SEAMLESS integrated project aims at developing an integrated framework that allows ex-ante assessment of agricultural and environmental policies and technological innovations. The framework will have multi-scale capabilities ranging from field and farm to the EU25 and globe; it will be generic, modular and open and using state-of-the art software. The project is carried out by a consortium of 30 partners, led by Wageningen University (NL).

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Table of contents

General part

Objective within the project

The objective of this deliverable is to report on labour input estimations that will be used in conjunction with the SEAMLESS version of the CAPRI model. The coefficients reported on in this deliverable will be incorporated into the CAPRI model and then used in income per head calculations, in scenario building and in reference forecasts. These 'labour input coefficients' are estimated using an econometric model applied to EU FADN data (1990-2002) for the EU 15. For the new member states more recent data will have to be used. The estimation of these coefficients is necessary because heretofore CAPRI has been a behavioural model motivated by efficiency per hectare considerations and labour has not been included in the model. It is expected that by including labour some of the social aspects of SEAMLESS will be addressed.

General Information

Task(s) and Activity code(s):	3.9, 3.9.1
Input from (Task and Activity codes):	
Output to (Task and Activity codes):	
Related milestones:	3.9.1

Executive summary

The term input allocation describes how aggregate input demand (e.g. total family or paid labour) is 'distributed' to production activities. The resulting activity specific data are called input coefficients. In general, they may either be measured in value (€) or physical terms (hours). The CAPRI data base generally uses physical terms and, where not available, input coefficients are measured in constant prices. In our estimations using FADN data we have estimated input coefficients for labour in hours (both paid labour and family labour) and we have estimated wage payments in constant (1995) euro.

Input coefficients can be put to work in a number of interesting fields. First of all, activity specific income indicators may be derived, which may facilitate analyzing results and may be used in turn to define sectoral income. Similarly, important environmental indicators are linked to some input uses and can hence be linked to activities as well with the help of input coefficients. Labour coefficients can be used to calculate income per capita in the agricultural sector and can also be used to track forecast employment changes over time or in policy scenarios. Apart from the estimation of input coefficients for young animals, fertilizer and feed, the remaining inputs in CAPRI are estimated from a Farm Accounting Data Network (FADN) sample and then these estimation results are combined with aggregate national input demand reported in the EAA and standard gross margin estimations, using a Highest Posterior Density (HPD) estimation framework.

As a result, as a first step in Task 3.9 for SEAMLESS input coefficients (family labour and paid labour, both in hours, as well as wage regressions for paid labour) were estimated using standard econometrics from single farm record as found in FADN. Family labour, paid labour and wage coefficients have been estimated for almost all CAPRI activity categories at a regional level (roughly 100 FADN regions) using panel data (13 years for most countries). It has taken quite a long time to come up with reasonably satisfactory coefficients as, often, the straightforward econometric approach throws up implausible or frankly impossible results. While the initial estimations were complete in February 2006, 3 months of checking and re-estimation were needed before we felt comfortable enough to think of introducing them into the CAPRI model (this is being done in the summer of 2006, using a Bayesian approach).

This deliverable reports on the methods used in the econometric estimations, and the state of play with regard to incorporation into the CAPRI database. Provisional results at a national level are included in an appendix, but it is important to note that these are undergoing constant revision at both regional and national levels.

Also included in the deliverable is a useful extension of some work done for CAPRI Dyna-Spat (another FP6 project). This work has been extended for SEAMLESS to improve the forecasting ability of the labour module within CAPRI, and possible to help with indicator building in WP2.

Scientific and societal relevance

This deliverable reports on an aspect of task 3.9 that has both a clear scientific and societal relevance. The scientific relevance is that for the first time there will be available a set of EU wide labour coefficients for family and paid farm labour, using a standardised database. This has not been available heretofore. It is important that these results be plausible, and bear some relation to the know engineering coefficients (usually calculated on the basis of 'best practice'). Hence the constant revision of results.

The societal relevance is the existence of plausible labour coefficients enables calculates of employment effect within the sector following on from policy changes or from the simple passage of time. The work on cohort analysis also enables a link to be made between on and off-farm regional changes. This is extremely important if we are to have idea of the time allocation effects on farm households of policy changes. It is also important for linking in with work done on indicators for WP2, and for our own ongoing work on gender for Task 3.9.

Specific part

1 Introduction

The term input allocation describes how aggregate input demand (e.g. total family or paid labour) is 'distributed' to production activities. The resulting activity specific data are called input coefficients. In general, they may either be measured in value (€) or physical terms (hours). The CAPRI data base generally uses physical terms and, where not available, input coefficients are measured in constant prices.

There is a long history of allocating inputs to production activities in agricultural sector analysis, dating back to the days where I/O models and aggregate farm LPs were the only quantitative instruments available. Input coefficients can be put to work in a number of interesting fields. First of all, activity specific income indicators may be derived, which may facilitate analysing results and may be used in turn to define sectoral income. Similarly, important environmental indicators are linked to some input uses and can hence be linked to activities as well with the help of input coefficients. Important income, employment and social indicators can be linked to the coefficients reported on this deliverable.

Input coefficients for different inputs are constructed in different ways. Apart from the estimation of input coefficients for young animals, fertilizer and feed, the remaining inputs in CAPRI are estimated from a Farm Accounting Data Network (FADN) sample and then these estimation results are combined with aggregate national input demand reported in the EAA and standard gross margin estimations, using a Highest Posterior Density (HPD) estimation framework.

As a result, as a first step in Task 3.9 for SEAMLESS input coefficients (family labour and paid labour, both in hours, as well as wage regressions for paid labour) were estimated using standard econometrics from single farm records as found in FADN. Additionally, tests for a more complex estimation framework building upon entropy techniques and Bayesian and integrating restrictions derived from cost minimization were run in parallel.

In some cases estimates revealed zero or negative labour input coefficients, which cannot be taken over into CAPRI. Accordingly, it was decided to set up a second stage estimation framework building upon the unrestricted estimates from FADN. This is described below.

1.1 Econometric Estimation

Standard econometric methods are employed to calculate labour input coefficients from single farm records found in FADN. At a first stage, raw data were transformed into CAPRI compatible categories. Different kind of panel models, such as Fixed-Effects, Random Effects, Weighted Fixed-Effects, and Weighted Random-Effects as well as OLS and WLS models were tested with varying degrees of success.

The starting point for the building of our statistical model is to treat the unobserved variable as “unobserved heterogeneity” or individual effect that varies only across farms and not over time. As a result, it follows that all behavioral differences between individual farms are captured by the intercept. Examples of this heterogeneity, in our case, could be the average quality of land depending highly on soil quality, the managerial quality of family running the farm and other unobserved time-constant factors.

In our models the unit specific component is initially included in the error term. Furthermore, by adopting the fixed effect model (which all the statistical tests suggest is the correct model, for the weighted data), we allow for the unobserved fixed effect to be correlated with the explanatory variables, level (ha) and the interaction variable level multiplied by maximum yield or herd size (ha or heads*tones/ha). Hence, we regard that for example management ability or soil quality may be correlated with the maximum yield of the farm or the decision of how many hectares will be attributed to every production activity.

Main model:
$$Input_{it} = \beta_{1i} + \sum_{k=1}^{53} \beta_{2kr} Level_{iktr} + \sum_{k=1}^{53} \beta_{3k} \max(yield)_{ikt} * Level_{ikt} + u_{it}$$

Benchmark model: $$Input_{it} = \beta_{1i} + \sum_{k=1}^{53} \beta_{2kr} Level_{iktr} + u_{it}$$

Two types of specification were considered, as reported above. One with the level variable and the interaction term and a second one with one regressor (level) which is used as a benchmark model. We should note that maximum yield or herd sizes is chosen as part of the interaction term because it is considered a reliable proxy for the expected yield, as this is anticipated in the decision making of the farmer to use any particular input. Regional variations are incorporated by using activity level on the right hand side at the NUTS I, NUTS II levels accordingly with the compatibility of FADN and NUTS administrative regions. In addition, we should remark that the interaction term is included at the national level apart from the case of Italy, Spain, France, and Germany where it is at NUTS II and NUTS I level, for the last one, respectively.

Furthermore, because of a clearly deleterious effect on results, the equivalents of the CAPRI residual activity categories OCRO (other crops), OFRU (other fruits), OCER (other cereals), OVEG (other vegetables), etc. were all dropped from the estimations.

As previously mentioned, the data for the input demand estimations is the FADN dataset for the EU 15 from 1989 to 2001. Sample sizes vary from country to country (Italy, for example, has over 200,000 observations, while most countries have about 15,000-50,000). On average each particular farm appears 5 times in the 13 year panel.

The starting sample sizes from the FADN data and the regional level are given in Table 1 below. These are for the years 1989-2001, unless otherwise stated:

Table 1: Sample Information for the FADN data

Sample size	**Region**
•AT - Austria - 2570 farms--→ price data from'95-2001	National
•BL – Belgium/Luxembourg, 2643 farms	National
•DE - Germany, 16745 farms	NUTS I
•DK - Denmark, 7299 farms	National/NUTSII
•EL - Greece, 7152 farms	National
•FI - Finland, 1413 farms--→ price data from'95-2001	National
•IR - Ireland, 3733 farms	NUTS II
•IT - Italy, 57264 farms	NUTS II
•PT - Portugal, 6912 farms	National
•SE - Sweden, 1471 farms--→ price data from'95-2001	National
•UK - United Kingdom, 8102 farms	"Nuts half"
•ES - Spain, 25427 farms	NUTS II
•NL – Netherlands, 4347 farms	National
•FR – France, 15262 farms	NUTS II

Before the econometric regressions the following data cleaning procedures and other data transformations were employed:

- The regressors with less than or equal to 50 observations for both activity levels and yield/herd size were excluded.
- All non-zero values were counted.
- The data were truncated at zero in order to eliminate reported negative level and yield values and also reported negative real input costs.

- Price indices were taken from the COCO database in order to calculate wage input costs in real terms.
- The maximum yield/herd size is calculated by economic unit (farm) and it replaced yield and herd size respectively.
- The interaction term level*yield/herd size is created.
- Variables were weighted by total output.
- Year dummies were generated.

Several regressions were run to yield estimates for coefficients in each of 24 input categories available (not just labour: these other input coefficients MAY also be useful for CAPRI and it was felt to be worthwhile to combine them with the labour estimations) : Total Inputs, Crop Specific Inputs, Animal Specific Inputs, Seeds, Plant Protection, Fertilizer, Repair, Energy, Agricultural Services, Depreciation, Compensation of Employees, Other Taxes on Production, Other Inputs, Other Crop Inputs, Purchased and Non-Purchased Feeds, Other Animal Inputs, Water, Rent, Interest Paid, Electricity, Fuels, Wages, hours of Paid and Family Labour. These are only run for EU15 as we await data for the new member states.

The main focus for SEAMLESS, obviously, is total family labour and total paid labour. Other focuses (e.g. gender specific labour) are not possible given the data at hand, and will need to await new data sources. In the appendix the results national benchmark models for six countries are reported. These results seem reasonable on the whole, although individual coefficients are always arguable. They are provided simply as a sample. Three sets of equations are presented – those for total labour, for family labour and (a panel based tobit-type model for) share of paid labour (of total labour). The first two sets of results appear to be broadly reasonable, although in many cases total labour coefficients are less than those for family labour. The difference is rarely great, and nearly always confidence intervals overlap. Nevertheless, when this happens it will pose some problems in reconciling results for CAPRI. The ancillary "share of paid-labour regressions" provide additional information. In many cases coefficients here are negative – indicating that increases in the relevant activity levels increase the share of family labour. It is interesting in this regard to compare the paid-labour share coefficients for the cereals in Denmark and France. They are all negative in Denmark and mixed in France, implying a greater importance for family cereal farming in denmark than France.

Further development and improvement of the above estimations and particularly that of the FADN employment models is anticipated through the incorporation, if possible, of 'engineering' labour requirements for various activities. The work in incorporating both the engineering results and the econometric results into CAPRI should take advantage of the previous general work on inputs as a whole. This will be done in alliance with the Bonn team through the Autumn of 2006. At the time of writing (early June, 2006), the whole set of results (all are completed since March/April 2006) are being analysed for plausibility.

Finally, it is regarded that the cohort analysis of farm holders, one part of the FP6 CAPRI DYNA-SPAT project, will provide information which once linked with the econometric estimation output, is likely to produce more reliable results than what becomes available from the econometric analysis alone regarding predicted labour use coefficients that may be used in scenario building. These results were presented in Brixen, in February 2006, and link regional unemployment levels with numbers of farm holders. They may also be combined with the Markov chain results of the Bonn team (also part of WP3). It is to the Cohort analysis we now turn.

2 Cohort Analysis

2.1 Cohort Analysis: a methodological introduction

With the ubiquitous decline of the importance of agriculture in all Member States, there is concern as to the consequences for on-farm employment. With farming populations falling steadily, the increase in agricultural income per unit of labour is primarily a result of labour productivity. This is due mainly to the reduction in labour employed in agriculture. Within the EU, there is a marked difference in farm structures between Northern and Southern countries, with the average size of holdings much smaller in the latter than in the former. Because of the farming demographic in the Southern regions, a large drop in farm numbers is to be expected. By contrast, farms in the Northern regions tend to be medium-sized or large. Inheritance traditions, or a culture of primogeniture, vary across Member States. Family inheritance tends to be strong in regions that are strongly dependent on agriculture and that have modernised little. Conversely, a tradition of family inheritance is weaker in regions where agriculture is relatively more market-based. However, economic factors will also play a role in the future structure of farms, as demographics will. These will provide the market and policy environment in which the decisions of farmers will have to be made. To this end, we utilise a Cohort Analysis approach.

In terms of CAPRI, regional projections of the number of holders facilitate a more accurate welfare analysis in terms of regional income per 'capita' (i.e. farmer). In addition, the cohort analysis is seen as a corollary to the work on structural change using the Markov-Chain approach taking place elsewhere in the project (Task 3.6). Finally, holder projections can be linked to the Galway team's work on labour input estimations in terms of adding plausibility to forecasts of changes in labour requirements. Therefore, the cohort analysis will broaden CAPRI's range of policy analysis and enhance its existing capabilities.

This rest of the paper is structured as follows: section 2.2 describes the cohort anlysis methodology and the existing wok of the Galway team in this are; section 2.3 describes the data used in the construction of both the autonomous change variables and the econometric model; section 2.4 describes our econometric estimation procedure and results.

2.2 A Cohort Model

Changes in farm structure over time can be separated in to 2 components: (1) an autonomous component, which comprises of structural changes due to demographic factors such as ageing, death, disability and early retirement, and (2) a non-autonomous component, which incorporates all other factors that influence changes in farm structure. Thus, cohort analysis tires to dichotomise the effects of the components so as to simplify the econometric analysis of changes in the structure of farm holdings.

As mentioned, Cohort Analysis is used to separate autonomous changes in the structure of land holdings from non-autonomous changes. The cohorts are the holders of land divided in to different age groups. Steele and Gaffney (1998) offer the following example:

$C_{25}(1993)=C_{24}(1992)_{n24\text{-}25}\text{-}NA_{24\text{-}25}$

Where C_{25}= Cohort aged 25

C_{24}= Cohort aged 24

$N_{24\text{-}25}$= Probability of survival for 24 year olds in 1992

$NA_{24\text{-}25}$= Net non-autonomous change of cohort size 1992-1993

Net non-autonomous changes are those arising from farmers' decisions to leave farming and join other labour markets, or vice versa. These factors will vary from region to region and from year to year. The autonomous factors comprise of demographic changes such as the death rate or the probability of permanent disability.

Cohort analysis will estimate the expected size of a particular size state, given these autonomous factors. The difference between the estimated and observed size of a cohort, the 'residual', is the net non-autonomous change of the cohort size. The second stage of this approach involves the analysis of this residual econometrically. Using the number of holders as an approximation for total agricultural labour can be problematic. Thus, we examine the relationship between the number of holders and total agricultural labour input. It is examined for 11 member states, yielding the following correlations. It can be seen that the approximation is reasonable acceptable for all countries except Italy, where the large number of very small farms means that the number of holders diverges considerably from the amount of agricultural labour.

Table 2: Correlations between Holder Numbers and Agricultural Labour

Country	**Correlation Coefficient**
Germany	0.929342
Italy	0.486949
Ireland	0.947002
France	0.991825
Spain	0.941472
Greece	0.895167
Denmark	0.979908
Belgium	0.993277
United Kingdom	0.917235
Netherlands	0.932555
Luxembourg	0.993772

While accepting that this is a less than ideal approximation, we proceed pending the availability of more appropriate data. The probability of survival in any year in a region is calculated using crude death rates and population statistics obtained from Eurostat. The data is then divided in to 5-year cohorts. Linear interpolation is used to disaggregate the age distribution for holders at each age. The midpoints of each age group for which data is available is found and then connected with straight-line segments. These lines give a particular value for the number of holders at each age.

Autonomous changes are forecast by multiplying the number of holders for each age by the probability of survival for each age. New entrants were allowed for by creating a cohort of holders aged between 12 and 24. We base our ex-post analysis of the cohort results on the following assumptions:

- Death and disability: disability occurs through physical invalidity or by reaching the age of 75 years.
- Occupational mobility is approximated by the sum net changes in cohorts 25-55, when these changes were not due to death or disability. Those, who release their agricultural holdings, are assumed to do so in order to undertake alternative employment. We accept that they are not allowing for the possibility of interregional movements of holders.
- Holders in the 55-75 cohort who release their holdings are assumed to retire, as people in this age group are less likely to seek alternative employment.

To supplement the analysis, we construct 'age-lines' that illustrate the estimated number of holders in a country at each age. We incorporate two additional procedures to Steele and Gaffney (1998); (1) in order to allow for new entrants, the ratio of holders from 10-14, 15-19, and 20-24 to the total population in those age groups in each region was assumed to equal the ratio of farm holders of 25-34 year olds and total population in that age group for each region., (2) age-lines are in some cases adjusted so that from 10-34 year olds, no age-lines sloped downwards. This was achieved by constructing support points (0.1, 0.1, 0.1, 3.7) multiplied by the frequency at each age (the linear interpolation method described above. The entropy function was maximised subject to the restriction that the frequency at each age must be lower than that for the group one year older.

In making projections for 2005 (for which the actual data is due very soon – and projections can and will be made to 2010 or 2012, depending on the needs of SEAMLESS), we are required to make additional assumptions. Trends for 10-54 year olds are calculated based on demographic changes using 1993 death rates. For the 55-75 cohort it is assumed that the annual rate of retirement (or exit for non-demographic reasons) is the same as the annualised average of rates for 55-75 age group between 1987 and 1993. This exit rate is then spread across the individual years by a factor multiplied by the death rate for each year. These factors range from 0.995 for 55 year olds to 0.9 to 70 year olds. The projection for individual years is adjusted across the 21 years to ensure that the sum of the projection for the individual years is equal to the projection for the cohort as a whole. Figure 1 shows composite agelines for 10 EU member states (excluding Germany and Luxembourg) for 3 years; 1987, 1993, and 2005. The movement towards a more normal distribution of holders relative to their age is clear from the diagram.

FIGURE 1 EU10: Ages of Farm Holders in 1987, 1983 and 2005 (EU12 excl. Germany and Luxembourg)

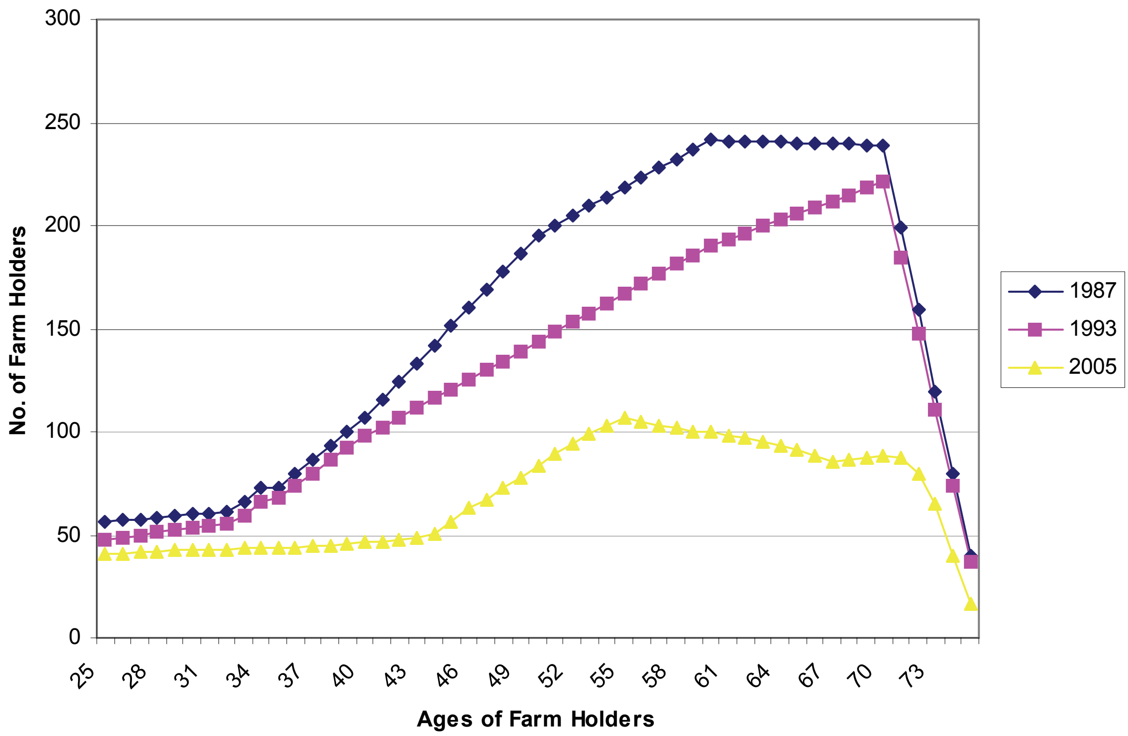

Table 3 below shows (i) projected total holders in 2005, (ii) projected percentage changes in total holders between 1993 and 2005 and (iii) projected percentage changes for 25-34 year olds (Cohort 1), 35-54 year olds (Cohort 2) and 55-75 year olds (Cohort 3) for Ireland. Also shown are the percentage change in each of the above three cohorts that is due to non-demographic factors, between 1985 and 1987 (if the data existed), between 1987 and 1990 and between 1990 and 1993.

Table 3: Cohort Analysis – an example for Ireland using earlier data

Cohort Trends to 2005 for Ireland (using earlier data, 1985-1993)

	%change cohort 1* 1993-2005	%change cohort2 1993-2005	%change cohort3 1993-2005	Number of Holders in 2005	%change all holders 1993-2005	annual% decline 1993-2005
IRELAND	-35.46	-21.49	-64.59	91.79	-42.27	-0.05

% CHANGE FOR NON-AUTONOMOUS (ECONOMIC) REASONS

	1985-87	1987-90	1990-93
Cohort1	0.69	-9.64	5.56
Cohort 2	7.21	6.86	-6.27
Cohort 3	-6.43	-29.48	-15.30

According to these results, the projected annual rate of decline in the number of holders between 1993 and 2005 for Ireland is 5%. Although the estimated rates may be high, they are consistent with the faster rate of decline for family vis-à-vis non-family labour input in most countries. This may also be exacerbated by the fact that projections of exit rates for the 55-75 year old cohort are based on annualised 1987-1993 exit rates, which historically were high in most countries. The table also shows the percentage change arising from non-autonomous reasons. It is clear that economic reason play a relatively more important role in influencing the decline in the number of farm holders in the oldest cohort.

As far as we know, De Haen and von Braun (1978) provides the only other attempt at analysing structural change using Cohort Analysis. They examine farm entry and exit for the *Laender* of West Germany from 1962-1973. They include in their econometric analysis variables that describe the labour market situation (ratio of vacancies to the number of unemployed, and a manufacturing wage index), the returns to agriculture (farm income) and the general macroeconomic environment pertaining to the region (regional GDP). Their results show clear interregional differences in the impact of regional labour markets, income differentials and age structures on level and structure of the total rate of change.

In the next section, we describe the data used in the calculation of the autonomous change variables and in the econometric analysis.

2.3 Residual and Econometric Data

Data on holders is taken from Eurostat's Farm Structure Surveys. Unfortunately, comprehensive holder data at NUTS2 level is a limited, particularly until the year 2000, our last year of observation. In addition, regions that only enter the dataset in 2000 have to be excluded, as it is not possible to calculate forecasted holders for this year. We are further constrained by the availability of NUTS2 data on some macroeconomic variables and therefore include data from the 1995, 1997, and 2000 surveys only. This leaves 433 observations, from 14 member states, 63 NUTS1 and 87 NUTS2 regions.

Farm Structure Surveys decompose holders in to several cohorts: those under 35 years old, those between 35 and 44, between 45 and 54, between 55 and 64, and those over 65. We assume that all holders 'under 35' in this data are older that 25. In order to make projections for future 25-34 year old holders we construct new cohorts between 10 and 14 years old, between 15 and 19, and between 20 and 24. These are constructed by simply assuming that the ratio of holders in the 25-34 cohort to the total male population in this age group in the region is the same for the three youngest cohorts. Observations are further restricted by the lack of NUTS2 data for some regions and years as is described below. Each holder group, or cohort, is then linearly interpolated in order to ensure a smooth distribution of holders across the cohort for each year of age. This gives the number of holders in a region for each age between 10 and 75[1].

In order to calculate the probability of survival we obtain data on regional death rates and population for each age from the Regio database. The probability of survival is one minus the former divided by the latter[2]. For Germany, regional deaths rates were taken from the National Statistics Agency[3] and were only available for ages in 5 year intervals. The intervals were linearly interpolated to give the number of deaths at each age. The probability of survival is then calculated as before.

Data on regional retirement rates of farmers at each age were unavailable and so crude assumptions were necessarily made. Specifically, we assume a linear retirement rate for holders between 55 and 75 years of age. A more accurate, region-specific retirement function is clearly desirable and this is one aspect of our current approach which we intend to modify.

Our residuals for the econometric analysis of farm entry and exit are computed as the difference between forecasted holders for a particular cohort in a particular year and the actual number of holder in that cohort for that year divided by the actual number of holders in that cohort in the previous year of observation. Thus a positive residual indicates net entry to agriculture in that region.

As mentioned, the econometric analysis comprises, on the left hand side, the 'residuals' from above, and, on the right hand side, information on the contemporaneous macroeconomic climate. Following De Haen and von Braun we choose variables to reflect the labour market situation, income and to the national growth rate of the economy, in this case over the 1995-2000 period.

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[1] We assume that there are no holders over 75

[2] more specifically, as deaths are reported as the total at the end of the year, this is 1-(no. of deaths at age j)/(population of age j+(deaths at age j/2))

[3] www.regionalstatistik.de

To capture the general economic climate we include Regional GDP per Capita, which is only available from 1995 from Eurostat. The actual measure available from Eurostat is 'GDP at current market prices'. This is divided by regional population to get a per capita measure and then deflated using the GDP deflator, also taken from Eurostat. Including GDP per capita reduces the number of observations to 409.

In order to measure the economic significance of the agricultural sector in a region, we calculate the share of total employment attributable to agriculture in the region during the 1995-2000 period. The Eurostat variable we use is "full-time/part-time male employment by economic activity at NUTS level 2". Including the share of agricultural employment in the model with the residuals reduces the number of observations to 333.

As a complementary measure, we also calculate the share of Gross Value added in a region that is derived from Agriculture. The Eurostat variable used is 'Gross Value Added at Basic Prices'. Including this variable with the residuals reduces the number of observations to 237. Both of these variables enable us to control for possible differences in the availability of employment outside of agriculture.

In addition, we include a measure for farm income constructed using data on family farm income in currency units from the Farm Accountancy Data Network (FADN)[4]. This measure is deflated using the national consumer price index from Eurostat (base year=1995). We calculate farm income at NUTS2 level where possible: where it is possible to discern the NUTS2 region form the FADN farm code. The number of observations falls to 305 when this income measure is included with the residuals.

Finally, we attempt to control for the labour market environment by including the total unemployment rate in the region, also taken from the Regio database. This differs from the measure used by De Haen and Von Braun in that they use the ratio of job vacancies to the number of unemployed in the German *Laender* to measure slackness in the market for labour.

[4] The FADN code is SE425

Unfortunately, NUTS2 data is not available on job vacancies. The number of observations falls to 377 when the unemployment rate is included with the residuals.

Having described the data used to construct our variables for the first and second stage of the Cohort Analysis we now describe our econometric model and results.

The inclusion of the above variables in the models reduces the number of observations to less than 200, and the periods modelled to the last three dates for which we have data: 1995, 1997, 2000.

2.4 Econometric Analysis

The equation estimated, for both young (25-35) and slightly older (35-55) farmers, is:

$$Net \quad non-autonomous \quad entry \quad (\%) = \sum_{j=1}^{k} \beta_j X_{jit} + \sum_{c=1}^{m} \alpha_c Country_c + \lambda Year_{2000} + e_{it}$$

The X variables are Regional GDP per capita, Unemployment rate, Farm Family Returns per AWU, Share of Total Output from Agriculure, Share of Total Workforce in Agriculture. The i subscripts indicate region and the t subscripts year. The m country dummies are dummies for the 14 countries, to control for nation-specific factors, and the time dummy is for one year (2000). After a two-way stepwise procedure only those variables with p-values less than .25 are retained. The Germany, Spain and France dummies are significant in both estimations, while the time dummy is insignificant in both.

The results of the estimations are presented below. The two most satisfactory models (for entry/exit of 35-55 year olds and entry/exit for 25-35 year olds) only have one substantive significant (or close to significant) X variable: regional unemployment at the beginning of each period. The other X variables noted in the last section are all insignificant once appropriate national and annual dummies are included in the regression. In one way this is unfortunate, and may be due to the small sample size. But perhaps, in the present context, it is sufficient to have one variable that links on and off-farm employment. The fact that this variable is unemployment and that the signs and coefficient sizes for the two age groups concerned are quite plausible means that linking the results with CAPRI, or with the indicators needed for task 2, is less problematic than might otherwise have been the case.

Table 4: Econometric results

Number of obs = 190				
F(11, 178) = 16.15				
Prob > F = 0.0000				
Adj R-squared = 0.4686				
Dep. Var.: Net Entry for non-demographic reasons(35-55 year olds)				
	Coef.	Std. Err.	t	P>|t|
Unemployment	.8407819	.2223935	3.78	0.000
Austria	-5.722791	4.229498	-1.35	0.178
Germany	-10.0221	3.901146	-2.57	0.011
Spain	-9.378648	3.076985	-3.05	0.030
France	-7.54331	2.398615	-3.14	0.002
Pastue=Unemployment at the beginning of each period.				
Number of obs = 190				
F(10, 179) = 33.28				
Prob > F = 0.0000				
Adj R-squared = 0.6307				
Dep. Var.: Net entry for non-demographic reasons (25-35 year olds)				
	Coef.	Std. Err.	t	P>|t|
Unemployment	1.466174	.5047168	2.90	0.004
Italy	18.6979	6.599314	2.83	0.005
Spain	-12.80021	7.482226	-1.71	0.089
Sweden	-14.64539	8.693749	-1.68	0.094
Germany	-8.065038	6.447161	-1.25	0.213
France	-16.40263	5.861609	-2.80	0.006

Variables in the full cohort model: Regional GDP per capita, Unemployment rate, Farm Family Returns per AWU, Share of Total Output from Agriculture, Share of Total Workforce in Agriculture, 14 Country Dummies and Annual Time Dummies. All money variables in euro, 2000. All independent variables measured at the beginning of the relevant period.

The results can be interpreted fairly straightforwardly: a percentage point increase in regional unemployment leads generally to a 1.5 percentage point increase in net entry among young farmers and an .8 percentage point increase in farmers between 35 and 55. Net entry among young farmers appears to be more sensitive to regional unemployment changes than is entry or exit my more middle aged farmers. This is not implausible. Different countries, as we see, also have unexplained entry or exit patterns specific to them. For example, ceteris paribus net non-autonomous entry from German farms is around 10% lower than that in most other EU countries for both middle aged and young farmers, while in France the gap is a lot larger for younger than for middle aged farmers. In Italy, the net entry for economic reasons into farming by young farmers appears to be greater than in the rest of Europe.

Again, as with the FADN results, these results are being checked and re-checked prior to inclusion into the CAPRI model in Autumn 2006. At the time of writing, data for 2003 is also being added to the sample but appears, provisionally, to have few effects on results.

3 Conclusion

The cohort analysis provides forecasts up to 2012 of purely demographic changes in the number of farm holders for NUTS1 and NUTS2 regions across Europe. Using the same techniques, these forecasts can also be made “backwards in time” and the “backwards forecasts” compared with the actual number of holders in past years. The gap between the backward forecast and the actuality creates a residual that we try to explain econometrically by changes in the relationships between non-agricultural and agricultural variables at the beginning of each time period. Only one such variable appears to be useful in explaining variation in the residual (interpreted as entry or exit from farming for non-demographic reasons) – regional unemployment. Forecasts of regional unemployment for, say, 2012 (if this year is used for model simulations) can, therefore, be used to augment the cohort analysis in order to provide a better overall predictor for the number of regional holders in 2012. These results may also be further used with the structural results of Task 3.6 to provide ultimately better information for regional farm structure forecasts.

Appendix: Results of Selected national FADN Labour Models

FIXED EFFECTS MODELS	Austria			Germany			Denmark		
Page 1 RESULTS: coefficients and standard errors	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours
Soft Wheat - level	-0.006	60.73	56.789	-0.101	40.403	36.776	-0.094	24.002	24.117
	0.018	4.141	4.02	0.009	1.253	1.153	0.008	0.716	0.681
Barley - level	0.023	68.625	69.049	-0.039	44.916	44.724	-0.069	27.432	28.015
	0.02	4.481	4.351	0.011	1.285	1.182	0.008	0.581	0.552
Oats - level	-0.003	100.524	102.667	-0.052	53.972	52.838	-0.186	25.198	20.581
	0.072	14.829	14.397	0.032	3.163	2.91	0.04	2.621	2.493
Durum Wheat - level	-0.025	55.873	54.689	0	0	0	0	0	0
	0.054	14.421	14.001	0	0	0	0	0	0
Maiz - level	-0.05	41.359	39.243	0.032	31.462	34.705	0	0	0
	0.021	6.199	6.018	0.022	3.079	2.833	0	0	0
Rye - level	0.004	66.841	65.005	-0.037	32.375	32.13	-0.114	26.403	25.959
	0.043	9.101	8.836	0.014	1.574	1.448	0.021	1.552	1.477
Rapeseed - level	-0.018	48.545	47.22	-0.028	37.061	35.036	-0.067	25.153	25.013
	0.031	7.682	7.458	0.015	2.034	1.872	0.015	1.17	1.113
Sunflower - level	-0.144	58.542	51.885	0.021	54.602	52.924	0	0	0
	0.046	10.364	10.062	0.064	6.147	5.655	0	0	0
Paddy Rice - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Olivs for Oil - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Soya - level	0.06	54.567	55.975	0	0	0	0	0	0
	0.042	9.915	9.626	0	0	0	0	0	0
Potatoes - level	-0.328	117.502	111.021	-0.175	48.796	43.212	-0.292	44.234	44.79
	0.075	23.183	22.508	0.036	5.463	5.026	0.034	3.776	3.592
Sugarbeet - level	-0.087	109.704	122.596	-0.175	82.725	82.014	-0.481	26.871	31.088
	0.102	23.58	22.893	0.043	6.167	5.674	0.059	5.821	5.538
Pulses - level	0.014	69.076	66.362	-0.067	26.463	11.916	-0.035	25.099	25.647
	0.038	8.914	8.654	0.024	3.252	2.992	0.021	1.618	1.539
Tobacco - level	0	0	0	-1.353	131.109	-34.382	0	0	0
	0	0	0	0.328	47.994	44.154	0	0	0
Textiles - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Apples - level	-2.156	579.969	485.836	-0.596	336.55	243.353	-1.163	139.737	87.082
	0.187	28.457	27.629	0.139	11.815	10.87	0.139	6.502	6.186
Tomatoes - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Citrus Fruits - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Table grapes - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Table Wine - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Table Olives - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Flowers - level	0	0	0	-0.088	127.376	108.875	-1.954	134.325	88.861
	0	0	0	0.094	29.274	26.932	0.426	26.282	25.004
Nurseries - level	0	0	0	-1.376	698.877	336.514	-0.845	257.011	221.791
	0	0	0	0.373	42.355	38.967	0.156	14.508	13.802
Fodder root crops - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Fodder Maiz - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Set aside - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Non food production on set asi	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0

	Austria			Germany			Denmark		0
PAGE 2 RESULTS	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours	Share of Paid Labour in Total (%)	Total Labour - Hours	0
Dairy cow - level	-0.04	178.161	175.34	-0.124	44.79	41.659	-0.234	29.505	24.683
	0.022	4.215	4.092	0.009	1.123	1.033	0.012	1.632	1.553
Suckler cow - level	-0.035	94.056	93.504	-0.024	42.847	37.418	-0.048	22.365	23.153
	0.034	4.983	4.838	0.018	1.379	1.269	0.033	1.045	0.995
Heifers for fattening - level	-0.303	8.643	-2.817	-0.066	12.185	12.903	-0.026	11.044	14.353
	0.125	24.539	23.825	0.02	2.047	1.883	0.057	4.745	4.514
Heifers for rearing - level	0	0	0	0.023	0.756	-0.352	0	0	0
	0	0	0	0.014	1.848	1.7	0	0	0
Calfs fattening male - level	0.006	-2.712	0.462	-0.062	9.804	10.399	-0.107	31.223	28.076
	0.056	13.667	13.269	0.024	4.375	4.025	0.025	2.683	2.552
Bulls for fattening - level	-0.018	56.297	56.184	-0.002	16.957	16.647	-0.004	11.612	11.706
	0.023	4.933	4.789	0.008	0.906	0.833	0.021	1.408	1.339
Calfs raising male - level	0.003	93.797	93.751	-0.031	25.033	24.006	-0.084	26.921	25.194
	0.032	7.376	7.161	0.011	1.329	1.223	0.019	1.728	1.644
Calfs raising female - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Calfs fattening female - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Sows for piglet production - lev	0.002	27.297	22.686	-0.018	9.552	9.671	-0.069	5.199	3.68
	0.01	2.469	2.397	0.004	0.563	0.518	0.003	0.577	0.549
Sheep and goat for milk - level	0	0	0	0.001	0.773	0.557	-0.018	6.456	6.346
	0	0	0	0.002	0.205	0.189	0.022	1.263	1.202
Pig fattening - level	-0.006	6.047	5.727	0	1.815	1.773	-0.004	0.831	0.95
	0.002	0.781	0.759	0.001	0.129	0.119	0.001	0.128	0.121
Laying hens - level	0	1.512	1.414	-0.001	0.113	0.101	0	-0.061	-0.015
	0.001	0.239	0.232	0	0.047	0.043	0	0.026	0.025
Poultry fattening - level	0	0.334	0.061	0	-0.022	-0.018	0	0.024	0.042
	0	0.127	0.123	0	0.02	0.019	0	0.014	0.013
Sheep and goat fattening - leve	0.024	12.135	11.724	0.032	2.441	3.048	-0.01	4.439	4.202
	0.01	1.81	1.757	0.007	0.401	0.369	0.035	2.149	2.045
1989				-4.984	223.733	49.261	0	0	0
				0.237	28.813	26.508	0	0	0
1990				-4.466	272.108	115.834	0.47	-44.141	-36.74
				0.234	27.934	25.699	0.347	26.904	25.595
1991				-4.6	308.625	143.688	0.168	-66.117	-80.013
				0.231	27.544	25.341	0.358	27.723	26.375
1992				-4.433	369.04	190.602	1.145	76.672	36.616
				0.224	26.601	24.473	0.365	28.871	27.467
1993				-4.451	526.475	330.084	0.813	173.302	107.038
				0.221	25.886	23.815	0.379	30.034	28.573
1994				-4.008	435.461	276.486	2.043	37.489	55.835
				0.221	25.871	23.801	0.391	30.812	29.313
1995				-3.733	262.324	136.802	2.215	31.26	63.846
				0.213	24.931	22.936	0.396	31.297	29.774
1996	-0.007	1,097.23	1,101.39	-3.784	201.89	65.235	1.985	-17.862	8.623
	0.135	61.688	59.892	0.21	24.691	22.715	0.397	30.939	29.434
1997	-0.115	921.199	892.561	-3.756	160.331	41.288	1.882	-93.019	-62.178
	0.131	60.459	58.699	0.203	23.882	21.972	0.403	31.637	30.098
1998	-0.169	754.195	737.46	-4.041	223.676	74.695	2.108	-99.922	-107.025
	0.129	59.744	58.004	0.204	24.121	22.191	0.423	34.548	32.867
1999	0.07	590.373	606.779	-1.21	88.584	43.823	3.147	-158.742	-130.255
	0.129	59.809	58.067	0.191	22.513	20.712	0.434	34.945	33.245
2000	-0.057	515.439	515.876	-0.751	-45.848	-54.356	3.608	-242.143	-148.986
	0.128	59.304	57.577	0.185	21.769	20.028	0.456	35.028	33.324
2001	-0.11	330.18	320.505	0	0	0	3.293	-256.811	-161.228
	0.127	58.961	57.245	0	0	0	0.474	36.128	34.37
Constant	97.954	1,962.02	1,846.76	94.678	1,713.72	1,385.74	88.483	1,145.78	663.467
	0.336	109.202	106.023	0.312	35.772	32.91	0.443	35.213	33.5
Observations	12875	12875	12875	62951	62951	62951	20369	20369	20369
Number of Farm number	2428	2428	2428	14884	14884	14884	6282	6282	6282
R-squared	0.02	0.34	0.33	0.03	0.19	0.2	0.11	0.34	0.35

Standard errors underneath coefficients

FIXED EFFECTS MODELS	Spain			Finland			France		
Page 1 RESULTS: coefficients and standard errors	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours	Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours
Soft Wheat - level	-0.153	25.133	23.228	-0.003	37.01	33.733	-0.021	20.895	23.677
	0.008	0.824	0.785	0.031	2.763	2.518	0.006	1.004	0.897
Barley - level	-0.075	24.31	23.969	0.013	25.745	24.315	-0.03	23.442	25.098
	0.006	0.485	0.462	0.021	1.719	1.567	0.009	1.469	1.312
Oats - level	-0.015	30.787	29.869	0.034	32.75	32.303	0.076	15.099	19.509
	0.019	1.591	1.515	0.032	2.545	2.32	0.043	4.737	4.232
Durum Wheat - level	-0.105	21.518	20.37	0	0	0	-0.049	16.981	16.657
	0.012	0.939	0.894	0	0	0	0.014	2.016	1.801
Maiz - level	-0.053	53.302	51.232	0	0	0	-0.026	27.701	31.042
	0.027	2.954	2.813	0	0	0	0.009	1.32	1.179
Rye - level	0.005	34.368	35.893	-0.014	44.189	41.417	0.174	32.758	40.098
	0.038	3.25	3.095	0.07	5.929	5.404	0.067	6.7	5.986
Rapeseed - level	0.015	34.898	33.606	0.001	27.908	26.472	-0.033	10.514	9.584
	0.075	4.65	4.429	0.044	3.568	3.252	0.01	1.686	1.506
Sunflower - level	-0.07	23.615	21.058	0	0	0	-0.004	23.993	25.627
	0.011	0.91	0.867	0	0	0	0.011	1.36	1.215
Paddy Rice - level	-0.22	25.736	14.311	0	0	0	0	0	0
	0.097	11.386	10.843	0	0	0	0	0	0
Olivs for Oil - level	-0.535	109.701	84.6	0	0	0	0	0	0
	0.028	1.748	1.665	0	0	0	0	0	0
Soya - level	0	0	0	0	0	0	-0.041	36.842	35.946
	0	0	0	0	0	0	0.03	3.539	3.162
Potatoes - level	-0.137	136.723	138.577	-0.424	292.937	287.124	-0.436	66.077	64.188
	0.075	7.761	7.39	0.219	25.245	23.008	0.041	9.332	8.338
Sugarbeet - level	-0.201	80.412	82.422	0.14	55.011	54.413	-0.149	-13.332	-1.681
	0.055	6.221	5.924	0.138	12.05	10.982	0.034	7.537	6.734
Pulses - level	-0.158	17.648	15.116	-0.174	22.654	14.378	-0.039	21.785	22.391
	0.02	1.723	1.641	0.08	8.857	8.072	0.015	2.488	2.223
Tobacco - level	-1.715	646.173	437.592	0	0	0	-1.257	607.305	528.471
	0.302	11.188	10.655	0	0	0	0.233	34.925	31.203
Textiles - level	-2.185	105.669	68.882	0	0	0	0	0	0
	0.07	5.928	5.645	0	0	0	0	0	0
Apples - level	-0.639	92.689	88.936	0	0	0	-1.911	288	161.82
	0.132	8.623	8.211	0	0	0	0.069	10.093	9.017
Tomatoes - level	-1.914	283.42	221.259	0	0	0	-3.296	374.506	195.554
	0.143	16.845	16.041	0	0	0	0.242	41.437	37.02
Citrus Fruits - level	-1.643	306.876	256.716	0	0	0	0	0	0
	0.245	14.831	14.123	0	0	0	0	0	0
Table grapes - level	0.111	102.686	87.953	0	0	0	-0.481	291.535	289.987
	0.135	7.606	7.243	0	0	0	0.186	18.924	16.907
Table Wine - level	-0.057	88.94	78.732	0	0	0	-0.573	96.076	67.73
	0.052	3.365	3.205	0	0	0	0.024	2.657	2.374
Table Olives - level	-0.305	50.065	40.869	0	0	0	0	0	0
	0.077	4.51	4.295	0	0	0	0	0	0
Flowers - level	0	0	0	0	0	0	-1.05	119.297	86.003
	0	0	0	0	0	0	0.177	29.554	26.404
Nurseries - level	0	0	0	0	0	0	-3.435	255.905	117.39
	0	0	0	0	0	0	0.28	43.859	39.184
Fodder root crops - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Fodder Maiz - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Set aside - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Non food production on set asi	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0

PAGE 2 RESULTS	Spain Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours	Finland Share of Paid Labour in Total (%)	Family Labour-Hours	family labour in hours	France Share of Paid Labour in Total (%)	Total Labour - Hours	Family Labour-Hours
Dairy cow - level	0.028	83.575	84.031	-0.094	148.793	138.809	0.12	46.943	52.715
	0.019	2.149	2.046	0.047	6.851	6.244	0.007	1.006	0.899
Suckler cow - level	0.191	65.775	68.894	0	0	0	0.05	36.301	37.054
	0.018	1.415	1.347	0	0	0	0.007	0.735	0.657
Heifers for fattening - level	0.089	12.32	10.61	0.027	12.25	10.497	-0.023	1.38	1.639
	0.071	7.525	7.166	0.088	9.645	8.791	0.012	1.497	1.338
Heifers for rearing - level	0.022	-4.26	3.133	0.005	29.102	29.43	0.017	-1.584	-1.077
	0.104	12.474	11.879	0.095	10.515	9.584	0.01	1.332	1.19
Calfs fattening male - level	0.083	30.983	34.912	0	0	0	-0.006	6.261	6.365
	0.029	3.774	3.594	0	0	0	0.01	1.161	1.037
Bulls for fattening - level	-0.013	8.413	8.673	0.011	34.322	32.299	-0.052	4.255	4.067
	0.036	3.649	3.475	0.034	3.314	3.02	0.006	1.04	0.929
Calfs raising male - level	0.021	35.101	37.34	-0.033	50.821	48.43	0.001	0.983	3.12
	0.03	3.283	3.127	0.039	4.288	3.908	0.012	1.492	1.333
Calfs raising female - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Calfs fattening female - level	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
Sows for piglet production - lev	0.022	17.073	18.108	0.01	7.592	7.833	-0.014	4.593	5.574
	0.013	1.429	1.361	0.013	1.78	1.623	0.007	1.262	1.127
Sheep and goat for milk - level	-0.002	4.28	4.235	0	0	0	0.006	4.288	4.2
	0.002	0.137	0.131	0	0	0	0.001	0.134	0.12
Pig fattening - level	-0.002	0.496	0.48	0.001	2.581	2.555	0.001	0.447	0.584
	0.002	0.275	0.262	0.003	0.363	0.331	0.001	0.172	0.154
Laying hens - level	0	0.062	0.053	-0.001	0.316	0.286	0	0.037	0.038
	0	0.11	0.105	0.001	0.077	0.07	0	0.008	0.007
Poultry fattening - level	0	-0.001	0	0	0	0	0	-0.003	0.005
	0	0.002	0.002	0	0	0	0	0.004	0.003
Sheep and goat fattening - leve	0.009	0.289	0.606	0	0	0	-0.002	1.404	1.457
	0.004	0.404	0.385	0	0	0	0.002	0.213	0.19
1989	0	0	0	0	0	0	3.501	1,223.11	1,272.60
	0	0	0	0	0	0	0.22	33.63	30.045
1990	2.063	-1,446.65	-1,196.94				3.18	1,041.02	1,100.18
	0.235	82.842	78.89				0.214	32.637	29.158
1991	2.76	-2,043.49	-1,742.77				3.172	936.335	1,000.30
	0.241	84.797	80.753				0.21	32.25	28.813
1992	3.766	-2,430.20	-2,045.03				3.03	884.414	913.796
	0.255	89.641	85.365				0.205	31.387	28.042
1993	2.039	-2,202.73	-2,086.00				3.021	860.161	892.616
	0.258	90.771	86.441				0.203	30.981	27.679
1994	4.976	-2,046.79	-1,664.04				2.436	636.95	664.603
	0.269	94.876	90.351				0.199	30.456	27.21
1995	4.223	-2,770.43	-2,376.68				2.104	478.295	520.788
	0.275	96.832	92.213				0.198	30.326	27.094
1996	1.129	-2,786.24	-2,787.71	0.066	-394.702	-324.295	1.456	388.23	410.952
	0.268	94.035	89.55	0.362	90.819	82.773	0.194	29.854	26.672
1997	4.699	-2,523.77	-2,182.21	-0.869	-570.851	-597.486	0.898	341.021	322.909
	0.266	93.675	89.207	0.374	93.201	84.944	0.191	29.28	26.159
1998	5.324	-2,147.20	-1,803.21	-1.005	-564.816	-612.766	0.592	232.075	234.6
	0.27	95.074	90.539	0.392	97.947	89.27	0.187	28.78	25.712
1999	4.12	-2,036.50	-1,864.77	-1.163	-801.252	-841.628	0.184	196.342	164.161
	0.272	95.78	91.212	0.407	101.963	92.93	0.184	28.275	25.261
2000	4.55	-1,964.43	-1,713.86	-0.848	-1,092.57	-1,137.35	0.012	111.79	104.122
	0.273	95.694	91.129	0.42	102.71	93.611	0.18	27.695	24.743
2001	4.31	-1,603.53	-1,425.78	-1.141	-1,577.56	-1,590.21	0	0	0
	0.278	97.239	92.601	0.443	106.989	97.511	0	0	0
Constant	86.935	7,964.69	6,652.24	93.507	3,789.37	3,472.99	87.214	2,164.72	1,485.15
	0.239	81.9	77.993	0.688	148.647	135.478	0.232	34.69	30.992
Observations	81013	81013	81013	5874	5874	5874	59379	59379	59379
Number of Farm number	22253	22253	22253	1305	1305	1305	12369	12369	12369
R-squared	0.05	0.25	0.23	0.01	0.36	0.38	0.07	0.21	0.25

Standard errors underneath coefficients

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