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DID THE CAP REFORM AFFECT OFF-FARM LABOUR PARTICIPATION IN ITALIAN FARMS?

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Paper prepared for presentation at the 1st AIEAA Conference
'Towards a Sustainable Bio-economy: Economic Issues and Policy Challenges'

4-5 June, 2012
Trento, Italy

Summary

The process of change in the Common Agricultural Policy (CAP) from trade and market distorting measures to more neutral interventions has been long, but in this process the 2003 reform (the so-called Fischler reform) has been the most important step, leading to a more decoupled, and hence less market distorting, support (Oecd, 2004) and introducing the fully decoupled Single Farm Payment Scheme (SFP). In this paper, we estimate a model of operators' off-farm labour participation from a panel of Italian COP farms drawn from the FADN. To this purpose we use a random effects probit model, thus controlling for unobserved heterogeneity.
The results suggest that the effects of the reform on off-farm labour participation, if any, are weak. No variable directly related to the CAP reform is significant. These results are not in contrasts with the theoretical considerations, since the reform entails both wealth and substitution effects that tend to offset each other. Also, rigidities in the labour market tend to contrast adjustments to the changing conditions. Our results also suggest that changes in relative prices affect off-farm labour participation of farm operators, but that this effect depends on the labour intensity of the different crops. Therefore, the effects of the reform on off-farm labour participation can be due to these changes, but the role of the CAP reform in the changes in relative prices is uncertain, and out of the scope of this paper.

Keywords: CAP reform, off-farm work, farm household

JEL Classification codes: J220, J430, Q120, Q180

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1. INTRODUCTION

The process of change in the Common Agricultural Policy (CAP) from trade and market distorting measures to more neutral interventions has been long, but in this process the 2003 reform (the so-called Fischler reform) has been the most important step, leading to a more decoupled, and hence less market distorting, support (Oecd, 2004). Indeed, the Fishler reform is not only addressed to decoupling. Also the improvement of European agriculture competitiveness, agro-environmental concerns, rural development and the tailoring of the CAP tools to the need of Member States and their territories were specific features of the reform (De Vivo et al, 2011). Though, the most important measure was the implementation of the fully decoupled Single Farm Payment Scheme (SFP), as reported in EC Regulation 1782/2003. The SFP provides income support to farmers independently of their current production decisions.

Though Member States had the possibility to implement the reform gradually, in Italy the decoupling was immediately implemented in the first possible year (2005). Also, disregarding the possibility to introduce forms of regional distribution of the direct subsidies, Italy decided to stick to the so-called historical criterion. Farmers were granted their SFP according to an entitlement based on the coupled subsidies they received in the reference period 2000-2002. Moreover, with regards to the cereal, oilseed, and protein crops (COP), Italy decided for a full decoupling[1]. This makes the Italian implementation an easier case study for assessing the effects of the reform we are interested in.

The Fischler reform has far-reaching potential effects, ranging from changes in the relative prices of agricultural products, to price volatility, to effects on capital and land markets, to cite only some. Apart from several ex-ante evaluations, among which the most important is probably the impact assessment of the EU (European Commission, 2003), and some simulations based on farm behaviour before the reform, a certain number of studies try an ex-post assessment of the effects of the reform. Blanco et al. (2008), analyse changes in cropping patterns as a consequence of the Fischler reform. Gallerani et al. (2008) focus on the investment behaviour. Bartolini et al. (2011) analyse the effects of the CAP on the innovation process of farms. De Vivo et al. (2011) show that after the 2003 reform both those farms that kept their COP specialisation and those that changed it increased their income.

The CAP reform might also affect agricultural labour markets. We are particularly interested in the effects of the reform on off-farm labour participation. Off-farm labour participation (or pluriactivity) is widespread among family farm households, and is increasing in developed countries, so that off-farm

[1] According to the reform, up to 25% of the payments could initially remain coupled or, alternatively, up to 40% of the durum wheat supplement payment could be retained.

incomes are an increasing part in farm household income (Oecd, 2003; Eurostat, 2002). Combining on- and off-farm work, at the individual and/or at the household level, is indeed an efficient use of households' labour resources, and allows a growth and a stabilization of household income. Hence the importance of this issue, in particular in a rural development perspective. The agricultural sector affects local labour markets, and it is of interest for policy-making having an assessment of how and how much changes in agricultural policy translate into changes in those markets. More so, in that creating and maintaining jobs in agricultural and rural areas has been a traditional goal of the CAP.

So far, empirical analysis on this issue, and more generally on the effects of the CAP reform on labour use in agriculture, has been rather scarce[2]. Ooms and Hall (2005) simulate the effects of the CAP reform for a sample of Dutch dairy farms, finding that its impact both on on-farm (positive) and on off-farm labour supply (negative) are weak. Olper *et al.* (2011) examine at an aggregate regional level the determinants of labour out-migration from agriculture in different EU regions and include, among the determinants, CAP payments. They conclude that CAP payments, in particular direct subsidies, contribute significantly to job creation in agriculture. By contrast, Petrick and Zier (2011) from an econometric analysis of the impact of the reform in 3 regions in Germany draw the result that in general the reform decreased agricultural employment.

More research has been produced on the effects of decoupled subsidies in the USA (El-Hosta *et al.*, 2004; Ahearn *et al.*, 2006; Dewbre and Mishra, 2002; Serra *et al.*, 2005; Goodwin and Mishra, 2004). These analyses are generally based on a comparison between pre-1996 FAIR Act and the following period, and/or on the comparison of the effects of more coupled payments, like marketing loans or loan deficiency payments, to those of more decoupled payments, like marketing loss assistance payments and agricultural transition payments (Burfisher and Hopkins, 2004). The results are mixed. Some are compatible with theoretical predictions, like the result that both coupled and decoupled payments decrease off-farm work hours (Goodwin and Mishra, 2004; El-Hosta *et al.*, 2004). Others are puzzling: e.g. Ahearn *et al.* (2006) find no significant difference in the impact of different payment types on off-farm labour participation, which is negative for both; El-Hosta *et al.* (2004) find that decoupled payments have a positive effect on on-farm work, while the coefficient is not significant for coupled payments[3]. Anyway, in general, the magnitude of the effects is strikingly small. In the US case, it is nevertheless unclear to what extent decoupled payments substituted for coupled payments. For on- and off-farm work, substitution between the two forms tends to offset each other, which could explain to a certain extent these results. This is not the case for the effect on total work, for which the effect is independent from the specific form of payment, and the results suggest that in the USA case the wealth effect on total work is indeed small.

To the best of our knowledge, so far no study has been produced ex-post on the labour use effects of decoupled payments at the farm level in Europe. In this paper, we will focus on the effects of the CAP reform on off-farm labour participation of family farms. To this purpose, we utilise a panel of Italian family

[2] Quantitative analysis in the EU are scarce also on the determinants of off-farm labour participation (Benjamin *et al,* 1996*;* Benjamin and Kimhi, 2006; Bjørnsen, 2004; Weiss, 1999; Woldehanna, Lansink and Peerlings, 2000; Corsi, 1994; Salvioni *et al.*, 2008) and, due to the lack of good data, generally the determinants do not include agricultural prices or non-labour income.

[3] Some factors can prevent or dampen farmers' response to the policy change. Among them, nonpecuniary returns from living a farming lifestyle (Ahearn *et al.*, 2006; Key and Roberts, 2009), effects of decoupled payments on farmers' risk aversion (Serra *et al.*, 2005), expectations that future payments will also be tied to past yields and production choices (El-Hosta *et al.*, 2004), a factor that though is not likely to play a role in the EU, where the commitment of the EU to the policy change is very clear.

farms drawn from the Farm Accounting Data Network (FADN) of the EU, and specifically for the COP sector.

The structure of the paper is as follows. Section 2 will present the theoretical framework and the econometric strategy. In Section 3 the data on which the analysis is based will be presented. The estimation results will be presented and commented in Section 4. Some considerations will conclude.

2. THEORETICAL MODEL AND ECONOMETRIC STRATEGY

The theoretical approach follows Corsi (2007 and 2008). The CAP reform is quite articulated, but its main feature is in essence a trade off of a coupled support with direct payments. This is clearly the "philosophy" of the Reform itself, and it is quite explicit in the norms prescribing that the budget allocated to coupled support should shift to SFP. While coupled payments can take many forms, their reduction is theoretically equivalent to a decrease in the average revenue received by farmers, i.e., is equivalent to a price decrease[4]. The overall impact of the Fischler reform can be therefore analysed as the introduction of i) a direct payment, compensating for ii) a price decrease (equivalent to the abolition or reduction of coupled payments).

Assuming a competitive labour market, and no farmer preference for farm rather than for off-farm work, according to the farm-household models (Nakajima, 1986; Singh et al. 1986; Huffmann, 1991), the farmer (for simplicity, we consider a single farmer) is assumed to maximise utility over consumption and leisure, under income and time constraint. The income constraint comprises both farm income and off-farm wages. The model is as follows:

$$\begin{aligned}
&Max\, U = U(C, L; H, Z_H) \\
&S.t.: \\
&T = F + M + L \\
&L > 0 \qquad\qquad (1) \\
&F, M \geq 0, \\
&Q = f(F, X; H, Z_F) \\
&(p+s)Q - RX + \sum WM + V = C
\end{aligned}$$

where: C is consumption (or, equivalently under the assumption of a composite good, income); L is leisure; H is a vector of personal variables; Z_H a vector of characteristics of the household; T is total available time; F and M are time spent working on the farm and off the farm, respectively; Q is the quantity of the good produced by the farm; p its price; s the coupled payment per unit of output; X is the vector of hired inputs and R the vector of their relevant prices; Z_F the vector of farm characteristics; W is off-farm market wage; V is non-labour income. The utility function and the production function are assumed to be well-behaved.

The Kuhn-Tucker maximisation conditions yield the following off-farm participation conditions:

$$\delta(p+s)Q / \delta F \leq \mu / \lambda \qquad (2)$$

$$W \leq \mu / \lambda \qquad (3)$$

[4] Even when coupled payments are area-based or animal-head-based, for a given yield or animal production their reduction or abolition is the same as decreasing the received price. Of course, since yields and area-based coupled payments were different, and since following the reform the crop mix and the factor use can be changed, the "price decrease" is not the same for all farmers, which makes this effect different from an actual price change, that would be the same for all.

where μ and λ are the marginal utilities of leisure and income, respectively.

In a pluriactive farm, equations (2) and (3) hold as equalities:

$$\delta(p+s)Q\ /\delta F = W \quad (4)$$

$$W = \mu/\lambda \quad (5)$$

That is, the marginal value product of farm labour (inclusive of the coupled support) is equal to the market wage and to the leisure-income Marginal Rate of Substitution (MRS). Using this model, the impact of a direct payment has long been established (El-Osta *et al*., 2004; Ahearn *et al*., 2004): a decoupled direct payment is tantamount to an increase in non-labour income. Assuming leisure is a normal good, it will increase the time allocated to leisure and, hence, decrease total time allocated to work. Nevertheless, if production decisions are separable from labour allocation decisions, and no change is introduced in farm prices, total labour allocated to farm work does not change. Hence, for a farmer participating to off-farm work, a decoupled direct payment will decrease off-farm work. Though, if production and labour allocation decisions are not separate, it is unclear which work will be reduced.

While direct payments only have a wealth effect, a decrease in coupled support (i.e., a decrease in the average revenue of the agricultural output) has both a wealth and a substitution effect. The decrease in the marginal value product of family farm labour induces a reduction of on-farm work. The optimal on-farm work is now $\delta pQ\ /\delta F = W$ and, since $\delta pQ/\delta F < \delta(p+s)Q/\delta F$ for any labour quantity and given the diminishing marginal returns to farm labour, the optimal on-farm labour is decreased. At the same time, the decrease in income decreases the MRS, so that the farmer consumes less leisure. Hence, the overall result is an increase in off-farm work.

As the CAP reform is a combination of an income payment and of a decrease in the average revenue, the two effects operate in opposite directions. This is an issue not considered in previous studies of decoupled payments, that analyse them *per se*, while in the case of the CAP reform, the real issue is the result of introducing the decoupled payment *and, at the same time,* abolishing the coupled one. Therefore, additional hypotheses about the amount of decoupled payments relative to the price decrease following the abolition of the coupled payments are to be taken. The assumption could be made, in the spirit of the reform, that at the farm level the decoupled subsidy exactly compensates for the pre-reform farm income ("exact compensation"), i.e., that

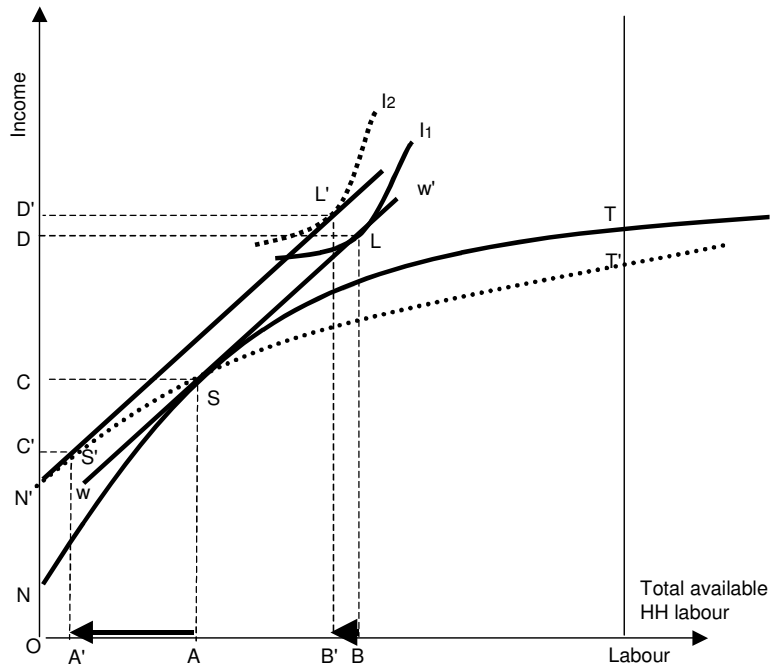
$$(p+s)Q_1\text{-}RX = pQ_1 - RX + SFP \quad (6)$$

where Q_1 is the pre-reform output, and SFP is the decoupled payment. Assuming that the abolition of the coupled payment reduces the relevant price, the model predicts that the CAP reform reduces on-farm work and, hence, farm output[5]. The effects of the reform under the assumption of "exact compensation" are graphically depicted in Figure 1. In the pre-reform situation, the farmer has a non-labour income ON. The curve NST depicts levels of farm income corresponding to different levels of on-farm labour, and the decreasing slope reflects the diminishing marginal value product of on-farm labour. The slope of the ww' line is the wage rate. Assuming free access to the labour market, the farmer works on the farm as long as the marginal return of his on-farm labour is greater than the wage rate, i.e. for quantity OA. The overall income possibility curve is therefore NSL. Off-farm labour is provided until the wage rate is equal to the income-leisure MRS, shown by the slope of the indifference curve I_1, and total off-farm labour is AB. The abolition

[5] Since the implementation of the reform, many agricultural prices increased, even dramatically. This is due to other factors, and obscures the direct effect of the reform.

of the coupled payment decreases the marginal value productivity of on-farm labour, but a decoupled payment NN', shifting upwards the income possibility curve, is granted to the farmer, such that the new on-farm income line N'ST', stemming from the abolition of the coupled subsidy and by the introduction of the decoupled subsidy NN', crosses the pre-reform line NST exactly at point S. As a result, if the pre-reform on-farm labour were maintained, after the reform farm income NC, inclusive of decoupled subsidy NN', would be equal to the pre-reform one.

Figure 1. Effects of the CAP reform on a pluriactive farm.



But even under the assumption of decoupled subsidy exactly compensating the pre-reform farm income, no theoretical prediction on off-farm work is possible. While on-farm work is unambiguously reduced, the new income possibility curve lies above the original one in the relevant portion of off-farm work. Therefore, the farmer consumes more leisure, and total work is reduced. The overall effect on off-farm work depends on whether the decrease of farm work (depending on the substitution effect and shown as AA' in Figure1) is larger or smaller than the decrease in total work (due to the wealth effect and shown as BB')[6]. The overall conclusion of this analysis is that the effect of the reform must be assessed empirically.

Three important further remarks must be added. First, adjustments of the production mix following the abolition of the coupled support are possible, due to the elimination of price distortions. If formerly subsidized crops are to a certain extent dismissed by farmers, the drop in supply can increase their price and also make the decrease in average revenue less severe than the abolition of the coupled subsidy for those farmers continuing the same production. Hence, a decrease in farm work is less likely than if no adjustment were possible. Supply of formerly non-subsidized crops is likely to grow, which, ceteris paribus, would

[6] Remark nevertheless that under "exact compensation",, a welfare gain is accrued to the farmer. This obviously stems from the possibility of adjusting on- and off-farm labour supply to the new conditions. In Figure1, the welfare gain is shown by considering that the post-reform equilibrium in L' lies on the indifference curve I_2, which is at a higher utility level than the indifference curve I_1 on which lies L, the pre-reform equilibrium point.

imply a price drop. Therefore, farmers not receiving decoupled payments will suffer a price decrease without any compensation, with the resulting trend to increasing off-farm labour supply.

Second, the equality between coupled payments and decoupled payments holds, at best, at a regional level, not at a farm level. Hence, "over-compensation" or "under-compensation" from the CAP reform are probably widespread. The former tends to reduce off-farm labour, ceteris paribus, while "under-compensation" makes an increase in off-farm work more likely.

Though there is no theoretical prediction to the direction of the changes in off-farm labour participation, these remarks lead to three issues to be considered in the empirical analysis: a) all farms are affected, though at different degrees, by the price adjustments following the reform, but b) not all farms adjusted their production mix; and c) the amount of the individual decoupled payment directly impacts on the wealth effect of the reform on labour choices.

For the empirical analysis, we focus on family farms, and we take as the variable of interest the participation of the farm operator in off-farm work. Hence, the dependent variable is a dummy variable indicating the farm operator having an off-farm activity.

We exploit the panel nature of our data to ascertain the effects of the reform on off-farm labour participation, and we control for unobserved heterogeneity through random effects models. We insert explanatory variables usually employed for these analyses, referring to farm characteristics, personal characteristics, and household characteristics. The effects of the change in CAP are captured by another set of variables.

The model we employ is a random effects probit model (Cameron and Trivedi, 2005), so that:

$$\text{Prob}(y_{it}=1) = \Phi(\beta \mathbf{x}_{it} + \varepsilon_{it} + u_i)$$

where y_{it} is a dummy variable equal to 1 if the farm operator participates in off-farm work, else 0, $\mathbf{x}$ are explanatory variables and β parameters to be estimated. Φ is the normal cumulative density function, u_i is an individual idiosyncratic term and ε_{it} is a random component, uncorrelated across individuals and years.

3. DATA

This study relies on data collected by the Italian Farm Accountancy Data Network (FADN) survey. The survey started to be conducted on a statistically representative basis in 2003. The sample is stratified according to criteria of geographical region, economic size (ESU) and type of farm (TF)[7]. The field of observation is the total of commercial farms, that is farms with an economic size greater than 4 ESU (4,800 euro).

In this study we make use of a 5 waves balanced panel of 437 farms containing only those holdings practicing TF 1310 in year 2003, i.e. specialist cereals (other than rice), oilseed and protein crops (COP) for which information were collected in all years from 2003 to 2007. We only kept family farms[8]. Table 1 presents the descriptive statistics for the dependent and explanatory variables.

[7] The Farm Accounting Data Network of the European Union defines a farm as specialised in a TF if the Standard Gross Margin (SGM) for the particular production covers more than 2/3 of total SGM. SGMs are calculated as the balance between a standard value of production and a standard value of certain specific costs, determined for the various crop and livestock characteristics within each region, and are stratified in ESUs.

[8] Farms that were not sole ownership or private partnership were not considered in this analysis

The dependent variable is a dummy variable indicating whether the farm operator works off the farm. The share of farms operators having an off-farm job is 10.1 percent over the whole 2003-2007 period, and increases from 9.6 percent in 2003 to 11.9 percent in 2007, but with a drop to 8.2 percent in 2005.

Following previous research, we use three categories of explanatory variables to specify the model for off-farm participation decision: individual, farm and local market characteristics.

Individual attributes include age, age squared and gender of the operator, while it was not possible to control for the effect of education since this information is not collected by the survey. Modelling off-farm work participation of household in response to decoupling is quite new, hence there is no established prediction concerning their age patterns.

The household non-labour incomes, i.e., capital income and pensions, are used to explore the existence of a wealth effect. Larger values are expected to have a negative effect on off-farm participation. Unfortunately, we only have the information about the household having or not these kinds of incomes, so they are measured as dummy variables.

Farm characteristics include farm size (in hectares); farm location (Mountain, Hills and Plains as base category); total debts in thousand Euro; degree of mechanization, given by horse power per hectare of land; working capital in thousand Euro; presence of direct selling and a dummy for organic farming.

Table 1 - Descriptive statistics of the variables

	Mean	Std.Dev.
share of off-farm labour participants 2003-2007	0.101	0.301
share of off-farm labour participants 2003	0.096	0.295
share of off-farm labour participants 2004	0.101	0.301
share of off-farm labour participants 2005	0.082	0.275
share of off-farm labour participants 2006	0.105	0.307
share of off-farm labour participants 2007	0.119	0.324
UAA (ha)	53.37	88.91
Share of land in property	0.66	0.39
Total Debts (1000 Euro)	3.63	22.89
Hp/UAA	9.38	8.29
Working capital (1000 Euro)	73.84	97.00
Pension income (0,1)	0.28	0.45
Capital income (0,1)	0.01	0.11
Direct sales (0,1)	0.17	0.38
Organic farming (0,1)	0.03	0.18
Hills (0,1)	0.41	0.49
Mountain (0,1)	0.08	0.27
Operator's age	57.27	14.20
Operator's age squared	3481.50	1644.57
Operator's gender (1=M, 2=F)	0.80	0.40
Single Farm Payment (1000 Euro)	9.50	2.38
Relative COP/Crops price Index (2005=1)	1.10	9.82
Agricultural to total employment (%)	6.41	4.39
AV per inhabitant (1000 Euro)	21.51	4.80
AV per LU in agriculture/AV per LU total (%)	43.38	10.34

Farm size is usually expected to decrease off-farm participation, since larger farms are usually more profitable, which makes off-farm labour comparatively less attractive. Mountain and hill farms are typically characterized by low returns. Accordingly, the farm location in Mountains and Hills should be expected to positively affect off-farm participation of farm household members trying to increase total household income with alternative off-farm incomes. Nevertheless, these areas typically also provide less job opportunities, which would have the opposite effect. The higher the debt the higher the service farmers have to pay to lenders. This provides an incentive to farm households to work off-farm in order to find new sources of income to pay back the debt. There are no clear theoretical expectations regarding the sign of the coefficient of mechanization. The use of machines could reduce the labor hours required on farms and in this way increase the probability of off-farm labour participation. On the contrary a high investment in machinery could be a sign of a deep commitment of the household in the farm activities and, more importantly, could raise farm income. High levels of working capital are expected to increase productivity and to lower off-farm labour attractiveness. The use of organic farming is anticipated to reduce the likelihood of off-farm work, given the higher labour requirements of these farming systems, as compared to conventional farming. Finally, direct selling is labour intensive, and should reduce off-farm activities.

The variables describing the local labour market and the external economic environment are at Provincial level (Province are administrative bodies corresponding to the NUTS-3 level of Eurostat). All data are provided by Istat, i.e. the national official statistical agency. Value Added per employed in agriculture as a percentage of overall Value Added per employed is introduced trying to capture the average labour income differential between agriculture and the overall economy at the local level. It is drawn from National accounting data published by Istat. The source is the same for the variable showing the percentage of agricultural to total employment, introduced to account for job opportunities outside agriculture[9]. A high gap between agricultural income and the average income in the overall economy is a priori expected to induce off-farm labour participation.

We introduced the amount of SFP annually received by individual farms to detect the effect of the reform. It is both an indicator of the policy structural change and of the intensity of the intervention. Since SFP is allocated based on historical production mix, it is to be considered as exogenous (in fact, decoupling aims at making public support exogenous to production choices). The amount of the SFP is farm-specific, and its impact is a pure wealth effect.

The price of COP crops relative to other agricultural prices tries to control the effects of the reform in terms of relative price changes, though, of course, variables other than the reform can affect price changes. These effects are common to all farms, and their impact includes both the substitution and the wealth effects of the price changes. The variable is an index of the relative price of COPs to the price of crops in general (base 2005=100). We have no definite a priori expectation on its direction. All price data are drawn from the Eurostat database.

[9] It would have been desirable to introduce two other important variables concerning local labour markets, the activity rate and the employment rate. Unfortunately, Istat changed in 2004 the methodology of the labour force surveys, so that the series from 2004 onward is not comparable to the one of previous years. For this reason we could not add these variables.

4. RESULTS

Table 2 reports the results of our estimation of the model on the period 2003-2007. The table reports both the coefficients and the marginal effects of the variables. Since marginal effects depend on the value of the variables, they are as usual calculated at their mean values.

Table 2 -Estimates of the random effects Probit model of off-farm labour participation.

	Coefficient		Marginal effects	
	Coeff.	t-ratio	Coeff.	t-ratio
Constant	-6.120**	-2.258	-0.2856	0.1848
UAA (ha)	-0.005	-0.865	-0.0002	0.0003
Share of land in property (%)	0.256	0.602	0.0120	0.0208
Total Debts (1000 Euro)	-0.004	-0.524	-0.0002	0.0004
Hp/UAA	-0.016	-0.722	-0.0007	0.0010
Working capital (1000 Euro)	-0.010***	-3.588	-0.0005	0.0003
Pension income (0,1)	-2.017***	-5.478	-0.0941	0.0452
Capital income (0,1)	1.812**	2.421	0.0846	0.0517
Direct sales (0,1)	0.299	1.048	0.0140	0.0137
Organic farming (0,1)	-2.681	-0.527	-0.1251	0.2061
Hills (0,1)	0.271	0.653	0.0126	0.0195
Mountain (0,1)	1.805**	2.388	0.0842	0.0495
Operator's age	0.057	0.807	0.0027	0.0038
Operator's age squared	-0.001*	-1.655	0.0000	0.0000
Operator's gender (1= female)	1.363***	4.548	0.0636	0.0356
Single Farm Payment (1000 Euro)	0.008	0.770	0.0004	0.0005
Relative COP/Crops price Index (2005=100)	0.026***	2.668	0.0012	0.0007
Agricultural to total employment (%)	-0.051	-0.931	-0.0024	0.0030
AV per inhabitant (1000 Euro)	0.000	-1.205	0.0000	0.0000
AV per LU in agriculture/AV per LU total (%)	0.028*	1.809	0.0013	0.0009
rho	0.902***	0.240		
Log-likelihood	-392.8276			

Note: Marginal effects are estimated at the mean values of the variables
***, **, *: significant at 1, 5, 10 percent, respectively

The model is overall highly significant. The correlation coefficient is strongly significant and very high (0.902). This means that controlling for heterogeneity with the random effects model is appropriate. Under the retained hypothesis that the effects of unobserved variables specific to the farm and to the individuals are time invariant, their impact is high, which also implies a strong persistence in the status.

Among farm characteristics, the working capital has a negative and significant effect on the probability of off-farm participation of the farm operator. This can be considered as the result of a high commitment of the household to the farm. Also, a larger capital makes the farm more productive, thus raising the attractiveness of farm relative to off-farm employment. The impact, though statistically significant, is nevertheless rather weak. The marginal effect shows that, at the mean values, an increase by 100,000 euro in working capital decreases the probability of off-farm participation only by 5 percent.

Among personal and household characteristics, the coefficient of age is positive but not statistically significant, while age squared is negative and significant. This suggests a curvilinear effect of age on off-farm labour participation, with the maximum probability reached at 56.7 years. Non-labour income, specifically capital income, is –admittedly poorly- measured by a dummy variable. If the household has any

capital income, the probability of off-farm labour participation is increased by 8.5 percent, at the mean values of the variables. Since theoretically non-labour income should reduce off-farm work, a possible interpretation of this result is that off-farm employment is induced by off-farm high wages that, in turn, provide more financial assets that yield capital incomes. This probably concerns the wealthiest farms. If a household member has a pension income, the probability that the farm operator has an off-farm job is significantly decreased (by 9.4 percent at the mean values of the variables). A possible interpretation is that for poor farm households, off-farm income stemming from pensions of other members decreases the income needs, thus raising the off-farm reservation wage of the operator.

Farm location is another significant determinant of off-farm labour participation. Relative to the plains (the reference area), the farm being located in the mountains increases the probability of an off-farm job of the operator by 8.4 percent, while for hills the effect is not significant.

Among the variables introduced to capture the external economic environment, the only (weakly) significant one is the ratio of agricultural to total Value Added per Labour Unit, which is positive. This result is counter-intuitive, since one might argue that a higher income gap between agriculture and the overall economy should induce more off-farm labour participation. Our interpretation is that the most profitable agricultural areas (specially in the North of Italy) are also the ones where more job opportunities are available.

The variables of utmost interest are the ones directly related to the reform. The SFP is not significant. The COP to crops relative price index has a positive and statistically significant effect on the probability of off-farm work, i.e. an increase in relative prices of COP versus other crops positively influence off-farm labour participation. This result is at first sight counter-intuitive, since more profits on the farm should reduce the incentive to off-farm work. On the other hand, one might argue that COP crops are generally less labour intensive than other crops. Therefore, when the relative price increase makes them more profitable, the shift towards this type of farming frees labour resources for off-farm activities. Moreover, the price index concerns market prices, not the average revenue received by farmers inclusive of coupled subsidies.

Some considerations are at point. First, our dependent variable is a dummy variable. This implies that the changes it registers are movements in and out of off-farm employment, not adjustments in terms of labour time. Given the rigidities in labour hours, no change can be registered if the threshold for changing the work status is not crossed. Hence, only strong effects can be detected. Second, the theoretical considerations of a previous paragraph show that the effects of the reform on off-farm labour are in opposite directions. Theoretically, the wealth effects of the SFP push to a reduction of off-farm participation, while the substitution effects of the price changes go in the opposite direction. What our results suggest is that, overall, the net effect is small enough not to influence significantly the off-farm work status of household members. Indeed, the raw data show that there have been few changes of work status. Only in 90 cases a change in off-farm work status actually occurred in the whole 5-year period, of which only 66 in the post-reform years. These results on Italian farms are also consistent with the findings of US studies, that found indeed very small effects of decoupled payments on off-farm labour (Dewbre & Mishra 2002; El-Hosta et al. 2004; Goodwin & Mishra 2004; Ahearn et al. 2006; Serra et al. 2005). A third consideration is that, since our results suggest that the change in relative prices has a greater influence on off-farm labour participation than the pure income transfer, it is much likely that the effects of the reform have rather been due to the changes in relative prices than to the SFP income transfer. We nevertheless stress that the actual changes in relative prices of the relevant years cannot be ascribed only to the reform, since other, and possibly more important, factors were at work, and we cannot disentangle which part is due to the CAP reform.

5. CONCLUSIONS

In this paper we have examined the issue of the effects of the 2003 CAP reform on off-farm labour participation of farm households. The theoretical implications of the reform have been explored, and the conclusion is that there is no a priori theoretical prediction on its impact on off-farm labour participation of farm households. Therefore, an empirical analysis is required for assessing the issue.

To this purpose, we estimated a model of farm operators' labour participation from a panel of Italian COP farms drawn from the FADN. We used a random effects probit model, thus controlling for unobserved heterogeneity.

The results suggest that the effects of the reform on off-farm labour participation, if any, are weak. No variable directly related to the CAP reform was significant. These results are not in contrasts with the theoretical considerations, since the reform entails both wealth and substitution effects that tend to offset each other. Also, rigidities in the labour market tend to contrast adjustments to the changing conditions. These results are consistent with the ones of studies on the effects of decoupled subsidies in the US, that generally pointed to weak effects in terms of off-farm labour participation.

Our results also suggest that changes in relative prices affect off-farm labour participation of farm operators, but that probably this effect depends more on the labour intensity of the different crops than on the wealth effect of the induced change in the type of farming. Therefore, the effects of the reform on off-farm labour participation can be due to these changes. But the role of the CAP reform in the changes in relative prices is uncertain, and out of the scope of this paper, and the issue is left for further research.

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