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Assessing rural development policies of the CAP

Explaining structural policy use by farmers with discrete choice models: an evaluation of structural policies supported by the EAGGF

Riccardo Scarpa,

University of York, U.K.

Laura Viganò,

National Institute for Agricultural Economics (INEA), Italy

and

Davide Bortolozzo

National Institute for Agricultural Economics (INEA), Italy.

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Abstract

A farmer's choice to make an on-farm investment programme can be modelled as a discrete choice amongst finite alternatives. The idea of this paper is to test the possibility of using discrete choice models in the field of the evaluation of structural policies.

Farmers choose to take part into agricultural programmes according to their preferences, and farm structural and economic characteristics. Adhesion to a voluntary scheme or policy can be cast as a discrete choice problem. Hence, discrete choice models are adequate to describe probability of choice using a utility maximization framework.

First, we want to explore if the choice of investing depends on farms' characteristics, such as Used Agricultural Area, Standard Gross Margin, Farm type, Possession of lands, Form of Farm Management, Standard Work Unit, class of European Size Unit, Fixed costs, etc.. We use the binomial logit model to explain the probability of making an on-farm investment in 1999 with regards to Italian Northern and Central Regions. The estimation of this model allows us to identify the determinants of such a decision.

We also use discrete choice analysis to identify the significant determinants of the probability of selection of on-farm investment across 12 investment categories within the Regulation

(EEC) No 2328/91 and, subsequently, the Regulation (EC) No 950/97. These include – amongst others – land purchase, system for refusal treatment, land improvement, agricultural machinery, agricultural and non-agricultural farm buildings, permanent crops, etc.

We find such an approach to be insightful on the basis of business farm survey data from the Italian Farm Accountancy Data Network (FADN), and hence propose to develop it further.

Since 2001, within the FADN, INEA (Italian National Institute for Agricultural Economics) has collected information about farms' adhesion to measures of Regulation (EC) No 1257/99 which supports rural development with the European Agricultural Guidance and Guarantee Fund (EAGGF). Such measures are implemented by means of rural development plans (Italian Northern and Central Regions) and operational programmes (Italian Objective 1 Regions). The analysis of these data could allow us to obtain a number of goals. Amongst the most interesting we list:

1. to ascertain whether the intended policy goals were achieved in practice by the policies under examination. In particular, one wants to verify if the agricultural firms beneficiary of Structural Funds identify the target of agricultural holding established in programmes, which can be different among Regions. At this point in time, however, this issue can only be superficially addressed due to the lack of regional plans for the pursuance of the Regulation No 950/97 in the Italian Central and Northern Regions;
2. to explore a wide set of policy measures of rural development plans and operational programmes.

Keywords: investment measures, discrete choice models.

1 Introduction

This paper aims at exploring the use of discrete choice models to explain determinants of on-farm investments (OFIs) choice and type. Two sets of discrete choice estimates are presented obtained from two samples of Italian farmers, along with some policy simulations. The first model is explorative in nature and is estimated on a large sample of over 9,500 farmers. Its aim is to describe the determinants of farmers' investment choice in the year 1999. The second model is more complex in nature and it underlies the policy simulations that explore changes in investment type consequent to changes in resource availability. In particular, it aims to explore the determinants of selection of on-farm investment (OFIs) categories in a smaller sample of farms that have received public co-funding under the framework of Regulation (EEC) No 2328/91 and Regulation (EC) No 950/97.

The paper is organised as follows. Section 2 provides some background on the policy instrument. Section 3 describes the sets of data utilised for the estimation of discrete choice models, coming from two different sources of data:

1) the Farm Accountancy Data Network (FADN);
2) an evaluation study on the effects of the application of the Regulation (EC) No 950/97 in the Italian Central and Northern Regions (INEA and Agriconsulting, 2001).

Moreover, in order to provide some additional insight on the determinants of investment choices, some comparisons between investing and non-investing farms are presented, on the basis of the latter study.

Section 4 concerns the results coming from the estimation of the binomial and multinomial logit model logit models along with some policy simulations.

We conclude in Section 5 by summarising our findings and discussing potential future developments on the evaluation of structural policies on OFIs by using discrete choice models.

2 Some background

2.1 The evolution of the Common Agricultural Policy for on farm investments

The Common Agricultural Policy for on-farms investments (OFIs) has long been a part of the EU socio-structural policies. In the last decades these policies have undergone a significant evolution and a progressive change of their objectives and instruments.

In the 70's, investments in the rural sector had been already stimulated by socio-structural Directives. These policy instruments had the main objective of compensating the imbalance generated by the Common Agricultural Policy (CAP). With the First Structural Funds Reform (1988), support for OFIs were made part of Objective 5a), whose goal has been to speed up the adjustment of agricultural structures. That reform introduced some general principles, such as multi-year programming and the focus of assistance on priority objectives (Mantino, 2002; Vieri, 2001). Since then Regulation (EEC) No 2328/91 and Regulation (EC) No 950/97 have been the main policy instruments to promote OFIs.

Regulation (EC) No 950/97 made some provision in order to aid farms to improve their production efficiency. The aims of this instrument were (EC, 1997):

> "to help restore the balance between production and market capacity; to help improve the efficiency of farms by developing and reorganizing their structures and by promoting supplementary activities; to maintain a viable agricultural community; to contribute to the preservation of the environment and the countryside."

The main measures were:

- investments in agricultural holdings,
- measures to encourage the setting-up of young farmers,
- measures to assist agricultural holdings, involving the introduction of accounts and the launching of groups,
- measures to support farm incomes and to maintain viable agricultural communities in less-favoured areas, vocational training projects.

The aims of OFIs have been the improvement of agricultural incomes and farmers' standards of living, working and producing. The typologies of investments were: the qualitative improvements and redeployments of production; the diversification of activities on the holding (tourist and craft activities, direct sale of farm produce); reducing production cost and saving energy; the improvement of living and working conditions; the improvement of the hygiene conditions of livestock and compliance with Community animal welfare standard; the protection and improvement of the environment.

The reform brought about by the agenda 2000 confirmed the financial support to the OFIs by including them in the measures of Regulation (EC) No 1257/99. This regulation gathers, in a unique regulatory framework, all the different instruments of the structural policies for the rural sector (INEA, 2002).

In comparison to the previous programming period, in order to be eligible farms must demonstrate economic viability, to respect minimum standards for environment, hygiene and animal welfare. Furthermore, farmers must possess adequate occupational skills and competence.

3 OFIs under Regulation 950/97 in Italy in non-Objective 1 Regions

A recent Italian study has appraised the effect of the Regulation 950/97 in non-Objective 1 areas during the 1994-99 programming period (ITA INEA – Agriconsulting, 2001). The three main measures included in the regulation were subject to the appraisal. These included: OFIs, start-up support for young farmers, and measures to support farm incomes and maintain viable agricultural communities in less-favoured areas. In particular, this study has appraised the financial implementation of measures and assessed their impact on farms.

Impacts of investment measures were evaluated with regards to: efficiency of productive resources; incomes of farmers; conversion and diversification of productive activity; quality of the productions and stabilisation of markets; environment. In this paper, the data of the study are first used to describe the main structural and economic characteristics of the agricultural farms that have completed OFIs using such funds, then to estimate the determinants of two sets of discrete choices: decision to carry out an OFI and the type of investment. In particular, with the first model we relate farms' characteristics with the decision to invest, while with the second model we try and explain the determinants of selection across the 12 categories of OFIs.

3.1 Data and methodology

The policy evaluation involved two distinct phases (ITA INEA – Agriconsulting, 2001). In the first phase a sample from The Farm Accountancy Data Network (FADN) was employed. This sample satisfies the general methodological requirements for the evaluation of a policy impact (counterfactual comparison, uniform methodology of survey and compatible with commune standards). Moreover the FADN:

- is the only economic data archive about farms in the European Union;
- it provides time series on farm income, productivity, costs of production, structural and economic indicators. This data are available on a local scale and sector level;
- this data collection system collects data systematically across regions and time.

The analysis is based upon a panel observations from a sample of representative farms (constant sample) over the 1990-1998 period. Each farm remained in the panel for at least three accounting years in order to occur the comparison between the socio-economic status of a farm at the time of absence of OFIs (*initial year*) and the farm situation at the time in which the OFIs can be consided to be completed (*final year*).

The overall sample is made up of three sub-samples of farms:

- *study group (SG)*, farms that made significant investments under either the EC Regulation 950/97 or the preceding (EEC) Regulation 2328/91;
- *comparison group "with investments" (CGI),* farms with significant investments that did not benefit from (EC) Regulation 950/97;
- *comparison group "without investments" (CGWI)*, farms that did not make significant investments.

For the purpose of the analysis an OFI is defined as "*significant"* when at least one of the following conditions is verified:

- the yearly value of new investments (land capital and agricultural machinery) is equal to or greater than €12,900.00. Here the purchase of land is excluded from the computation of land capital;
- the ratio between the yearly value of new investments (land included) and the value of the owner-provided capital (debts included) is larger than 5%;

- the initial value of farmlands, or farm buildings, or agricultural machinery, is at least 10% higher than the final value of the previous year.

Farms that made significant OFIs only in the last year of their being in the panel are excluded from the groups with investments (SG, CGI) because in such a case the impact of the investment cannot be observed.

To allocate a given farm to the SG or CGI sub-samples the farm had to have supplied a Improvement Material Plan (IMP). In order to have access to funds from the (EC) Regulation 950/97 such plan was in fact necessary. Farms that made OFIs without an IMP were allocated to the CGI sub-sample.

The remainder of farms were included in the sub-sample "*without investments*", which were used as baselines to compare the structural and economic characteristics of farms and the main indicators of farm performance. All values are expressed in real terms, 1990 price values.

The constant sample is made up of 17,030 farms (table 1). The study group includes 2,227 cases; the comparison group "*with investments*" includes 4,338 farms, while the comparison group "*without investments*" includes 10,465 cases.

The sample was also stratified on the basis of a three parameters.

- The economic size of farm (European Size Unit, ESU). For every group three categories have been used: "small" (ESU < 16), "medium" (40 < ESU < 16) and "large" farms (ESU > 40);
- Farm Type (FT); classification of farms into types is based on the financial potential of the various agricultural activities of the farm and the combination of these activities.
- Altimetry of farm, classified in three classes: "lowland", "hill areas" and "mountain areas".

The structural and economic situation of a farm, before and after investments, is assessed observing the following variables:

- Used Agricultural Area (UAA);
- total Annual Work Unit (AWU) and Family Workers Unit (FWU);
- Value of Final Output (VFO);
- Net farm Income (NI).

Moreover, the following indicators were used:

- Net farm Income per family workers (NI/FWU);
- Value of Final Output per hectare (VFO/UAA);
- Used Agricultural Area per Annual Work Unit (UAA/AWU);
- Productivity of labour (VFO/AWU);
- Ratio between family workers and total labour force (FWU/AWU);
- Return of sales* (NI/VFO).

In the second phase, the study has assessed some regional case studies (ITA INEA – Agriconsulting, 2001). These concerned a sample of farms that made investments under the (EC) Regulation 950/97. The sample included 403 farms subdivided in three classes by their economic dimension (table 2).

The socio-structural characteristic of farms were investigated by means of a questionnaire which focussed on the annual balance before and after the observed investment (in particular the value of final output, variable costs, fixed costs and net farm income before and after the improvement material plan), the financial aids received on 1994-99 period, the motivations for the given choice of investment, and other socio-economic and environmental effects.

3.2 Structural characteristic of FADN sample

In this subsection we present the main characteristics of farms that made OFIs under (EC) Regulation 950/97 and emphasize the differences between the study group and the two comparison groups (CGI and CGWI) (ITA INEA - Agriconsulting, 2001).

The average value of the used agricultural area (UAA) in farms that invested is 21.5 hectares, which is lower than the GCI group (29,6 hectares), but larger than that in the group without investments (14,2 hectares). OFIs farms are concentrated in the medium size bracket of agricultural area (5 e 20 hectares) (table 3), while those of the SG group are quite evenly distributed according to altitude; farms belonging to CGI and CGSI are mostly concentrated on “lowland” and “hilly” areas.

In the final year, UAA increases by 17% in the study group, but the increase was only of 7% in the control groups (table 7).

Focussing on the economic size of the farm (ESU), we can observe that "small" and "medium" farms prevail in the study group (table 4), while the "small" farm prevail in the control groups without investments. In the control groups *with* investments, instead, the distribution of farms is more uniform. Moreover, the UAA in the GCI group is larger than that in the SG group in the "large" farms category.

The distribution of groups per farm type (FT) indicates remarkable differences:

- farms specialised in: grazing livestock (39%), vineyards (11%) and fruit (14%) are prevailent in the SG group;

- in the CGI group, instead, the predominant farms are: specialist in grazing livestock (27%), in field crops (16%) and the mixed farms (15%);

- finally, in the CGWI group the specialist field crops farms (24%) prevail.

In the groups with investments (SG and CGI) there is a large use of manpower: in fact, this production factor is equal to 2.2-2.4 AWU. In general, manpower increases in farms with higher economic size (ESU) (table 5). In the study group, livestock farms, vegetable-growing farms and floricultural enterprise require a great employment of manpower. The ratio between family workers and total labour force is greater than 90%. This indicator decreases in farms in the lower economic size (table 6).

In the SG group, the value of final output and net income are intermediate to those in the others two groups (initial year). However, this economic indicator increases in the final year. VFO increased by 15% in the study group and of 3% in the CGI group. A similar trend is observed for the NI: this indicator is equal to 20,300.00 € in the study group and it increases by about 13% in the final year (table 7).

3.2.1 *Productivity and profitability indicators*.

In the study group, the productivity and profitability indicators are always intermediary in comparison to the others two groups (table 8).

The value of final output per hectare is about 2,400.00 € in the first year and shows only a modest decrease in the final year (-1%). In the SG farms, the productivity of labour is equal to €23,800.00 and it is lower than in the control groups with investments. However, VFO/AWU and NI/FWU increase clearly in the SG group in the final year. This situation results from an increase of production and from the maintenance of the level of employment (-0,6%).

The land capital and working capital is equal to about €323,900.00 in the SG group. Total capital of farms is lower than in the control groups with investments (table 9). However, the SG farms show significant investment and total capital increases about of 24% in the final year, particularly concentrated in investments concerning farm buildings improvement and construction (livestock houses, wine cellars, warehouse and store, etc.). The CGI farms invest in farm machinery and agricultural equipment. For this group total capital increases only by 2% in the final year.

The total costs is equal to €39,100.00 in the SG group and it is lower than in the control groups with investments (table 9). The fixed costs increase meaningfully in the final year.

In the SG group the return of sales is largest than CGI groups; however, this indicator shows a modest decrease in the final year because of their fixed costs increase (28%).

In synthesis, the structural characteristics of the study group are lower than the control group with investments in terms of:

- economic size of farm (ESU);

- used agricultural area;

- level of employment.

The productivity and profitability indicators are also lower than in the control group with investments. The SG farms need investments to increase their income and improve their structure, and the Common Agricultural Policy for OFIs is a significant incentive to modernize agricultural holdings. In the CGI group farms rely on self-financing to fund their investments. In the CGWI group the main problem is the lack of financial resources to make profitable investments.

4 Econometric analysis and results

The main objective of the econometric analysis in this is paper is to complement the previous qualitative comparison by conducting a more rigorous analysis of the determinants of farmers' choice of OFIs. A secondary objective is the focus on the determinants of selection of investments categories provided by the Regulation (EC) No 950/97 using discrete choice models.

4.1 *Binomial choice models: explaining which farmers invest*

In order to explore the determinants of farm investment we estimate a dichotomous choice logit model over the 1999 whole sample of farms sited in the Italian Central and Northern Regions from the Italian section of the Farm Accountancy Data Network that counts 9,649 observations.

We assume that the probability of observing the implementation of at least one on-farm investment in the year is dependent on a vector **x** of farms' structural and economic characteristics and this probability is distributed logistically according to the law:

$$Pr(\text{at least one investment on farm}|\mathbf{x}) = \Lambda(\beta'\mathbf{x}) = \frac{\exp(\boldsymbol{\beta}'\mathbf{x})}{1+\exp(\boldsymbol{\beta}'\mathbf{x})}$$

where $\Lambda(\cdot)$ is the logit c.d.f..

Investments are defined in a broad sense and include those not funded under regulation 950/97. A total of 44.36 percent of these farms were found to have invested in the year 1999.

The determinants of investment are broadly aggregated in groups, which include indicators of economic and financial performance and farm structure.

Amongst the economic performance indicators with NEGATIVE effect on the likelihood of investment we find the following variables to be significant. Net farm income (NETINC), value of final output in absolute (VFO) and relative terms (VFO/UAA), net revenue on value of final output (NI/VFO), the value of final output from transformation of raw produce into wine and olive oil (VFOTRWIOI), and the stock variable 'total rural capital' (TOTRURK)[1].

Amongst the economic performance indicators with POSITIVE effect on the likelihood of investment we find the following variables to be significant. Fixed costs (FIXCOST), value of final output per unit of labour (VFO/TAWU), Operative Income (OPERINC), and the flow variable 'Working Capital' (TOTWORKK).

Most farm structure indicators have a positive effect: total annual work unit (TOTAWU), total family annual work unit (TOTFAAWU), used agricultural area (UAA), level of altitude from sea level (ALTITUD), dummy for mountainous areas (MOUNZONE), number of separate land units in the farm (NUMLANDU), cattle unit equivalent (CUE), grazing area per cattle unit equivalent (LIVEEXT), total income from on-farm tourism (ONFARTUR), livestock payments (LIVEPAYM). Amongst the farm structure indicators with a negative effect we list: used agricultural area by unit of labour (UAA/TAWU), age of farm manager in the year 1999 (AGE99), and the usable farming area with slope larger than 15 percent (SAUMACCL). Finally, it is important to stress the positive sign of the variable 'presence of the Plan for Improvement Material', which is necessary in order to obtain funds from Regulation (EC) No 950/97.

Overall we find that the magnitude and significance of indicators are consistent with the notion that farms with low economic performance, located in mountainous areas (MOUNZONE) and generally low structural potential and young management tend to invest with higher likelihood.

Even if we consider all farms that invested on 1999, this seems to be coherent with the Regulation (EC) No 950/97 which establishes "the aid system shall be limited to agricultural holdings where labour income per man work unit is less than 1,2 times the reference income" fixed by Member States (Article 5, par. 2). This means that only farms with a minor profitability could be supported by the Regulation (EC) No 950/97.

A second binomial model is estimated considering only farms that did OFIs satisfying the following conditions:

- the yearly value of new investments (land capital and agricultural machinery) is equal to or greater than €12,900.00. Here the purchase of land is excluded from the computation of land capital;
- the ratio between the yearly value of new investments (land included) and the value of the owner-provided capital (debts included) is larger than 5%.

To this end, we consider only farms that invested on 1999 that constitute a sample of 4,280 observations. In this case we test the determinants on the choice of making OFIs with the upper characteristics.

The presence of an Improvement Material Plan (IMP) required by Regulation (EC) No 950/97 is significant and shows a positive sign. A profitability indicator, NI/VFO, and fixed costs (FIXCOST) have a negative sign but the productivity of land and that of labour have a positive sign while Net income is not significant. Many structural variables show a positive sign, as 'total annual work unit', 'total family annual work unit', farm localisation in mountainous areas, usable farming area with slope larger than 15 percent (ACCLUAA), while AGE and 'Total working capital' are negative. Even if the results obtained from the estimation of the binomial logit model in the sub-sample of 4,280 observations are different in terms of signs and significant variables, generally both models support the hypothesis that OFIs are

[1] The values of the economic variables refer to the first year of implementation of the OFI so that they cannot be influenced by the investment itself.

made by farms with relative poor starting conditions from the structural and economic point of view.

4.2 *Multinomial choice models: explaining which category is funded*

In the second stage of the analysis we estimate the probability of investment category selection for investment from 1990 to 1998, using a sub-sample of 403 beneficiary farms of public funding from Regulation (EEC) No 2328/91 and, in the latter two years, from Regulation (EC) No 950/97. The total number of observations increase to 792 as some farms have implemented more than one investment typology. The probability of observing a particular investment category conditional on farm structural characteristics and investment category attributes is modelled by a multinomial logit function.

Particularly, for each farm choice, the selection across 12 investments categories considered in the study is assumed to be driven by a random utility process. Consider the following linearly additive indirect utility specification for a choice of a given category *j* chosen from a set of alternative investment options:

$$v_{ij} = \alpha' \mathbf{s}_{ij} + u_{ij} \, .$$

The unobserved component u_{ij} includes idiosyncratic preferences known to the single farmer but unobservable to the researcher. The deterministic component $\alpha'\mathbf{s}_{ij}$, is observable in the dimensions of the row vector $\mathbf{s}_{ij}$, and the column vector α may be estimated given a quite restrictive set of assumptions on the distribution of $u|\mathbf{s}$ across the population of farms.

Prediction of probability choices on the support of **s** is carried out as if the utility of a given choice were a probabilistic event, even if it does not, and assuming that $u|\mathbf{s}$ is distributed i.i.d. Extreme Value Type I with scale parameter *k*, which has the distribution function

$$F(u_{ij}) = \exp(-k \exp(-u_{ij})).$$

This assumption is consistent with an underlying population of random utilities (McFadden, 1974). The probability of choosing investment category *k* for farm *i* is therefore:

$$\pi_{ik} = \frac{\exp(\alpha' \mathbf{s}_{ik})}{\sum_j \exp(\alpha' \mathbf{s}_{ij})} \qquad j = 1,2,\ldots J \, , \, i = 1,2,\ldots N$$

The obtained results are presented in tables 12 and 13. The variable “REALTIME” indicates the length of time it takes from the moment of application for funding the investment to the final payment from the granting authority. The estimated value is positive, indicating that the longer this time, the more likely is the probability of funding the associated investment type.

The basic rate of co-funding established with regulation (EC) 950/97 for each category of investment (950FUNPU), ranging from 20% to 35%, also displays a positive effect on the probability of funding, as one might expect. The average lack of cash reported by grant recipients in the class of investment shows a negative effect on the probability of funding, suggesting that categories of investments subscribed by farms that are likely to be insolvent have low probability of grants being successful.

The variable APPLAMOU is the average total cost of the investment per application and it shows a positive effect, suggesting that categories with high value investment have higher likelihood of being granted.

PUFUAPPL is the average size of public grant per application in a given farm investment category, and it shows a negative effect on the likelihood of selection for granting. This is probably due to the intention to fund a higher number of applications with the available budget.

INVEST is a variable which indicates the value of the investment for each chosen alternative, while for the competing alternatives (non chosen investment categories) it is represented by the expected sample value, as a plausible measure of the expectation. Such estimate has a positive sign, suggesting, perhaps, that more valuable investments to farmers are funded more frequently than less valuable ones.

A similar variable is PUBFUN, which indicates the amount of public funding of each chosen alternative, while for the other alternatives it is the category average. The negative coefficient suggests that applications with higher demand of public funds are relatively less likely to be funded.

Public funding is more likely for farms located in disadvantaged areas (DAs). To capture the effect of public funds in such areas we used an interaction variable (PFAP_IND) between a dummy variable indicating that the farm is sited in a DA, and PUFUAPPL. The associated estimate is positive and indicates that farms in DAs are more likely to be funded than elsewhere, irrespective of category of investment.

Finally, the model includes four alternative-specific constants, which capture the effect of unobserved variables linked to single categories of investment (Stable, machinery, improved permanent crops, and “other categories”).

The diagnostics of the basic MNL model (Table 12) indicate a relatively low fit. In the specification of the model we explored a number of mixed logit specifications, where parameters where assumed to be random and normally distributed. Such models failed to converge and we hence focused on latent class models. We refer to the relevant literature for a detailed explanation of how these two categories of models explain heterogeneity (Adamowicz and Boxall 2002; Provencher et al. 2002; Hensher and Greene 2003; Shonkwiler, J. S. and W. D. Shaw 2003; Scarpa et al. 2003, 2004). Briefly, while mixed logit models assume that coefficients are randomly distributed according to continuous parametric distributions (normal, log-normal, uniform and triangular are the most frequently employed) (Train, 2003), latent class models assume the existence of a finite number of classes in the sample, each with a different set of parameters. We tried and estimated a series of models with 2, 3 and 4 classes. Only two latent class specifications achieved convergence in this sample and the estimated parameters are reported in table 13. So, our probability structure takes the following form.

Given a sequence of OFI decisions by the same individual and conditional on belonging to a given preference group or class *c*, say for example class *A*, the joint logit probability of a sequence of destination choices *t*(*i*) is:

1) $$P_{t(i)n} \mid A = \prod_{t(n)=1}^{T(n)} \frac{\exp(\boldsymbol{\beta}_A '\mathbf{x}_{t(i)})}{\sum_{j=1}^{18} \exp(\boldsymbol{\beta}_A '\mathbf{x}_j)}$$

With the individual probabilities of membership to a group *c* defined as Q_{nc} one can derive the unconditional probability of destination choice for the individual by taking the expectation over all the 2 classes:

2) $$P_{in} = \sum_{c=1}^{2} Q_{nc} P_{jtn} \mid c = Q_{n1} \prod_{t(n)=1}^{T(n)} \frac{\exp(\boldsymbol{\beta}_1 '\mathbf{x}_{t(i)})}{\sum_{j=1}^{12} \exp(\boldsymbol{\beta}_1 '\mathbf{x}_j)} + (1 - Q_{n1}) \prod_{t(n)=1}^{T(n)} \frac{\exp(\boldsymbol{\beta}_2 '\mathbf{x}_{t(i)})}{\sum_{j=1}^{12} \exp(\boldsymbol{\beta}_2 '\mathbf{x}_j)}.$$

Finally, a posterior estimate of the individual-specific class probability can be obtained given the observed sequence of $T(n)$ choices and using Bayes' formula:

3) $$Q_{nc}^{*} = P_{jnc} \mid y_{T(n)},\ \mathbf{x}_{T(n)} = \frac{Q_{nc} \prod_{t(n)=1}^{T(n)} \frac{\exp(\boldsymbol{\beta}_c '\mathbf{x}_{t(i)})}{\sum_{j=1}^{12} \exp(\boldsymbol{\beta}_c '\mathbf{x}_j)}}{\sum_{c=1}^{C} Q_{nc} \prod_{t(n)=1}^{T(n)} \frac{\exp(\boldsymbol{\beta}_c '\mathbf{x}_{t(i)})}{\sum_{j=1}^{12} \exp(\boldsymbol{\beta}_c '\mathbf{x}_j)}},$$

where $y_{T(n)}$ and $\mathbf{x}_{T(n)}$ are, respectively, the observed OFIs choices amongst the 12 categories of investment and the attributes of the chosen categories of investments.

As can be seen by the diagnostics and the predicted versus the observed choices in table 15, this model shows a much superior fit to the previous basic MNL model, increasing from 13.8 to 92.1 percent the number of correctly predicted choices.

The two latent classes show a remarkable difference in the pattern of signs in the estimates. Neither class shows significance of PFAP_IND, while class 2 has also parameters OTHERS and PUBFUN which are not significantly different from zero. The only variable whose estimate shows a concordant sign in the two latent classes is 950FUNPU, which has a positive effect. All other variables show discordant signs in the estimates of the two classes. We suggest that this pattern indicates the presence of two regimes of behaviour, one for low public funding projects (class 1) and one for high public funding projects (class2). Class 1 is associated with an average amount of public funding per realised investment of €8,227 (LIT15,931,000), while class 2 is a much higher public fund class with an average endowment of €27,770 (LIT 53,771,000). We proceed to explore further the determinants of posterior probabilities on the basis of some farm-specific variables. The results of the binary logit model explaining the posterior probabilities of belonging to class 1 – obtained as from equation 3) – is reported in table 14.

Such estimates show that a higher probability of belonging to the low-funding group is found for farms that:

- were managed by women;
- with a low number of family members working on-farm (FAMHURES);
- that would have proceeded with the investment regardless of public funding (NOWOPF);
- with low income from farming in the first year of implementation of the OFI (FARMINC);
- with low income from on-farm produce transformation in the first year of implementation of the OFI (TRAINC);
- low family income in the first year of implementation of the OFI (FAMINC);
- low public funding level from public policies (PUBFULE)

Such a result is supportive of the plausibility of the model and its partition into classes. In the next subsection we assess the latent class model by examining its sample predictions under various hypothetical policy changes.

4.3 Policy simulation

The first policy change postulates a 10 percent increase in the rate of public co-funding, while the second postulates a reduction of 20 percent in the number of applicants lamenting a lack of cash-flow in the financial plan during the realisation of the investment (LACKCAFL). While the first is a direct provision reachable by simply increasing the budget or reducing the number of beneficiaries, the second is an indirect provision that can be reached either by implementing more flexible measures of financial engineering for farmers, or by improving the financial flow of public funding to beneficiaries, so that farmers need not bear the cost of financial exposure.

Each policy is simulated in turn at a different scale. First across all categories of investment, second only for investments in farm buildings, then it is limited to a given category of buildings: those for extra-agricultural activities to enhance farms' multi-functionality.

The implied sample simulations from both MNL and two-class LCM models are reported in tables 16a-c.

We note that both models predict an increase of the likelihood of investment in building categories when the *first policy* is applied across categories, although with some differences in the shares due to the fact that the LCM accounts for the presence of two different regimes. As a consequence, when the policy is restricted to farm buildings categories these effects are amplified.

On the other hand, when the simulation is restricted to non-agricultural farm buildings only, the two models produce predictions of similar magnitude in terms of own-effects, but somewhat different cross-effects.

Quite a different picture is predicted by the simulation of the second policy: While the MNL model predicts a shift to building categories, the LCM predicts a higher share to non-building related categories of investment. The difference in predictions between the two models is emphasized in the other two scales of the policy simulation, in terms of both the magnitudes and signs of own-effects and cross-effects.

The prediction of the changes in shares for the combined policy scenario, are – of course – hybrids between the two. Overall the MNL seems to indicate that both policies, separately and jointly, would promote the likelihood of funding investments of building categories. On the other hand, the LCM predictions are characterized by a more heterogeneous outcome, with markedly smaller magnitudes, especially when policies are limited to investment in farm buildings.

5 Conclusions

In this paper we have presented an evaluation of the differences and determinants of on-farm investments. We started with a qualitative summary of findings by the evaluation study on impact of the Regulation (EC) No 950/97 in Italian Central and Northern Region in which simple descriptive statistics were used to contrast sub-samples of farms that did and did not carry out on-farm investments. Then we focussed on determinants of OFIs using logit regression, finally we explored the determinants of the type of investment and found evidence of two processes at work: one for small and a second for larger investments.

The empirical analyses of determinants of on-farm investment decisions and selection have shown to produce insightful results. In particular, the binomial decision of investing on-farm was found to be significantly linked to various relevant indicators of farm economic performance and farm structure. In general, it was shown that low economic performance and marginal farm structure increase the likelihood of investment.

The multinomial (conditional logit) analysis of determinants of selection amongst categories of on-farm investment uncovered the existence of two different regimes of decision behaviour for public funding decisions under regulation 950/97. These were highlighted by making use of latent class modelling, and would not have become apparent in a conventional multinomial logit approach. The two class model employed showed a much better fit, correctly predicting over 92 percent of observed choices, versus a poor 13 percent of the conventional multinomial logit approach.

The implications for policy simulations of the two models were also supportive of the 2-class approach, and indicated that the main response to an increase of public co-funding would result in an increase of the probability of selecting categories of investment related to farm buildings.

In the light of these results we suspect that discrete choice analysis may be a fruitful avenue of investigation of such policy programs. Evaluation agencies perhaps should organise their data collection accordingly, and privilege the collation of data suitable for such form of analysis.

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7 Tables

Table 1 Number of cases: FADN data bank

	No farms	Share
Study group	2.227	13
Comparison group with investments	4.338	25
Comparison group without investments	10.465	61
Total	17.030	100

Source: ITA INEA – Agriconsulting, 2002

Table 2 Number of cases: regional case studies

	ESU			Total
	< 16	16-40	>40	
Number of farms	100	153	150	403
Share	25	38	37	100

Source: ITA INEA – Agriconsulting, 2002

Table 3 Number of farms and UAA per size bracket of agricultural area (initial year)

Size bracket of agricultural Area	Study group		Comparison groups			
			with investments		without investments	
	farms %	UAA average (ha)	farms %	UAA average (ha)	farms %	UAA average (ha)
da 0 a 4,99	16	3,2	13	2,8	26	2,5
da 5 a 19,99	57	10,5	48	11,5	56	10,4
>20	27	55,9	40	52,7	19	42
Totale	100	21,5	100	26,9	100	14,2

Source: ITA INEA – Agriconsulting, 2002

Table 4 Number of farms per ESU (initial year) (share)

ESU	Group of study	Comparison groups	
		with investments	without investments
< 16	41	31	53
16 – 40	39	37	33
> 40	21	33	15
Total	100	100	100

Source: ITA INEA – Agriconsulting, 2002

Table 5 Annual Work Unit (AWU) per ESU (initial year)

ESU	Study group	Comparison groups	
		with investments	without investments
< 16	1,8	1,7	1,5
16 – 40	2,1	2,1	1,9
> 40	3,2	3,3	2,7
Total	2,2	2,4	1,8

Source: ITA INEA – Agriconsulting, 2002

Table 6 Ratio between family workers and total labour force per ESU (initial year)

ESU	Study group	Comparison groups	
		with investments	without investments
< 16	0,98	0,98	0,99
16 – 40	0,94	0,95	0,96
> 40	0,84	0,78	0,84
Total	0,92	0,88	0,95

Source: ITA INEA – Agriconsulting, 2002

Table 7 Used Agricultural Area, Annual Work Unit, Value of Final Output and Net farm Income (initial and final year)

		UAA ha	VFO .000 euro	AWU	FWU	NI .000 euro
Study group	initial	21,5	52,3	2,2	2,0	20,3
	final	25,2	60,3	2,2	2,0	23,0
	var.%	17	15	-1	-3	13
Comparison groups with investments	initial	26,9	71,1	2,4	2,1	27,3
	final	29,3	73,5	2,3	2,0	28,2
	var.%	9	3	-5	-5	4
Comparison groups without investments	initial	14,2	32,3	1,8	1,7	14,0
	final	14,7	31,6	1,7	1,6	13,8
	var.%	3	-2	-6	-6	-1
Total	initial	18,4	44,8	2,0	1,8	18,2
	final	19,8	46,0	1,9	1,7	18,7
	var.%	7	3	-5	-5	3

Source: ITA INEA – Agriconsulting, 2002

Table 8 Productivity and profitability indicators (initial and final year)

		VFO/ UAA .000 euro	UAA/ AWU ha	VFO/ AWU .000 euro	NI/ VFO %	AWU/ FWU %	NI/ FWU .000 euro
Study group	Initial	2,4	9,8	23,8	38,8	0,92	10,0
	final	2,4	11,5	27,6	38,1	0,90	11,7
	var.%	-1	18	16	-2	2	17
Comparison groups with investments	initial	2,6	11,3	30,0	38,3	0,88	13,1
	final	2,5	13,0	32,5	38,4	0,88	14,2
	var.%	-5	14	8	0	0	9
Comparison groups without investments	initial	2,3	8,0	18,1	43,2	0,94	8,2
	final	2,2	8,7	18,7	43,6	0,94	8,6
	var.%	-5	9	4	1	0	5
Total	initial	2,4	9,2	22,5	40,5	0,93	9,9
	final	2,3	10,4	24,2	40,5	0,92	10,7
	var.%	-4	13	8	0	1	8

Source: ITA INEA – Agriconsulting, 2002

Table 9 Costs and capital (.000 euro) (initial and final year)

		Variable costs	Fixed costs	Total costs	Land capital	Working capital	Total capital
Study group	initial	27,0	12,1	39,1	253,5	70,4	323,9
	final	29,0	15,5	44,4	325,6	74,6	400,3
	var.%	7	28	14	29	6	24
Comparison groups with OFIs	initial	36,7	16,9	53,6	326,0	89,3	415,3
	final	35,5	18,6	54,1	337,6	87,7	425,3
	var.%	-3	10	1	4	-2	2
Comparison groups without OFI	initial	13,8	7,7	21,6	177,3	38,2	215,5
	final	12,7	7,9	20,6	172,6	32,2	204,8
	var.%	-8	2	-5	-3	-16	-5
Total	initial	21,4	10,6	32,0	225,1	55,4	280,6
	final	20,6	11,6	32,2	234,6	51,9	286,5
	var.%	-4	9	1	4	-6	2

Source: ITA INEA – Agriconsulting, 2002

Table 10 Logit estimates for OFIs

Log-Likelihood Function = - 5,440.56			*N* = 9,649	
Variable	*Coefficient*	*Standard Error*	*Asymp. Z-value*	*P-value*
Constant	-8.8E-01	1.3E-01	-6.902	.0000
NETINC	-3.1E-05	7.9E-06	-3.935	.0001
NETINCSQ	3.2E-13	5.7E-14	5.662	.0000
TOTAWU	2.8E-01	6.1E-02	4.523	.0000
UAA	5.8E-03	1.3E-03	4.448	.0000
VFO	-4.9E-06	6.2E-07	-7.870	.0000
VFO/UAA	-4.7E-07	6.7E-08	-7.040	.0000
UAA/TAWU	-1.4E-02	2.5E-03	-5.722	.0000
VFO/TAWU	7.9E-06	8.2E-07	9.669	.0000
VFO/TAWUSQ	-1.3E-12	3.4E-13	-3.774	.0002
NI/VFO	-1.6E-02	1.3E-03	-12.379	.0000
FIXCOST	4.1E-06	1.2E-06	3.351	.0008
TOTRURK	-9.6E-08	3.0E-08	-3.183	.0015
TOTWORKK	3.1E-06	2.6E-07	11.541	.0000
ALTITUD	1.7E-03	2.2E-04	7.518	.0000
ALTITSQ	-6.4E-07	1.7E-07	-3.826	.0001
AGE	-1.8E-02	1.8E-03	-9.575	.0000
MOUNZONE	1.4E-01	6.4E-02	2.210	.0271
NUMLANDU	2.3E-02	3.3E-03	7.066	.0000
ACCLUAA	-4.7E-05	2.3E-05	-2.076	.0379
CUE	1.4E-03	6.5E-04	2.178	.0294
LIVEEXT	3.2E-02	2.0E-02	1.660	.0970
OPERINC	3.2E-05	7.8E-06	4.140	.0000
ONFARTUR	6.2E-06	2.5E-06	2.512	.0120
LIVEPAYM	2.4E-05	6.3E-06	3.774	.0002
VFOTRWIOI	-9.2E-07	4.6E-07	-1.995	.0460
IMP	2.2E-01	5.4E-02	4.028	.0001
TOFAAWU	2.4E-01	5.8E-02	4.237	.0000

Efron	.23211	*Cramer*	.22780
McFadden	.17898	*Veall/Zim.*	.34099
Ben./Lerman	.61882	*Rsqrd_ML*	.21795

Frequencies of actual & predicted outcomes

	Predicted		
Actual	0	1	Total
0	4436	933	5369
1	1861	2419	4280
Total	6297	3352	9649

Table 11 Logit estimates for OFIs greater then €12,900 and ratio between the new investments yearly value and the owner-provided capital value is larger than 5%

Log-Likelihood Function = -2289.573			*N = 4280*	
Variable	*Coefficient*	*Standard Error*	*Asymp. Z-value*	*P-value*
Constant	-9.0E-01	2.1E-01	-4.358	.0000
IMP	3.7E-01	7.7E-02	4.828	.0000
NETINC	-8.7E-08	6.2E-07	-.141	.8877
NETINCSQ	-1.0E-12	1.9E-13	-5.373	.0000
TOTAWU	2.2E-01	5.2E-02	4.262	.0000
MOUNZONE	1.4E-01	7.9E-02	1.786	.0740
ACCLUAA	5.1E-05	2.0E-05	2.517	.0118
VFO/UAA	3.8E-06	1.6E-06	2.382	.0172
VFO/TAWU	9.2E-06	9.7E-07	9.508	.0000
NI/VFO	-2.3E-02	1.8E-03	-12.772	.0000
TOTCOST	-6.4E-07	3.0E-07	-2.102	.0356
AGE	-2.1E-02	3.1E-03	-6.635	.0000
MALE	2.4E-01	1.1E-01	2.129	.0333
TOFAAWU	1.1E-01	4.9E-02	2.254	.0242
TOTWORKK	-2.5E-07	4.6E-08	-5.516	.0000

Efron	.11747	*Cramer*	.11847
McFadden	.09970	*Veall/Zim.*	.19507
Ben./Lerman	.64356	*Rsqrd_ML*	.11173

Frequencies of actual & predicted outcomes

	Predicted		
Actual	0	1	Total
0	2942	134	3076
1	991	213	1204
Total	3933	347	4280

Table 12 Multinomial logit model estimations: the investment category selection

Log-Likelihood Function = -1705,53		*N* = 783	
Variable	*Coefficient*	*Standard Error*	*P- value*
REALTIME|1	5.7E-01	2.1E-01	.0066
950PUBFU|1	3.8	2.0	.0561
LACKCAFL|1	-6.7E-02	1.6E-02	.0000
APPLAMOU|1	5.4E-05	2.2E-05	.0127
PUFUAPPL|1	-1.2E-04	5.2E-05	.0161
INVEST|1	2.7E-06	1.5E-06	.0637
PUBFUN|1	-1.4E-05	6.0E-06	.0215
STA|1	7.4E-01	1.7E-01	.0000
MAC|1	2.1	1.6E-01	.0000
IMP|1	1.5	2.7E-01	.0000
OTHERS|1	1.3	2.0E-01	.0000
PFAP_IND|1	1.0E-05	2.8E-06	.0004

Table 13 Two latent Classes Logit Model estimations: the investment category selection

Log-Likelihood Function = −691,08		*N* = 783	
Variable	*Coefficient*	*Standard Error*	*P- value*
	Utility parameters in latent class 1		
REALTIME|1	-5.95	1.49	.0001
950PUBFU|1	4.38E+01	1.05E+01	.0000
LACKCAFL|1	1.13	1.89E-01	.0000
APPLAMOU|1	-3.23E-03	4.58E-04	.0000
PUFUAPPL|1	7.90E-03	1.12E-03	.0000
INVEST|1	-5.55E-04	7.62E-05	.0000
PUBFUN|1	2.06E-04	5.86E-05	.0004
STA|1	3.05E+01	4.42	.0000
MAC|1	1.99E+01	2.69	.0000
IMP|1	-9.45	2.06	.0000
OTHERS|1	2.78E+01	3.92	.0000
PFAP_IND|1	1.23E-05	1.32E-05	.3524
	Utility parameters in latent class 2		
REALTIME|2	9.16	7.57E-01	.0000
950PUBFU|2	4.52E+01	6.56	.0000
LACKCAFL|2	-5.93E-01	5.57E-02	.0000
APPLAMOU|2	3.30E-03	1.89E-04	.0000
PUFUAPPL|2	-7.92E-03	4.54E-04	.0000
INVEST|2	2.94E-04	1.81E-05	.0000
PUBFUN|2	-8.16E-06	2.07E-05	.6936
STA|2	-1.97E+01	1.32	.0000
MAC|2	3.61	4.27E-01	.0000
IMP|2	2.27E+01	1.48	.0000
OTHERS|2	-6.35E-01	6.21E-01	.3063
PFAP_IND|2	-4.86E-07	9.41E-06	.9588
	Estimated latent class probabilities		
PrbCls_1	.627	.01751180	.0000
PrbCls_2	.373	.01751180	.0000

Table 14 Binary Logit Mode: Characteristics farms on posterior probabilities from LCM

Log-Likelihood Function = -504,77		*N* = 783		
		Characteristics in numerator of Prob[Y = 1]		
Variable	*Coefficient*	*Standard Error*	*P- value*	*Mean of X*
Constant	2.55	3.74E-01	.0000	
NOWOPF	-4.51E-01	1.99E-01	.0236	.18560606
MALE	-7.05E-01	2.42E-01	.0035	.84595960
FAMHURES	-1.53E-01	5.01E-02	.0023	3.26136364
FARMINC	-5.31E-03	2.79E-03	.0567	67.3988636
TRAINC	-9.92E-03	4.42E-03	.0249	5.43308081
PUBFUNLE	-1.43E-02	4.79E-03	.0029	7.07714646
FAMINC	-9.77E-02	6.16E-02	.1126	3.50883838

Table 15 Cross tabulation of actual vs. predicted investment category choices from LCM 2 classes model

	Stables	Sheds	Silos	Other storing bldg	Agric. Machinery	Waste disp. plants	Bldgs	Land purchase	Land improv.	Perm. crops	Non-agric. bldgs	Others	Total
Stables	127	1	0	0	1	0	0	0	0	0	0	0	130
Sheds	1	91	0	1	2	1	1	0	0	1	0	1	99
Silos	0	1	19	1	1	0	1	1	1	0	0	1	27
Other storing bldg	1	2	1	65	2	0	1	0	1	0	0	1	74
Agric. Machinery	1	2	0	2	167	0	1	1	0	0	0	1	176
Waste disposal plants	0	0	0	0	0	9	0	0	0	0	0	0	10
Buildings	0	1	0	0	1	0	63	1	0	0	0	0	68
Land purchase	0	0	0	1	1	0	0	12	1	0	0	0	15
Land improvement	0	1	1	1	1	0	1	0	15	0	0	1	21
Permanent crops	0	0	0	0	1	0	0	0	0	40	0	0	43
Non-agricoltural bldgs	0	0	0	0	0	0	0	0	0	0	16	0	19
Others	0	1	0	1	1	0	1	0	0	0	0	97	101
Total	131	100	22	73	178	12	70	16	18	43	17	102	783

Table 16a Policy predictions for a 10 percent increase in the rate of public co-funding (950PUBFU)

	950PUBFU increase for each investment category				*950PUBFU increase for stable, buildings, sheds, non-agricultural buildings, others*				*950PUBFU increase for non-agricultural buildings*			
	Discrete Choice		Latent Class		Discrete Choice		Latent Class		Discrete Choice		Latent Class	
	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb
Stables	0,47%	4	0,23%	1	**1,10%**	**9**	**0,51%**	**4**	-0,06%	0	-0,03%	-1
Sheds	0,35%	2	0,66%	5	**0,82%**	**6**	**1,49%**	**12**	-0,04%	-1	-0,06%	0
Silos	-0,09%	0	-0,16%	-1	-0,21%	-1	-0,38%	-3	-0,01%	0	-0,05%	0
Other storing bldg	0,27%	3	0,54%	4	**0,63%**	**5**	**1,27%**	**10**	-0,03%	0	-0,09%	-1
Agric. Machinery	-0,64%	-5	-0,77%	-6	-1,48%	-12	-1,84%	-14	-0,07%	-1	-0,09%	0
Waste disposal plants	-0,04%	-1	-0,14%	-1	-0,09%	-1	-0,31%	-3	0,00%	0	-0,01%	0
Buildings	0,26%	2	0,40%	3	**0,61%**	**5**	**0,98%**	**8**	-0,03%	0	-0,01%	0
Land purchase	-0,07%	-1	-0,19%	-2	-0,16%	-2	-0,41%	-3	-0,01%	0	-0,01%	0
Land improvement	-0,07%	0	-0,14%	-1	-0,16%	-1	-0,33%	-2	-0,01%	0	-0,05%	0
Permanent crops	-0,16%	-1	-0,17%	-1	-0,36%	-3	-0,39%	-3	-0,02%	0	-0,03%	0
Non-agricultural bldgs	0,07%	1	0,06%	1	**0,16%**	**1**	**0,16%**	**1**	**0,32%**	**3**	**0,46%**	**4**
Others	-0,37%	-3	-0,32%	-3	-0,85%	-7	-0,75%	-6	-0,04%	0	-0,04%	0
Total	0,00%	1	0,00%	-1	0,00%	-1	0,00%	1	0,00%	1	0,00%	2

Table 16b Policy predictions for a reduction of 20 percent in the number of applicants lamenting a lack of cash-flow (LACKCAFL)

	LACKCAFL reduction for each investment category				*LACKCAFL reduction for stable, buildings, sheds, non-agricultural buildings, others*				*LACKCAFL reduction for non-agricultural buildings*			
	Discrete Choice		Latent Class		Discrete Choice		Latent Class		Discrete Choice		Latent Class	
	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb
Stables	0,61%	5	-0,23%	-2	**4,09%**	**32**	**0,33%**	**2**	-0,28%	-2	0,00%	0
Sheds	-0,60%	-5	-0,21%	-1	**1,78%**	**13**	**0,17%**	**1**	-0,22%	-2	-0,01%	0
Silos	0,26%	2	-0,51%	-4	-0,62%	-5	0,26%	2	-0,05%	0	0,02%	0
Other storing bldg	-0,40%	-3	0,30%	2	**1,43%**	**12**	**-1,08%**	**-8**	-0,16%	-1	0,02%	0
Agric. Machinery	-0,15%	-1	-0,70%	-5	-4,48%	-35	-1,22%	-9	-0,38%	-3	0,04%	1
Waste disposal plants	0,45%	3	1,77%	14	-0,27%	-3	-0,29%	-3	-0,02%	-1	0,00%	0
Buildings	-0,04%	0	-0,38%	-3	**1,81%**	**14**	**2,77%**	**22**	-0,15%	-1	-0,02%	0
Land purchase	0,00%	0	-0,21%	-2	-0,48%	-4	-0,58%	-5	-0,04%	-1	-0,01%	0
Land improvement	-0,13%	-1	0,45%	4	-0,50%	-3	0,47%	4	-0,04%	0	0,02%	1
Permanent crops	0,60%	5	-0,31%	-2	-1,10%	-9	-0,09%	0	-0,09%	-1	0,01%	0
Non-agricoltural bldgs	0,36%	3	-0,10%	-1	**0,91%**	**7**	**-0,17%**	**-1**	**1,66%**	**13**	**-0,06%**	**0**
Others	-0,96%	-8	0,12%	1	-2,58%	-20	-0,56%	-5	-0,22%	-2	0,01%	0
Total	0,00%	0	0,00%	1	0,00%	-1	0,00%	0	0,00%	-1	0,00%	2

Table 16c Predictions for a combined policy scenario (a 10 percent increase in the rate of public co-funding with a reduction of 20 percent in the number of applicants lamenting a lack of cash-flow)

	950PUBFU increase and LACKCAFL reduction for each investment category				*950PUBFU increase and LACKCAFL reduction for stable, buildings, sheds, non-agricultural buildings, others*				*950PUBFU increase and LACKCAFL reduction for non-agricultural buildings*			
	Discrete Choice		Latent Class		Discrete Choice		Latent Class		Discrete Choice		Latent Class	
	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb	ChgShare	ChgNumb
Stables	1,10%	9	-0,03%	-1	**5,17%**	**40**	**0,56%**	**4**	-0,38%	-3	0,00%	0
Sheds	-0,27%	-3	0,50%	4	**2,53%**	**19**	**0,80%**	**6**	-0,29%	-3	-0,02%	0
Silos	0,16%	2	-0,57%	-4	-0,82%	-6	0,24%	2	-0,07%	0	0,01%	0
Other storing bldg	-0,14%	-1	0,96%	8	**2,00%**	**16**	**-0,66%**	**-5**	-0,21%	-1	0,01%	0
Agric. Machinery	-0,78%	-6	-1,31%	-10	-5,89%	-46	-2,22%	-17	-0,50%	-4	0,03%	1
Waste disposal plants	0,39%	3	1,31%	10	-0,36%	-3	-0,43%	-4	-0,03%	-1	0,00%	0
Buildings	0,23%	2	0,05%	0	**2,39%**	**19**	**3,22%**	**25**	-0,20%	-2	-0,03%	0
Land purchase	-0,07%	-1	-0,31%	-3	-0,62%	-5	-0,69%	-6	-0,05%	-1	-0,02%	0
Land improvement	-0,20%	-1	0,17%	2	-0,65%	-5	0,42%	4	-0,06%	0	0,02%	1
Permanent crops	0,43%	3	-0,45%	-3	-1,44%	-11	-0,19%	-1	-0,12%	-1	0,01%	0
Non-agricoltural bldgs	0,44%	4	-0,07%	0	**1,08%**	**9**	**-0,16%**	**-1**	**2,20%**	**17**	**-0,02%**	**0**
Others	-1,30%	-10	-0,26%	-2	-3,39%	-27	-0,89%	-7	-0,29%	-2	0,01%	0
Total	0,00%	1	0,00%	1	0,00%	0	0,00%	0	0,00%	-1	0,00%	2