yes, 0: no) |

Table 2: Descriptive Statistics for the Variables

| <i>Variable</i> | Hungary | | Greece | |
|----------------------|----------------|---------------------|---------------|--------------------|
| | <i>Mean</i> | <i>StdDeviation</i> | <i>Mean</i> | <i>StDeviation</i> |
| PINVT | 0.7647 | 0.5227 | 0.7750 | 0.6239 |
| PNEWCROP | 0.7843 | 0.4992 | 0.6812 | 0.6078 |
| POFFFARM | 0.3791 | 0.5001 | 0.6062 | 0.5506 |
| SATISF | 0.7516 | 0.4335 | 0.5500 | 0.4991 |
| HDAGE | 51.2941 | 9.7312 | 47.9562 | 10.4865 |
| INFOFARM | 0.4641 | 0.5003 | 0.7750 | 0.4189 |
| INFOINT | 0.3137 | 0.4655 | 0.1313 | 0.3387 |
| INFOPASS | 0.6275 | 0.4851 | 0.9187 | 0.2741 |
| EDUC | 0.5490 | 0.4992 | 0.2625 | 0.4414 |
| CROPONL | 0.6601 | 0.4752 | 0.7688 | 0.4230 |
| SIZE ¹ | 0.1699 | 0.3768 | 0.1750 | 0.3812 |
| INFLEVEL | 0.1242 | 0.3309 | 0.2875 | 0.4540 |
| FAMSIZ | 3.5817 | 1.1391 | 3.5875 | 1.2255 |
| STRUCTPR | — | — | 0.3250 | 0.4698 |
| DCOTTON | — | — | 0.4750 | 0.5009 |
| DTOBACC | — | — | 0.3563 | 0.4804 |
| FARMINC ² | 9.4494 | 20.9397 | 15.4074 | 24.1830 |
| SPEC ³ | 0.4670 | 0.2334 | 0.7771 | 0.2631 |
| DVEGETA | 0.2288 | 0.4214 | — | — |
| EXPER | 12.7255 | 6.1411 | 19.2875 | 10.1333 |
| OFFFARM | 0.5163 | 0.5014 | 0.4188 | 0.4949 |

¹ Small farms are those whose size is below the 20 per cent percentile, where size is computed in terms of total acreage for crops and number of heads of livestock.

² In the case of Hungary the computation was done from only 89 valid responses to the family farm income question.

³ For crops the acreage of each crop was used for the index, for livestock the number of heads was used, while for farms involved in both activities the minimum of the two indices was chosen.

statistics for both countries appear in Table 2. At a first glance, the data reveal that both samples (*i.e.*, Hungarian and Greek) display similar intentions concerning future investments in farming operations. However, there are differences concerning crop mix and off-farm work. Hungarian farmers in the Southern Great Plain are more likely to introduce new crops in response to the new agricultural policy regime within the EU, whereas Greek farmers are more willing to work off-farm as a means to sustain their household income and to cope with decoupled farm payments. In addition, Hungarian farmers are older on average by almost 4 years (51.3 versus 47.9 years) and more educated on the average compared to their Greek counterparts since 54.9 per cent have completed up to secondary school in Hungary versus 26.3 per cent in Greece and the percentage of farmers that have only completed primary school is 9.8 per cent in Hungary versus 60.6 in Greece. Household size is similar across the two regions, 3.581 and 3.587 in the *Southern Great Plain* and *Anatoliki Makedonia and Thraki*, respectively.

The level of satisfaction with their farming businesses is considerably higher for farmers in the Hungarian region. As expected the level of information concerning CAP measures is higher for Greek farmers, Greece being an older member state, whereas the internet was relatively more important as a source of this information for Hungarian farmers than for Greek farmers while the reverse holds for passive information sources. This is also confirmed by their own evaluation of their information level which is perceived higher for Greek farmers. There are no significant differences between the two countries with respect to farm size. As a result of CAP implementation, Greek farmers are more specialized (*Herfindhal* index is 0.777 for Greek farmers and 0.467 for Hungarian) while they enjoy a higher average farm income (15.41 versus 9.45 thousands of Euros for Greek and Hungarian farms, respectively). Finally, Hungarian farmers are less experienced (12.7 versus 19.3 years on average) with more off-farm work compared to their Greek counterparts.

The econometric models presented in relations (2), (3) and (4) above were estimated for the two regions separately, using the maximum likelihood method. The likelihood ratio test statistic was utilized to select the set of explanatory variables included in the final estimated equations. After several attempts and experimentation using different variables as explanatory ones in the three equations, the specifications shown in Tables 3, 4 and 5 was reached. The signs of the estimated coefficients provide information about the direction, but not on the absolute magnitude, of the effects of explanatory variables on the three different probabilities: to invest in farming, to introduce new crops and to increase work off-farm. The corresponding marginal effects calculated using these parameter estimates are presented in Table 6 next. Note that Table 6 gives us information as well about those factors that contribute to respondents giving uncertain

Table 3: Parameter Estimates of the Farm Investment Intentions

| <i>Variable</i> | Hungary | | Greece | |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| | <i>Estimate</i> | <i>StdError</i> | <i>Estimate</i> | <i>StdError</i> |
| SATISF | 0.4032 | 0.2734 | — | — |
| HDAGE | -0.0319 | 0.0122* | -0.0401 | 0.0110* |
| INFOFARM | -0.5844 | 0.2218* | 0.6274 | 0.2519* |
| INFOINT | 0.3775 | 0.2614 | 0.4644 | 0.3071 |
| INFOPASS | -0.4247 | 0.2396** | 0.9160 | 0.3843* |
| EDUC | -0.7470 | 0.2733* | — | — |
| CROPONL | -0.6814 | 0.2922* | -0.9359 | 0.3056* |
| SIZE | -0.3722 | 0.2915 | 1.0634 | 0.4031* |
| INFLEVEL | — | — | -0.4547 | 0.2408** |
| STRUCTPR | — | — | 0.5240 | 0.2393* |
| DCOTTON | — | — | 0.6541 | 0.3062* |
| Constant | | | | |
| α_1 | -3.3874 | 0.8640* | -1.2322 | 0.6884** |
| α_2 | -0.5971 | 0.7226 | 0.8031 | 0.6567 |
| log-likelihood | -98.9747 | | -123.7853 | |

*/**Significant at the 5/10 percent level.

Table 4: *Parameter Estimates of the New Crop Cultivation Intentions*

| <i>Variable</i> | Hungary | | Greece | |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| | <i>Estimate</i> | <i>StdError</i> | <i>Estimate</i> | <i>StdError</i> |
| INFLEVEL | -0.7786 | 0.3665* | 0.3522 | 0.2750 |
| HDAGE | — | — | -0.0208 | 0.0108** |
| INFOFARM | 0.3612 | 0.2454 | 0.4708 | 0.2548** |
| INFOINT | 0.3558 | 0.2500 | — | — |
| FAMSIZ | 0.1842 | 0.1063** | — | — |
| SPEC | -1.5754 | 0.5775* | -0.4689 | 0.4636 |
| SIZE | -0.7091 | 0.4156** | — | — |
| DVEGETA | 0.6098 | 0.3558** | — | — |
| DCOTTON | — | — | 0.7005 | 0.2298* |
| EXPER | 0.0275 | 0.0208 | — | — |
| STRUCTPR | — | — | 0.6216 | 0.2880* |
| Constant | | | | |
| γ_1 | -0.9879 | 0.6173 | -0.7186 | 0.6242 |
| γ_2 | 1.8402 | 0.6214* | 1.4683 | 0.5983* |
| Log-likelihood | -93.8027 | | -118.0781 | |

*/** Significant at the 5/10 percent level.

Table 5: *Parameter Estimates of the Off-Farm Work Intentions*

| <i>Variable</i> | Hungary | | Greece | |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| | <i>Estimate</i> | <i>StdError</i> | <i>Estimate</i> | <i>StdError</i> |
| INFLEVEL | -0.5760 | 0.3278** | 0.4291 | 0.2417** |
| HDAGE | -0.0167 | 0.0110 | — | — |
| FAMSIZ | 0.1928 | 0.0935* | — | — |
| INFOFARM | — | — | 0.3599 | 0.2413 |
| INFOINT | 0.6358 | 0.2395* | — | — |
| INFOPASS | 0.4581 | 0.2537 | — | — |
| DTABAC | — | — | 0.8096 | 0.2352* |
| OFFFARM | 0.3838 | 0.2317** | 0.3105 | 0.2041 |
| FARMINC | — | — | 0.0034 | 0.0033 |
| STRUCTPR | — | — | 0.5512 | 0.2288* |
| Constant | | | | |
| δ_1 | 0.8194 | 0.7397 | 0.8437 | 0.2828* |
| δ_2 | 3.3178 | 0.8518* | 3.1140 | 0.4015* |
| Log-likelihood | -92.8289 | | -117.8781 | |

*/** Significant at the 5/10 percent level.

Table 6: *Marginal Effects Estimates*

| <i>Variable</i> | <i>Effects on Investment Intentions</i> | | | | | |
|-----------------|---|---------|---------|---------------|---------|---------|
| | Hungary | | | Greece | | |
| | P(Y=0) | P(Y=1) | P(Y=2) | P(Y=0) | P(Y=1) | P(Y=2) |
| SATISF | -0.1328 | 0.1175 | 0.0154 | — | — | — |
| HDAGE | 0.0099 | -0.0084 | -0.0015 | 0.0140 | -0.0090 | -0.0050 |
| INFOFARM | 0.1821 | -0.1551 | -0.0270 | -0.2328 | 0.1714 | 0.0614 |
| INFOINT | -0.1105 | 0.0901 | 0.0205 | -0.1458 | 0.0709 | 0.0750 |
| INFOPASS | 0.1258 | -0.1034 | -0.0224 | -0.3503 | 0.2854 | 0.0648 |
| EDUC | 0.2227 | -0.1828 | -0.0399 | — | — | — |
| CROPONL | 0.1926 | -0.1513 | -0.0414 | 0.2744 | -0.1043 | -0.1701 |
| SIZE | 0.1243 | -0.1108 | -0.0135 | -0.2895 | 0.0737 | 0.2158 |
| INFLEVEL | — | — | — | - 0.1651 | -0.1155 | -0.0496 |
| STRUCTPR | — | — | — | -0.1728 | 0.0967 | 0.0761 |
| DCOTTON | — | — | — | -0.2239 | 0.1380 | 0.0859 |
| <i>Variable</i> | <i>Effects on New Crop Intentions</i> | | | | | |
| | Hungary | | | Greece | | |
| | P(Y=0) | P(Y=1) | P(Y=2) | P(Y=0) | P(Y=1) | P(Y=2) |
| INFLEVEL | 0.2727 | -0.2512 | -0.0215 | -0.1274 | 0.0968 | 0.0305 |
| HDAGE | — | — | — | 0.0078 | -0.0062 | -0.0016 |
| INFOFARM | -0.1064 | 0.0885 | 0.0179 | -0.1814 | 0.1530 | 0.0284 |
| INFOINT | -0.1005 | 0.0809 | 0.0196 | — | — | — |
| FAMSI | -0.0549 | 0.0462 | 0.0087 | — | — | — |
| SPEC | 0.4698 | -0.3952 | -0.0745 | 0.1754 | -0.1402 | -0.0352 |
| SIZE | 0.2423 | -0.2204 | -0.0219 | — | — | — |
| DVEGETA | -0.1577 | 0.1161 | 0.0416 | — | — | — |
| DCOTTON | — | — | — | -0.2558 | 0.1991 | 0.0567 |
| EXPER | 0.0082 | -0.0069 | -0.0013 | — | — | — |
| STRUCTPR | — | — | — | -0.2195 | 0.1612 | 0.0583 |
| <i>Variable</i> | <i>Effects on Investment Intentions</i> | | | | | |
| | Hungary | | | Greece | | |
| | P(Y=0) | P(Y=1) | P(Y=2) | P(Y=0) | P(Y=1) | P(Y=2) |
| INFLEVEL | 0.1914 | -0.1892 | -0.0022 | -0.1626 | 0.1375 | 0.0251 |
| HDAGE | 0.0062 | -0.0061 | -0.0001 | — | — | — |
| FAMSI | -0.0717 | 0.0705 | 0.0012 | — | — | — |
| INFOFARM | — | — | — | -0.1420 | 0.1278 | 0.0142 |
| INFOINT | -0.2417 | 0.2354 | 0.0064 | — | — | — |
| INFOPASS | -0.1653 | 0.1626 | 0.0027 | — | — | — |
| DTABAC | — | — | — | -0.2991 | 0.2468 | 0.0523 |
| OFFFARM | -0.1417 | 0.1391 | 0.0025 | -0.1201 | 0.1043 | 0.0158 |
| FARMINC | — | — | — | -0.0013 | 0.0012 | 0.0002 |
| STRUCTPR | — | — | — | -0.2075 | 0.1745 | 0.0330 |

answers, represented by the columns $P(Y=1)$. Thus farmers receiving information from passive sources are more likely to be uncertain about their future investment decisions than those not receiving it in the case of Greece while the contrary holds for Hungary, likewise the same pattern holds for the variable representing information from other farmers. Older farmers in both samples are less likely to be uncertain about their future activities than younger ones and more specialized farmers are as well less uncertain with respect to introducing a new crop in the future.

Looking first at the farm investment intentions presented in Table 3, the age of the farmer, information from other farmers about the CAP reform and specialization in crop production are the most important factors affecting individual responses. For both samples, the econometric estimates imply that the older the farmer is the less he/she is willing to increase investments on farm as a response to CAP reform (both parameter estimates are negative and statistically significant at the 5 per cent level). As farmers are getting old, their planning horizon for their business operation is shortened making them less willing to undertake the risk of a new investment (Koundouri *et al.*, 2006). On the other hand, interestingly enough, the level of information about new CAP measures affects negatively investment intentions of Greek farmers while they were highly insignificant for Hungarian farmers and therefore not reported here. Probably the negative repercussions about decoupled payment may explain this negative parameter estimate.

Turning now to the different channels of information about the CAP reform, the reader should note that opposite effects are obtained for two of the variables. Hence, while using other farmers as information channel increases the probability of future investments in the case of Greek farmers the effect is negative for Hungarian farmers. Moreover, the same result is obtained concerning the passive source of information which is the most important source informing both Greek and Hungarian farmers about the CAP implementation. The negative relationship observed for the Hungarian sample may be again due to the lack of information of rural stakeholders (*e.g.*, agricultural unions, cooperatives, extension agents, banks) who are primarily responsible for informing final users about the CAP policies. Contrary for the Greek sample, farmers' intentions are greatly affected positively by passive information sources who are the main channel of information acquisition concerning both CAP and rural development measures. Specialization in crop production affects negatively both samples. The fact that annual crops are mostly affected by decoupled payment schemes is making farmers in both countries less responsive to expand their farming operations.

Small farm size seems to affect only Greek farmers as the corresponding parameter for the Hungarian sample turned out to be statistically insignificant. This could be explained by the fact that small Greek farms in the region of *Anatoliki Makedonia and Thraki* are probably smaller than the minimum efficient size that minimizes average cost of farm production, making farmers more willing to invest and expand further their businesses. The same applies for cotton producers who consider farm investment as a means to cope with the significant reduction in their income support payments under the new regime. Participation in other structural farm programs in the past is a favorable condition for further investments in Greek operations.

Moving now to the new crop cultivation intentions, the econometric results presented in Table 4 provide some useful insights about the future prospects of Greek and Hungarian farmers. Hungarian respondents who perceive themselves as being well informed

about the CAP reform are less willing to move away from the traditional crops they produce. The same is true for specialized farmers who have gained through years a sufficient know-how with respect to their cultivation which they do not want to give away. This is stronger for those farmers who do not cultivate vegetables and are in contrast specialized in corn and pig production. Finally, small-sized farms are less willing to alter their crop mix moving into new cultivations, while family size affects positively the probability of introducing a new crop.

Concerning Greek farmers, the age of the household head is the most serious obstacle against changing crop mix. Information acquisition from other farmers seems to affect positively their intentions. Cotton growers who suffer significant income losses after abolishing the protective policy scheme are more willing to find alternative cultivations to sustain their farming income outside monoculture.

Finally, concerning off-farm work intentions, the econometric results presented in Table 5 suggest that there are significant differences between the two samples of farmers. Being already engaged in off-farm employment activities increases the probability of future increases in off-farm work in the case of Hungary while it is not significant in the case of Greece. Hungarian farmers accessing information about the CAP policy from passive sources (*e.g.*, agricultural unions, cooperatives, extension agents) are more willing to work off-farm probably getting a negative picture about the future course of farming activities within the EU. However, those farmers who believe they are informed about the CAP reform are less willing to work off-farm than the rest to sustain their income, probably implying that when the CAP measures are fully understood then perspectives with respect to the future become less negative. On the other hand, family size plays an important role enhancing off-farm employment as farmers are becoming more risk averse trying to find sources to sustain their standard of living. The situation is the opposite for Greek farmers who perceive CAP reform as being against their family income and thus more informed farmers are more willing to increase off-farm work. Finally, their experience with structural or other agricultural policy measures improves their perspective about employment opportunities in rural areas and therefore increase their willingness to work off-farm.

Concluding Remarks

Using data from a recent survey undertaken in two indicative regions of Greece and Hungary (*i.e.*, *Anatoliki Makedonia and Thraki* and *Southern Great Plain*), the present research analyzes farmers' intentions and perceptions with respect to the recent major reform of the Common Agricultural Policy. Both regions are greatly based on farming activities for their economic prosperity and therefore any change in the policy context is expected to affect significantly their future course. The survey results reveal that in both regions there is a lack of sufficient information concerning CAP changes which is more evident for Hungarian farmers who have recently entered the EU. Basic policy instruments included in the CAP schemes are unknown to Hungarian farmers who are mainly informed through intra-farm communications and not from an official based network. On the other and, Greek farmers are quite negative concerning the future course of their farming activities expressing their negative perceptions against the single farm payment

scheme. Both samples of farmers are not positive concerning rural development measures aimed to restructure rural activities in their region.

Concerning their future intentions, the econometric results provide some useful insights that can prove helpful for the future revisions of CAP schemes. Although farmers in both samples declared they are likely to increase their capital investment, this decision is greatly influenced by the sources of information about the CAP reform and, in the case of Greece, by the level of information. It could be the case that rural stakeholders in the Southern Great Plain might be conveying negative signals about the effects of the reform and are not very successful in helping farmers to cope with the new conditions brought about the implementation of the new policy scheme. On the other hand, passive information sources contribute positively in revising Greek farmers' intentions towards investing into their businesses.

Greek farmers are less willing to change their traditional crop mix maybe due to their comparatively higher degree of specialization while they are more willing to increase their work outside of the farm, therefore expressing negative perceptions against the policy regime. The low information level seems to affect that reaction and given the structural difficulties faced by them it is necessary to develop a complete organized extension network to assist farmers in coping with the difficulties they will face under a more competitive globalized agricultural market environment. Hungarian farmers, on the other hand, seem to be more flexible in revising their cultivation practices and more willing to focus on their farming activities. In both countries farmers with more financial pressure, namely tobacco producers in Greece and farmers with large families in Hungary, are willing to work off-farm as a means of sustaining their income. Finally, since off-farm working opportunities are going to be greatly affected by rural restructuring policies under the new development priorities set by the European Commission, it is crucial for the sustainability of rural areas that development plans be devised soon targeting the real restructuring of the countryside.

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