FACEPA

Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture

The Statistical Usefulness of the EU FADN Database for Production Cost Estimations

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Executive Summary

The purpose of the present document is to discuss and analyze the strengths and weaknesses of the EU FADN database for estimating cost of production from a statistical point of view. To this end, the approach and implementation of sampling and weighting in EU FADN is summarized and size and distribution of used weights are examined in Chapter 2 and 3, respectively. Chapter 4 analyzes the coverage and representativeness of EU FADN data. Finally, the question of the representativeness of EU FADN with respect to organic farming is addressed.

The field of survey of the EU FADN is a well-defined group of farms out of the total number of farms and includes commercial farms that exceed a minimum threshold of agricultural production measured in European Size Units. This threshold varies among Member States, and some countries apply additional criteria for excluding farms from the survey. Given the great variety within the FADN field of observation, stratified sampling is applied to ensure that the sample of farms adequately reflects this heterogeneity. Stratification as well as procedures and methodology to select sample farms vary among Member States. For example, non-random sampling and voluntary participation may introduce sampling bias. The differences in selecting, stratifying and sampling between Member States can also result in differences in national and EU FADN weights and affect representativeness.

Weighting factors are used to extrapolate the EU FADN sample. These weighting factors also have to be taken into account when specifying a cost of production model which aims to reflect the input-output allocation on the Member State level to prevent distorted results. The larger the variation in the weighting coefficients is, the greater the need for their incorporation in a cost production model that aims to produce information at the level of the Member States. To investigate the size and variation of weighting coefficients across Member States and farm types, a descriptive analysis is carried out for the year 2005. The results show that the variation of weights is rather high. In some Member States, farms with very high weights occur, which raises some doubt on the reliability of the estimates based on these farms for the represented population. Further research is needed to analyze the impact of differences in EU and national weights on production costs estimates.

The study highlights that there is considerable potential for focusing production cost estimation on samples of specialized farms, as these often have a very high share in the total production of selected products. Nevertheless sample sizes need to be checked in each case to ensure robust estimates.

To test the seriousness of the above mentioned (theoretical) problems, empirical analysis is performed on the FADN data. The coverage and representativeness of EU FADN data is assessed with the help of various indicators, namely the practical and theoretical coverage, their differences and a so-called “weighting error”. Furthermore, the mean values per farm, based on EU FADN and the Farm Structural Survey, are compared. The analysis focuses on the year 2005 and results are reported for all 25 Member States. In addition, the year 1995 is regarded to identify to what extent the indicators changed over time. The variables under study are the number of holdings, the utilized agricultural area, cereal area, wheat area, oilseed area, number of dairy cows and number of fattening pigs. EU FADN data are

extrapolated to the whole population by using the given weighting coefficients. The findings indicate that, on an EU average, the coverage and representativeness is relatively large for the variables under study. However, considering the single Member States reveals that in some cases significant differences exist cross-sectionally. In view of the changes over time, it is shown that the coverage and representativeness increase from 1995 to 2005. Looking at the mean values of EU FADN and the Farm Structure Survey reveals that discrepancies can be explained by sampling errors and it can not be proven that they are systematic. Finally, it must be noted that the empirical analysis and the conclusions drawn in this chapter are based on the comparison of structural variables such as hectares of major crops and numbers of specific livestock between the sample and the population. It gives, however, no final answer whether estimations of costs of production using EU FADN will reflect the true population value. Validating the estimation results using cost calculations from other sources are therefore necessary topics for future research.

Finally, this report analyzes the coverage of organic farming. An identifier variable for organic farms was introduced in the EU FADN in 2001. In 2006, the sample includes accounts from more than 3,000 fully organic farms, however, sample sizes vary strongly between countries. Currently, the number of organic farms is small , and hence the sample will only allow an econometric estimation for few countries. Generally, the potential for estimating cost of production based on specialized organic farms is low, due to small sample sizes and the often higher diversity of production structure in organic farms. As organic faming is not a stratification criteria employed when calculating the EU FADN weights, the reliability of these weights might be low, especially in countries where organic holdings represent only a small proportion of farms. Another problem is that some countries do have strata for organic farms on national level which are not taken into account in the EU weighting. More robust and representative estimates may be achieved using national FADNs, which in some countries include a higher number of organic farms, and/or allow a weighting of these farms.

Overall, this document provides evidence that the EU FADN is a useful database for estimating the cost of production for various agricultural products at the Member State or even the more regionalized level. The present findings, however, also show that for every empirical application using EU FADN, care should be given to the selection of holdings, and weights in relation to the variables of interest.

Contents

Abbreviations and Acronyms

AWU	Annual Work Units
COP	Cereals, Oilseeds and Protein Crops
ESU	European Size Units
EU	European Union
FACEPA	Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture
FADN	Farm Accountancy Data Network
FSS	Farm Structure Survey
nMS	New Member States (here referring to the ten new Member States of the EU enlargement in 2004)
oMS	Old Member States (here referring to the EU-15 until 2004)
SGM	Standard Gross Margin
TF	Type of Farming
UAA	Utilized Agricultural Area

Country Codes

AT	Austria
BE	Belgium
CY	Cyprus
CZ	Czech Republic
DE	Bulgaria
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

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1 Introduction

On the basis of the Farm Accountancy Data Network (FADN), the FACEPA project intends to estimate cost-allocation coefficients for various types of agricultural products within the European Union (EU) at the Member State level. An important step in the challenging process of developing such a "general" cost of production model is to look thoroughly at the statistical usefulness of the underlying database.

The EU FADN aims to compile a representative database applying a two-step procedure. Firstly, a set of farms which are stratified by region, economic size and type of farming are selected. Secondly, this basic data is extrapolated with the help of weights, in order to generate information concerning the whole population of a Member State. Nevertheless, earlier studies based on FADN data found statistical problems for various reasons, including methodological approach to sampling and weighting, use of additional criteria, and thresholds by Member States, which cause discrepancies between EU FADN data and the true population values reflected by the Farm Structure Survey (FSS). Given this background, it is no wonder that much effort has been spent on refining selection plans and the weighting scheme in order to improve the quality of EU FADN data.

The purpose of the present study is to demonstrate the strengths and weaknesses of the EU FADN database for estimating the cost of production from a statistical point of view. The focus of this report is on highlighting the limits for conclusions that can be drawn from the estimated production costs, and on pointing out potential adjustments to the cost estimation to deal with the statistical limitations of the given data set. It should be emphasized that the focus of the report is therefore not on discussing possible future improvements to the EU FADN system.

The report is organized into five chapters. In Chapter 2, the sampling and weighting in EU FADN are summarized and the implications for the representativeness and coverage are discussed. In Chapter 3, the size and distribution of the weights used in EU FADN data are examined. In this context, descriptive statistics are presented at the Member State level, both for the whole sample and disaggregated by type of farming. In Chapter 4, the coverage and representativeness of FADN data is analyzed by comparing the values of various structural variables with those from the Community FSS database published on the EUROSTAT website. Finally in Chapter 5, the question of the representativeness of EU FADN with respect to organic farming is addressed.

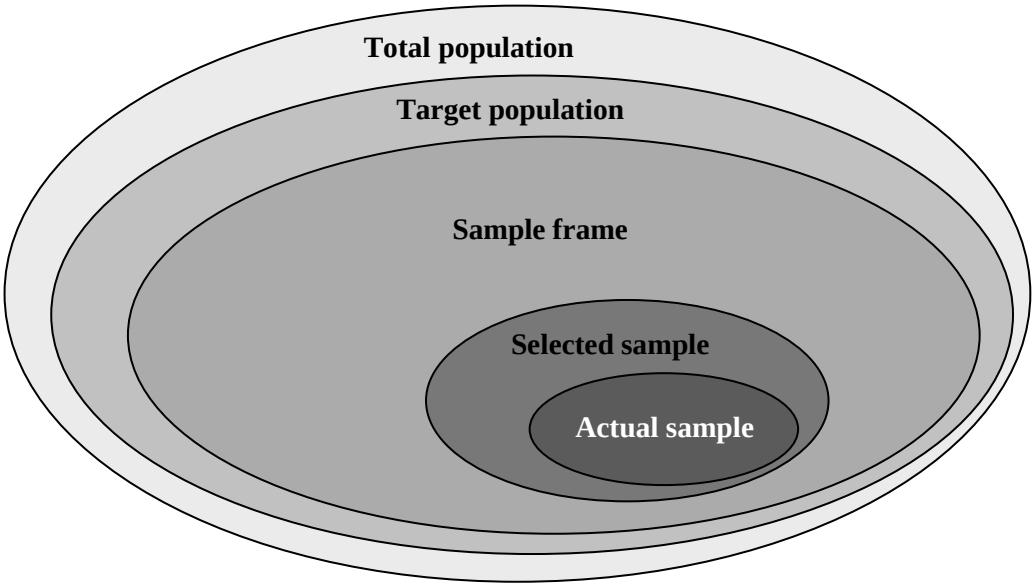
2 Sampling and Weighting in EU FADN

The statistical usefulness and appropriateness of the EU FADN for estimating production costs is to a large part determined by the sampling and weighting procedures applied. Building on the detailed description of the framework and the general methodology of the EU FADN by Barkaszi et al. (2008), this chapter will focus on the implications of the applied approaches and methods for selecting, stratifying and weighting sample farms for the representativeness of EU FADN and its use for FACEPA.

2.1 Sampling in EU FADN

Sampling is the process of selecting elements from a population in order to construct a subset ('sample') to be used for making inferences about the population. To judge the quality ('statistical usefulness') of a sample it is helpful to separate the basic steps of selection made when deriving an actual sample from the population (Figure 2.1). Most studies define a target population (i.e. the population about which conclusions will be drawn) that is smaller than the total population. To identify members of the target population, a comprehensive catalogue (e.g. address list) of this population is required, the so-called sample frame. From this sample frame, a sample is then selected to be contacted for the survey. The details of this selection are determined by the chosen sampling procedure. As usually not everyone contacted will participate in the survey (non-respondents), the actual sample will be smaller than the selected sample.

Figure 2.1: Sampling steps



Source: Own illustration.

In the following, these sampling steps will be described for the EU FADN with a view to the particular approaches chosen and their possible theoretical impacts on the statistical

usefulness of the sample. Some of the identified impacts are then quantified in the subsequent chapters.

From total population to target population

The target population ('field of observation') of the EU FADN refers to 'commercial farms' (Regulation 79/65/EEC), and is therefore a subgroup of the total population of all farms. Commercial farms are defined as farms which are large enough to provide a main activity for the farmer and a level of income sufficient to support his or her family (Barkaszi et al., 2008). In classifying a commercial farm, minimum thresholds regarding the economic size of farms are used[1]. These minimum thresholds differ between Member States. Furthermore, some Member States apply additional criteria, including upper thresholds for economic size[2] as well as supplementary criteria, e.g. a minimum level of annual work units (AWU) on the farms. (Delame and Butault, 2009). This can again significantly reduce the number of farms covered by FADN (RI/CC 1483, pp. 5).

A difference between total and target population is statistically irrelevant, as long as the conclusions drawn from the final sample will clearly refer to the target population. However, the (political) relevance of any conclusions based on the EU FADN would be reduced if there is a large difference between the target population and the total population. The measurement and extent of this gap will depend on the specific research questions. Besides, the gap will differ between countries and products, depending, among other things, on the share of small and other excluded farms and their output orientation. Against this background, Chapter 4 will provide a detailed quantitative assessment of the coverage of the EU FADN with respect to the total population.

From target population to sample frame

To identify commercial farms which can be contacted for participation in the EU FADN, a list with addresses or phone numbers of such farms - the sample frame - is needed. Sample frames are rarely complete catalogues of the units contained in the target population (Emerson and MacFarlane, 1995), and the characteristics of the sample frame for the EU FADN differ by member state. Usually, member states use the address list of the agricultural census to draw the sample (e.g. in the Netherlands, Vrolijkk et al., 2009). The time lag between the establishment of this list and the survey implies some discrepancies between the sample frame and the target population due to the exit and entry of farms, and, in particular, due to changes in farms' size and type. This also affects the statistical properties of stratified sampling, as discussed in the next paragraph. In some countries (e.g. Germany), selection and data collection of farms is done by bookkeeping agencies, which restricts the sample frame to current clients of theses agencies.

From sample frame to selected sample

From the sample frame, the units to be included in the survey are drawn. The outcome and statistical properties of the process are determined by the sampling procedure. For the EU FADN, a stratified sampling approach is used, with stratifying the population according to the three criteria i) region, ii) economic size and iii) type of farming (Barkaszi et al., 2008).

[1] The Standard Gross Margin (SGM), expressed in terms of European Size Units (ESU), is used to determine the economic size of farms (for details see Barkaszi et al., 2008).

[2] For instance, an upper threshold was introduced in the Netherlands because it is very hard to motivate these farms to participate in the sample (Vrolijk et al., 2009).

Some member states use additional stratification criteria, e.g. with respect to organic farming, horticulture, type of business, farmer's age or utilized agricultural area (RI/CC 1503; Delame and Butault, 2009), which can cause problems with respect to the calculation of correct weighting factors (see Chapter 2.2). Stratified sampling can increase the precision of estimates (Cochran, 1972, p.111) as well as reduce non-response bias. However, the choice of the stratification criteria has an important influence on the statistical properties of stratified sampling, and outdated sample frames can distort estimates from stratified samples (Cochran, 1972, pp.143-146). This is a central issue for the EU FADN, as there is often a significant time lag between the definition of the strata for the selection plans and the survey. This is true in particular with respect to the calculation of Standard Gross Margins (SGM), which are used to determine two of the stratification criteria of the EU FADN (economic size and farm type).

The sampling procedures vary among Member States, as some of them use stratified random sampling while others use non-random sampling. Those that use stratified random sampling further apply proportional sampling like the United Kingdom, or disproportional stratified sampling like the Netherlands. In proportional stratified sampling the percentage of farms in each stratum is proportional to their sizes in the population, while in disproportional stratified sampling, Member States optimize the percentage of farms for each stratum according to certain criteria. In the latter case, farms belonging to relatively homogeneous strata have a lower probability of being included in the sample.

Some Member States use non random quota sampling to ensure that there will be a minimum sample of the population for specified criteria or strata. Farms that are "easy to recruit" might be given preference over those that are not easy to recruit. The main argument against this approach is that the sample may be biased, as some farms may have no chance of selection, or the chance of selection may be unknown (Doherty, 1994). Further on farms with complicated juridical structure or intertwined non-agricultural activities might be underrepresented, because it takes more effort to assemble the data of these farms. Very large farms or farms that undergo large changes (recently being taken-over, or exiting farming in the near future) might be underrepresented as these farms are often less willing to participate. Related to this is another source of potential sampling bias: Over time, repeated participation can induce a learning effect (Buttler and Fickel, 2002, p. 54), i.e. farms taking part in the survey over several years may increase their performance due to the availability of detailed farm-level economic information. One strategy to deal with this potential bias is the regular replacement of a part of the sample ('rotation'). However, currently few member states have a systematic approach to the renewal of the sample (Mühlethaler, 2008).

From selected sample to actual sample

Few surveys reach a 100% response rate, and the FADN survey response rates can be quite low, especially in countries with voluntary participation and pure random selection (for example, the response rate was only 26% in the Netherlands; Mühlethaler, 2008). Non-response will introduce a bias to the sample if there exist systematic differences between respondents and non-respondents with respect to the variables of interest (Vrolijk and Cotteleer, 2005). If, for example, specific farm groups or farms with a specific type of farming are less inclined to participate, this will result in a different farm group or farm

type distribution in the sample compared to the population[3]. To deal with this problem stratified quota sampling is applied in several Member States (Mühlethaler, 2008). Non-respondents are replaced with other units from the same stratification cell until a preset quota is achieved. The survey estimates will then be unbiased as long as within a quota cell, respondents and non-respondents have the same characteristics. This approach can however not deal with sample bias if differences between respondents and non-respondents are not directly observable. For example, farmers with above-average management skills might be more inclined to be interested in and collect data on the economic performance of their farm. Hence, the resulting sample might be biased with respect to indicators of financial performance.

Another strategy to reduce non-response rates is the use of financial incentives. In several countries, farmers who participate in the FADN receive direct or indirect compensation via accounting offices (Mühlethaler, 2008). The use of financial incentives in surveys has been the subject of controversial discussion. On the one hand, it has been found to increase participation rates as well as quality of answers (see, for example, the literature review in Singer et al., 1999).[4] On the other hand there is the danger of an unwanted effect on sample composition if some units are more likely to react to financial incentives than others. While no study was available which has analyzed this issue for the FADN survey, results from other studies generally found no significant impact of financial incentives on sample composition (see, for example, the literature reviews by Shettle and Mooney, 1999; Stadtmüller and Porst, 2005).

2.2 Weighting

The purpose of 'weighting' sample observations when estimating population values is to take into account differences in the probability of units to be included in the sample. Weighting is a procedure to correct the distributions in the sample data to approximate those of the population from which it is drawn. This is partly a matter of expansion and partly a matter of correction or adjustment for both non-response and non-coverage (it seems strange to me that weighting can be used to correct non-coverage) (Research Triangle Institute and Federal Highway Administration, 1997).

Weighting in the EU FADN denotes the procedures followed in order to identify how many farms are 'represented' by each sample farm. Each farm is then weighted by the number of farms it represents and EU FADN results are produced as weighted totals and weighted averages, respectively (Agilis, 2005). To calculate these weighting coefficients in EU FADN data, holdings in the sample and the field of survey are post-stratified according to the criteria of region, type of farming and economic size class. The individual weight is equal to the ratio between the number of holdings of the same classification cell (FADN region × type of farming × economic size class) in the population and in the sample (RI/CC 1296, p.1). In principle, through this weighting method it is possible to take account of

[3] For example, response rates vary between different farm types from 6% to 25% in the UK or between different strata from 0% to 100 % in the Netherlands (Mühlethaler, 2008).

[4] Rather than using financial incentives which are not directly linked to the quality of the data delivered, many member states deliver benchmark reports in return for participation. These benchmark reports are only useful for the farmer if he delivers good quality data. Mistakes in the data might be detected by the farmer while studying his benchmark report. A disadvantage might be that the farmers learns from these benchmark reports and are not representative for the average farmer anymore.

different sampling fractions for different cells. However, discrepancies have been observed between population values estimated from EU FADN data and the true value reflected by the FSS (e.g. RI/CC 1356; RI/CC 1348), as well as between the results produced by the member states and those by the Commission (Agilis, 2005). The causes for these discrepancies are manifold and include the stratification scheme of the universe of farms, the available 'population figures' (i.e. data about the number of farms which exist in each stratum) and the data analysis rules used to identify the stratum to which each sample farm belongs (Agilis, 2005).

One of the key weaknesses of the weights in EU FADN is that they do not fully reflect the sampling scheme and approaches implemented by the member states. The use of additional strata, differences in the definition of stratum criteria (e.g. SGMs), additional criteria for delimiting the field of observation as well as differences in clustering rules to deal with sparsely populated stratification cells can lead to different sampling rates than implied by the weights resulting from post-stratification according to the EU FADN rules. The time lag between the available population figures from the FSS and the reference years for SGM calculation on the one hand and the year for which FADN farms are sampled and weighted on the other hand, can lead to incorrect weights, especially if the type of farming or farm size changes over time. A distortion of EU FADN weights might also arise from a technical difficulty related to the fact that the FADN unit does not have full access to the FSS data. The total number of farms per strata, which is used for the calculation of weights, is provided by Eurostat only after applying routines to protect data privacy, effectively limiting exact information on the number of farms to those cells which include at least 10 farms[5].

The theoretical discussion highlights that the comparatively simple and harmonized weighting approach of the EU FADN cannot correctly take into account the diverse statistical properties of the national samples. Some, though not all, of the problems identified for the EU FADN weights can be alleviated by using national weights which more closely take into account the actual sampling and stratification approach. It is therefore recommended for the FACEPA project that the impact of weights on production costs estimates are analyzed in detail by applying, if available, both EU and national weights.

2.3 Conclusions

The overview of the sampling and weighting used in the EU FADN data system highlights the extent to which Member States use different methodologies for selecting, sampling and stratifying farms, and the possible impacts this may have on representativeness, coverage and weighting of the data. Factors of concern include:

- the country-specific differences between the field of observation and the total population,
- the use of additional criteria and sub-samples as well as different SGMs for sampling plans,

[5] When there are only a limited number of farms in the FSS, some special rules are used: When there are 1-3 farms in the FSS, the FADN weight of the farm will be zero. When there are 3-9 farms in the FSS, the weight in the FADN is 0 or 10. If there is no FSS farm in that stratum, the weight will be 1 (EC Commission, DG Agri, personal communication, 19.6.2008).

- resulting differences in national and EU FADN weights and the representativeness,
- the potential sampling bias introduced by non-random sampling and voluntary participation in some Member States.

The following chapters will provide a more detailed quantitative analysis of some of the raised issues, to provide a basis on which the specification, estimation and interpretation of the FACEPA cost model can be related to country and product specific characteristics of the EU FADN data.

3 Analysis of the Weighting Coefficients Used in EU FADN Data

As described in the previous chapter, the FADN basic data is extrapolated via the use of weights in order to generate information concerning the whole population of a Member State. These weighting factors also have to be taken into account when specifying a cost of production model which aims to reflect the input-output allocation on the Member State level. Otherwise, results could be distorted, especially when the weighting coefficients within the national sample farms differ significantly. The aim of this chapter is to compare the size and variation of the weighting coefficients across Member States.

3.1 Preliminary Notes

The year under study is 2005 and various descriptive statistical measures are presented[6]. The analysis is carried out for the total number of farms in each national sample as well as for the different types of farming. Based on the so-called "TF8" FADN definition (see FADN 2009, p. 43 and pp. 49), the following eight subsamples are considered:

1) field crops (including, e.g. cereals, oilseeds, protein crops, root crops and field vegetables),
2) horticulture (including, e.g. flowers, ornamentals and market garden vegetables),
3) wine,
4) other permanent crops (including, e.g. fruits and olives),
5) milk,
6) other grazing livestock (including, e.g. cattle rearing and fattening, sheep and goats),
7) granivores (including pigs and poultry) and
8) mixed (including, e.g. mixed livestock and various crops and livestock combined).

Before interpreting the empirical results, it is helpful to summarize briefly how individual weights are determined in the FADN data. Assuming, for example, 500 large holdings exist in Schleswig-Holstein which are specialized in cereals, oilseeds and protein crops (COP): If there are 25 holdings in the FADN sample representing this classification cell, the individual weight would amount to 20 (= 500 / 25). Consequently, it can be inferred that with an increasing weighting factor, the reliability of the estimated decreases when the sample data is used to draw conclusions concerning the whole population. In other words, larger weighting coefficients may rather lead to an over- or underestimation of the estimated variables in the population than smaller ones given a certain heterogeneity of the stratum.

The various statistical measures applied to analyze the weighting coefficients include, at first, the minimum and the maximum value of the sample under study. The smallest individual weighting coefficient that can occur is one. This means that the number of holdings in the sample that fit in a specific classification cell equals the number of holdings in the population. In contrast, the largest individual weighting coefficient appears where

[6] All empirical analyses in this report are based on the FADN data set extracted and provided by the European Commission on 10/12/2008.

there is a small number of holdings or even only one holding in the sample representing a large number of holdings in the population.

In addition to the minimum and the maximum value, the arithmetic mean and the median of the weighting coefficients are calculated, which indicate the average extrapolating factor. The median is applied as it is, unlike the arithmetic mean, robust with regard to outliers and skewed distributions[7]. A difference between these two measures would suggest that the weighting coefficients are not normally distributed.

Finally, the variation of the weighting coefficients within the national samples is calculated by means of the relative median absolute deviation from the median, i.e. the median absolute deviation from the median divided by the corresponding median. It will be shown in the next section that this measure is chosen due to the existing skewness in the distributions under study. As noted earlier, the larger the variation in the weighting coefficients the greater the need for their incorporation in a cost production model that aims to produce information at the level of the Member States.

3.2 Descriptive Statistics

This section begins with descriptive statistics on average weighting coefficients per country as a whole. Later, disaggregated results by type of farming are presented. As can be seen from the first column in Table 3.1, the sample size differs substantially across the Member States. Overall, the EU FADN sample comprises 76,688 holdings, of which about three quarters are located in the oMS (old Member States). Italy has, in 2005, by far the largest sample (14,537 holdings), whereas the smallest is observed for Malta (311 holdings). Poland has the largest sample in the nMS (new Member States) and the second largest of all the 25 Member States (11,897). Of the ten nMS, four draw samples of more than 1,000 observations (i.e. Czech Republic, Hungary, Lithuania and Poland), while in the oMS all but three (i.e. Finland, Luxembourg and Sweden) show a sample size of more than 1,000 observations. Later, it will be illustrated that in some cases the sample size reduces to less than 15 observations[8] if a distinction is made between the types of farming.

The second column in Table 3.1 reveals that in 12 of the 25 Member States the minimum value of the weighting coefficients amounts to one. The largest minimum value can be found in Ireland (36.9). The maximum value of the weighting coefficients varies considerably across the Member States. In six of the 25 Member States, the maximum weighing coefficient exceeds 1,000, where the largest are observed in Spain (7,196) and Greece (6,180). The smallest maximum value is observed for Slovakia (13.2).

The average weighting coefficients in the third and fourth column of Table 3 show that the arithmetic mean is always greater than the median. This points to a left-skewed (or positively-skewed) distribution of the weighting coefficients. The largest average weighting coefficients are found in Ireland and Greece with a median of 73.7 and 67.8, respectively. Among the nMS, Cyprus (35.8) and Poland (34.2) have the largest median in

[7] The median is defined as the middle value of the data ordered according to their size. If the number of observations *n* is odd, then the median is the *(n / 2 + 1)*th value in an ascending order of size. Otherwise, if the number of observations is even, the median is calculated as the arithmetic mean of the two middle values, i.e. the *(n / 2)*th and the *(n / 2 + 1)*th value (see Medhi 1992, p. 58).

[8] Results based on EU FADN may only be published for samples including at least 15 farms.

this regard. In contrast, the smallest median for the weighting coefficients can be found in Luxembourg (3.1) and Malta (3.5).

Table 3.1: Descriptive statistics on the EU FADN weighting coefficients by Member State in 2005

	Sample size	MIN	MAX	MEAN	MED	relMAD %
EU-15						
AT	1,944	10.0	350.0	38.0	26.9	19.5
BE	1,209	9.2	420.0	28.1	21.3	35.7
DE	7,033	1.0	360.0	28.5	23.3	56.6
DK	1,900	1.0	180.0	19.3	12.7	49.6
ES	9,024	1.0	7,196.0	83.2	34.3	55.9
FI	898	10.0	380.0	48.3	31.2	38.0
FR	7,352	1.0	2,190.0	47.6	36.2	37.5
GR	4,126	1.0	6,180.0	123.2	67.8	49.9
IE	1,193	36.9	600.0	95.4	73.7	42.8
IT	14,537	1.0	1,112.5	49.8	30.0	63.0
LU	444	1.0	26.0	3.9	3.1	15.9
NL	1,450	5.8	447.0	43.4	30.9	60.8
PT	2,054	1.0	2,230.0	63.5	27.8	53.9
SE	943	4.7	236.4	30.4	22.0	42.2
UK	2,936	3.3	266.4	32.7	27.1	30.5
nMS						
CY	476	16.3	590.0	60.8	35.8	46.7
CZ	1,304	2.0	80.0	11.0	8.1	51.1
EE	494	3.3	79.1	13.6	6.5	40.7
HU	1,940	1.0	1,950.0	43.0	12.9	53.4
LT	1,053	2.2	159.2	29.6	14.0	83.0
LV	902	1.0	141.1	21.1	11.3	66.2
MT	311	1.0	30.0	4.4	3.5	63.0
PL	11,897	1.0	435.0	63.7	34.2	53.5
SI	658	2.5	740.0	59.2	24.9	63.0
SK	610	2.2	13.2	6.0	5.6	53.8

Notes: MIN stands for the minimum and MAX for the maximum. MEAN is the arithmetic mean, MED the median, and relMAD the relative median absolute deviation from the median presented in percentage terms.

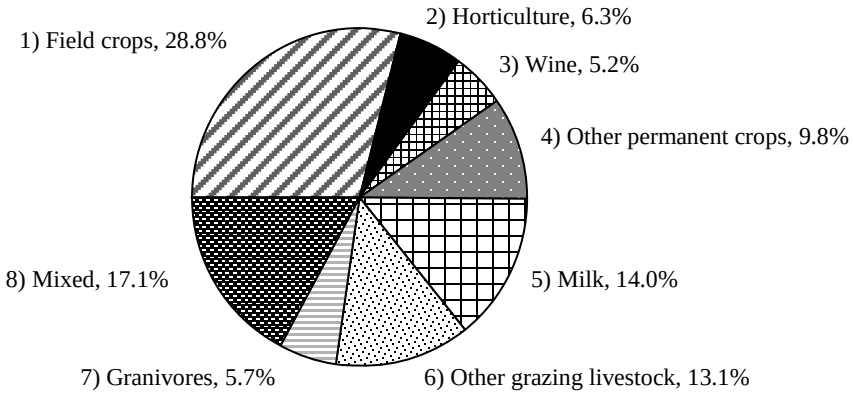
Source: EU FADN - DG AGRI L-3 and own computations.

Finally, the last column of Table 3.1 lists the relative median absolute deviation for the weighting coefficients in the Member States. In the oMS, the corresponding values are mainly below 50%, with the lowest variation in Austria and the largest in Italy. In the nMS the relative median absolute deviation exceeds 50% but for Cyprus and Estonia. The highest value can be observed in Lithuania.

As pointed out earlier, the FADN data allows distinguishing between various types of farming. Given the large sample size in most of the Member States, one could argue that the cost of production model has to be specified for subsets of the data. In this case, cost-allocation coefficients would not be calculated based on the total of FADN farms but separately for, e.g. specialist milk or field crops holdings. However, such an approach could lead to very small sample sizes in some Member States.

The purpose of the remaining part of this section is therefore to analyze the weighting coefficients of the EU FADN data disaggregated by the type of farming[9]. Using the aforementioned "TF8" classification, Figure 3.1 gives an overview of the composition of the 2005 EU FADN sample. It shows that more than one fourth of the holdings is specialized in field crops. The smallest fractions are made up by wine, granivores and horticulture. With regard to livestock, milk is the dominant field of specialization with a share of 14.0%.

Figure 3.1: Composition of the EU FADN by type of farming in 2005



Notes: Shares refer to the total of the 76,688 holdings in the EU FADN sample.
Source: FADN 2005 and own computations.

Due to the large heterogeneity in livestock and crop production across the EU, some farm types may not exist in some Member States, or may only be represented by a small number of observations in the sample. This is obviously true with regard to specialist wine holdings. Another example is Ireland, where four of the eight types of farming don't exist. Table 3.2 lists the number of holdings in the EU FADN by type of farming in the Member States. Detailed descriptive results on the corresponding weighting coefficients are provided in Appendix A which presents the same aforementioned indicators as used in Table 3.1.

The FACEPA project primarily aims to estimate the cost of production for crop products, milk and pigs. Hence, the focus is on these types of farming when the main findings are summarized below. As can be seen from the first column of Table 3.2, in seven of the 25 Member States, the FADN sample includes more than 1,000 specialist field crops holdings. The smallest sample in this context shows Luxembourg with less than 15 holdings. Furthermore, the samples of Ireland, Malta and Slovakia contain less than 100 holdings.

For horticulture, and especially for wine, small sample sizes are observed. Among the nMS only Poland has a sample size of more than 100 holdings which refers to specialist horticulture. In contrast, France and Italy include in total more than 2,000 specialist wine holdings which is almost two-thirds of the EU FADN sample.

[9] According to the EU FADN methodology the type of farming is defined based on the "relative importance of the different enterprises on the farm" (FADN 2009, p. 7). The relative importance is again measured as the share of the SGM of each enterprise in the total SGM of the farm (ibid.).

For specialist milk holdings the sample size is relatively large. Of the oMS all but one (Greece) have more than 200 specialist milk holdings in their sample. The largest samples in this context are found in Germany, Spain and Italy with more than 1,000 holdings. Of the nMS, only five show a sample size of less than 100 specialized dairy farms; Cyprus has the smallest sample size in this regard with less than 15 holdings.

Looking at specialist granivore holdings, which include specialist pigs and poultry holdings, two of the oMS (Greece and Luxembourg) have a sample size of less than 15. Moreover, the sample of Ireland does not include holdings belonging to this type. Among the nMS, five show a sample size of less than 15 holdings. Poland has, in contrast, by far the largest sample of specialist granivore holdings among the nMS and also among all Member States.

An inspection of the weighting coefficients for the different types of farming in Appendix A leads to the following conclusions: Firstly, the minimum of the weighting coefficients is relatively large in Austria, Finland, Greece, Ireland, Sweden and Cyprus. For example, the weighting coefficients of Ireland exceed without exception a value of 35. In contrast, the minimum weighting coefficients for Italy equal one for all types of farming.

The maximum of the weighting coefficients is particularly large for specialist field crop holdings. Setting an “ad hoc” threshold at 200, only ten Member States fall below this value. In four Member States (Spain, France, Greece and Portugal) the maximum weighting coefficients for specialist field crops farms exceed 1,000. The maximum weighting coefficients are, compared to this, relatively small for specialist milk and specialist granivores holdings. Seven Member States have maximum weighting coefficients of greater than 200 for these two types of farming.

On the Member State level Spain, Portugal, Greece, France, Italy and Hungary show very large weighting coefficients for the distinct types of farming. For Spain, the maximum weighting coefficients exceeds five times the value of 1,000 for the eight types of farming under study. With regard to holdings with a specialization in other permanent crops, the corresponding value even amounts to 7,196 in Spain. For Greece, the maximum weighting coefficient are in three cases larger than 1,000, for France, Portugal and Hungary in two cases.

Table 3.2: Number of holdings in the EU FADN by type of farming in 2005

	Field crops	Horti-culture	Wine	Other permanent crops	Milk	Other grazing livestock	Grani-vores	Mixed
EU-15								
AT	409	.	78	59	830	163	136	268
BE	122	208		76	250	229	80	244
DE	1,630	570	339	249	1,654	498	274	1,819
DK	639	192		63	370	.	215	408
ES	2,774	930	523	1,345	1,067	1,279	556	550
FI	258	64		.	363	52	48	107
FR	2,086	381	1,033	294	967	1,251	163	1,177
GR	2,098	111	186	969	.	462	.	280
IE	41				401	683		68
IT	4,610	963	1,409	3,058	1,037	1,906	455	1,099
LU	.		25	.	236	85	.	70
NL	198	440		77	334	79	250	72
PT	318	197	243	267	434	402	31	162
SE	271	27		.	365	56	74	149
UK	638	114		83	568	1,127	134	272
nMS								
CY	140	.	22	207	.	63	.	.
CZ	502	45	38	31	99	98	63	428
EE	190	19		.	158	16	.	97
HU	1,100	64	72	163	98	42	141	260
LT	592	31		27	118	16	.	260
LV	345	.		18	264	22	38	204
MT	82	74	.	26	41	.	68	.
PL	2,644	345		441	766	1,314	1,593	4,794
SI	63	.	22	34	266	134	.	124
SK	320		.	.	40	67	.	172

Notes: "." shows that there are less than 15 sample holdings.
Source: FADN 2005 and own computations.

However, the maximum weighting coefficients are rather low in Denmark, Luxembourg, Sweden, the Czech Republic, Estonia, Latvia, Malta and Slovakia. For example, in the Czech Republic no weighting coefficient exceeds the value of 80. In Slovakia the maximum weighting coefficient amounts to 13.2 with regard to specialist milk holdings.

The presence of these large weights could be due to low heterogeneity, sampling procedure and differences in national and EU FADN sampling and weighting methodology. This might have impact on the reliability of the cost estimates.

In view of the average weighting coefficients for the distinct types of farming, Greece again shows particularly large median values. Relatively low values for the median are found in Luxembourg, the Czech Republic, Malta and Slovakia. In Malta the median of the weighting coefficients is even less than five.

Finally, the variation of the weighting coefficients, measured as the relative median absolute deviation, is relatively high in Italy, Lithuania and Latvia. The largest variation is observed for mixed holdings in Lithuania, Latvia and Slovenia with values above 80%. In view of the distinct types of farming the results indicate that for specialist granivores the variation of the weighting coefficients is relatively low, while it is relatively large for specialist field crops holdings.

3.3 Production Shares by Type of Farming

This section tries to assess the implications of focusing the production cost estimation on specialized farms by exploring the share different farm types have in the total production of selected products. Taking into account the sample size for specialized farms in each Member State, the production shares give an indication of the suitability and representativeness of specialized farms for the cost of production estimation. The share of production is calculated as the output (here, the production value) share of a given product in different farm types relative to the output of the entire sample, using the EU FADN weights. For this analysis, the shares of cereals, wheat, oilseeds, pig meat and dairy in TF8 farm types are calculated and described in the subsequent section.

There will always be a subjective component when determining if a specialized farm type is suitable for the production cost estimations planned for the FACEPA project, and no fixed 'critical limit' for production shares can be given. For our analysis, we decided to display only those farm types which account for at least 50% of the production, and specifically highlight those cases where specialized farms account for more than 80% or 99% of production. Table 3.3 summarizes the shares of each commodity in the eight types of farming. Farm types accounting for a production share of more than 80% and 99% are denoted by "*" and "**", respectively.

In the majority of Member States (with the exception of Belgium, Ireland, Luxemburg, Malta, Poland and Slovenia), specialized field crop farms have a share of more than 50% of cereal production. United Kingdom (84%), followed by Cyprus, Greece and Hungary (79%), have the highest share of cereal production in the field crop farms (see Appendix B). Similarly, in all Member States but Belgium, Luxemburg, and Malta, the share of wheat production in the field crop farms is more than 50%. Cyprus, Greece, the Netherlands, Italy, Lithuania, Latvia, Finland and the United Kingdom have more than 80% share of wheat production in the field crop farms.

The share of oilseed production in the field crop farms is more than 50% for 20 Member States. A notable exception is Belgium, where mixed farms account for more than 50% of oilseed production. In the samples of Portugal and Greece, oilseed production is only found in field crop farms. In other Member States such as Spain, France, Latvia, Hungary, Lithuania, Finland and United Kingdom, the share of oilseed production in field crop farms is more than 80%.

Table 3.3: Overview of farm types accounting for at least 50% of production in the EU FADN

Farm types	Field crops	Milk	Granivores	Mixed
EU-15				
AT	cereals, wheat, oilseeds	milk*	pig production	
BE		milk	pig production	oilseeds
DE	cereals, wheat, oilseeds	milk		pig production
DK	cereals, wheat, oilseeds	milk		
ES	cereals, wheat, oilseeds*	milk*	pig production	
FI	cereals, wheat*, oilseeds*	milk*	pig production	
FR	cereals, wheat, oilseeds*	milk	pig production	
GR	cereals, wheat*, oilseeds**	milk*	pig production	
IE	wheat, oilseeds	milk		pig production**
IT	cereals, wheat*, oilseeds*	milk	pig production*	
LU		milk	pig production	
NL	cereals, wheat*, oilseeds	milk*	pig production*	
PT	cereals, wheat, oilseeds**	milk*	pig production*	
SE	cereals, wheat, oilseeds	milk*		
UK	cereals *, wheat*, oilseeds*	milk*	pig production*	
NMS				
CY	cereals, wheat*	milk*	pig production**	
CZ	cereals, wheat, oilseeds			milk
EE	cereals, wheat, oilseeds	milk	pig production	
HU	cereals, wheat, oilseeds*			
LT	cereals, wheat*, oilseeds*			milk
LV	cereals, wheat*, oilseeds*	milk	pig production	
MT		milk	pig production	
PL	wheat, oilseeds			pig production
SI	wheat	milk*		pig production
SK	cereals, wheat, oilseeds, pig production			milk

Notes: "*" denotes a share of more than 80% and "**" denotes a share of more than 99%.

Source: FADN 2005 and own computations.

The share of pig production is higher than 50% in granivore farms in 17 MS, and more than 50 % in mixed farms in Germany, Ireland, Poland and Slovenia. In Cyprus, the share of pig production is 100% in granivore farms; however the sample size is too small for econometric estimations (13 farms). In Slovakia, there is no pig production in the granivore farms, but in field crop farms (51%) and mixed farms (46%). Similarly, in Denmark pig production is higher (47%) in mixed type of farming than in grainvore farms (42%). As pointed out in the previous section, only 5.7% (Figure 3.1) of the holdings in the EU FADN sample are pigs and poultry production.

Specialized dairy farms account for more than 50% of milk output in all oMS. The Netherlands, Greece, Spain, Austria, Portugal, Finland, Sweden and the United Kingdom have more than 80% of milk production in specialized dairy farms. Only in five nMS is the share of specialized dairy farms in total milk output higher than 50 %. In Cyprus, the share of dairy production in specialized dairy farms is 100%. However, Cyprus has the smallest sample size with less than 15 specialist dairy farms.

Overall, the analysis points to the considerable potential for focusing production cost estimation on specialized farms (field crops, granivores and milk), though sample sizes needs to be checked in each case to ensure robust estimation. Focusing on specialized pig farms rather than granivores as a whole, for instance, could solve the heterogeneity nature

of the granivore farm types. Results of production cost estimation from specialized farms should be interpreted in view of their representativeness as highlighted by Table 3.3.

3.4 Conclusions

Weighting factors are used to extrapolate the EU FADN sample. These weighting factors also have to be taken into account when specifying a cost of production model which aims to reflect the input-output allocation on the Member State level to prevent distorted results. The larger the variation in the weighting coefficients is, the greater the need for their incorporation in a cost of production model that aims to produce information at Member State level.

The analysis of the weighting coefficients shows that the variation of weights is high, especially in the nMS. The results also reveal that some Member States have very high weights which might lead to lower reliability of the cost estimates. Some of the causes for the high weights could be very low heterogeneity, sampling procedure and differences in national and EU FADN sampling and weighting methodology. In this case use of national FADN weights can be an option to improve the reliability of the estimates.

This section also examined the share different farm types have in the total production of selected products. Overall, the analysis points to the considerable potential for focusing production cost estimation on specialized farms for selected products, although sample sizes need to be checked in each case to ensure robust estimates.

4 Coverage and Representativeness of EU FADN Data

The aim of this chapter is to assess the coverage and representativeness of EU FADN by comparing a set of various structural variables between EU FADN data and the FSS. For the interpretation, it is important to note that discrepancies may be attributed to several other factors in addition to the sampling and weighting system in EU FADN (see Chapter 2). For example, in some cases, definitions of variables differ between the two databases. Also, discrepancies may stem from the time of recording: while the EU FADN value is based on the average of a year, the FSS value is recorded at one point in time.

4.1 Data and Methodology

The present analysis focuses on the year 2005 and results are reported for all 25 Member States. Later, also the year 1995 and the corresponding Member States will be considered to identify whether the coverage and representativeness of EU FADN data has changed over time. The variables under study, their composition and codes are listed in Annex C. Besides the number of holdings and the utilized agricultural area (UAA), they consist of cereal area, wheat area, oilseed area, number of dairy cows and number of fattening pigs. The FADN basic data are extrapolated to the whole population by using the given weighting coefficients.

To quantify the representativeness of EU FADN data, the practical and theoretical coverage are calculated. These indicators are conventionally used by the European Commission. Moreover, it is defined that the smaller the difference between the two indicators, the higher the degree of representativeness (RI/CC 1483, pp. 2)[10]. For a further "statistical" inference, the discrepancy between mean values based on the FSS and EU FADN data is examined following the procedure used by Vrolijk et al. (2009).

The aforementioned practical coverage is defined as the ratio of the EU FADN and FSS values. The calculation of the theoretical coverage is based on the FSS and the country-specific thresholds of ESU. It refers to the concept of SGM which is applied in the FSS as well as EU FADN database (FADN 2009, pp. 5). It helps to classify farms according to their economic size. Since EU FADN considers only farms above a certain threshold, the theoretical coverage is defined as the ratio of the total of all values above the threshold in the FSS and the equivalent total of all values.

In algebraic form, the practical and theoretical coverage and their difference can be summarized as:

$$(1) \qquad Practical\ coverage = \frac{FADN\_value}{FSS\_value},$$

[10] The definition of the representativeness is based on the work done by the European Commission in assessing the quality of FADN data (see, for example, RI/CC 1503, p. 4). Although sometimes the term coverage is also used, we will refer to the term representativeness hereafter, when interpreting the difference between the practical and theoretical coverage.

(2) $$\textit{Theoretical coverage} = \frac{FSS^*\_value}{FSS\_value},$$

(3) $$\textit{Difference (1) and (2)} = \frac{FADN\_value}{FSS\_value} - \frac{FSS^*\_value}{FSS\_value} \text{ or}$$

(3') $$= \frac{FADN\_value - FSS^*\_value}{FSS\_value},$$

where *FSS** denotes the total of all FSS values above the ESU threshold. It should be noted that the equivalent of the theoretical coverage can be regarded as the "representation gap." It is defined here as the share of the total of all FSS values below the ESU threshold in the total of all FSS values. Algebraically, the following relationship can be derived:

(4) $$\textit{"Representation gap"} = \frac{FSS\_value - FSS^*\_value}{FSS\_value},$$

(4') $$= 1 - \textit{"theoretical coverage"}.$$

As the "representation gap" contains the same information as the theoretical coverage, it is not reported in this document.

The analysis on the representativeness of EU FADN data is, besides to the indicators in equation (1) to (3), supplemented with the relative divergence between the EU FADN value and the corresponding FSS value above the ESU threshold. In algebraic form, the so-called "weighting error" is defined as:

(5) $$\textit{"Weighting error"} = \frac{FADN\_value - FSS^*\_value}{FSS^*\_value}.$$

This indicator is similar to the aforementioned difference between the practical and theoretical coverage. But instead of the total of all FSS values, the denominator consists only of the total of those values above the ESU threshold. The "weighting error" therefore approaches the difference between the practical and theoretical coverage with a decreasing total of all FSS values below the ESU threshold, i.e. the closer the theoretical coverage is to 100%.

However, it is also possible that the "weighting error" approaches the difference between the practical and theoretical coverage even though the total of all FSS values below the ESU threshold is large, i.e. the theoretical coverage diverges from 100%. Assuming, for example, that both the practical and theoretical coverage take values of 25%, their difference amounts to zero. The "weighting error" would obviously be zero, too, if the EU FADN variable and the corresponding FSS variable above the ESU threshold take the same values.

It follows that the theoretical coverage alone does not give sufficient information on whether the "weighting error" approaches the difference between the practical and theoretical coverage. The latter two indicators can therefore rather be seen as complements than substitutes.

Finally, the mean values per farm based on FSS and EU FADN data are compared. These mean values are derived by dividing the national FSS and EU FADN value for the

variables under study by the number of holdings[11]. With regard to the FSS, again, only those values above the ESU threshold are considered. The discrepancy between the two mean values can be expressed as a ratio. Subtracting this ratio from one again yields a so-called "relative difference" which is algebraically defined as:

$$(6) \qquad Relative\ difference = 1 - \left(\frac{FSS*\_value}{no\_holdings} \Big/ \frac{FADN\_value}{no\_holdings} \right)$$

Whether the relative difference can be regarded as minor or significant in view of the representativeness is assessed with the help of the coefficient of variation for the corresponding variable. It is calculated based on the weighted standard deviation and the weighted mean for the sample of holdings in the EU FADN data[12]. With the coefficient of variation the confidence interval is determined, which defines the range of values with a given probability of containing the true mean value of the population.

It holds that 95.5% (99.7%) of the values fall in the range of two (three) times the coefficient of variation plus/minus the calculated mean value. According to Vrolijk et al. (2009, p. 52) a relative difference which is close to the coefficient of variation "cannot be regarded as proof of systematic differences between the sample and the population". However, if the relative difference exceeds the coefficient of variation by more than two (three) times it is rather (very) unlikely that these differences can be attributed to sampling errors (ibid.). Instead, the difference is significant and the sample is not representative with regard to the whole population.

4.2 Empirical Results

A summary of the findings on the coverage and representativeness of 2005 FADN data is shown in Table 4.1. It lists the various indicators described in the previous section for all seven variables under consideration for the EU-25, the EU-15 and the nMS, respectively. It is important to note that positive and negative values on the representativeness at the level of the Member States compensate each other. Therefore, the tables also indicate the number of countries which exceed a |5|%-points threshold for the difference between the practical and theoretical coverage. In addition, in Appendix D the corresponding results are presented on a country-specific basis.

An examination of Table 4.1 reveals that the practical as well as the theoretical coverage is the lowest for the variable "number of holdings." This can be attributed to the fact that the number of farms with an SGM below the country-specific ESU threshold is significant. Those farms do not fall into the FADN field of observation although they point to the high importance of part-time farming. The much higher practical and theoretical coverage for the other variables again show that those farms below the ESU threshold have a minor share in UAA or number of dairy cows, for example. In view of oilseed area and number of dairy cows, the practical coverage amounts to more than 100% for the EU-25, the nMS and the EU-15, respectively. In this case, the extrapolation of the FADN sample leads to an overestimation of the "population value", i.e. too much weight is given to the selected

[11] Here, the EU FADN value is extrapolated using the weighting coefficients to produce averages concerning the whole population.
[12] As individual data of FSS is not available for research, the estimates are based on EU FADN data.

farms or the selected farms are larger than the average farm in the stratum that they do represent.

It should be noted in this context that the low theoretical and practical coverages for the "number of holdings" versus the other variables are not surprising, since only farms above a certain ESU threshold are selected for inclusion in the FADN sample. The aim of the FADN is hence not to gain a high degree of coverage with respect to the number of holdings in the Member States, but with respect to "the most relevant part of the agricultural activity" measured in total SGM (Commission Regulation 1555/2001). For that reason, the variable "number of holdings" is not appropriate to assess the quality of EU FADN.

It can furthermore be seen from Table 4.1 that the divergence of the practical as well as the theoretical coverage from 100% is in most cases larger for the average of the nMS than the average for the EU-15. In other words, FADN data seems to include more information concerning the whole population in the oMS than in the nMS. This is particularly true for the number of farms where the average values for the EU-15 are more than twice as high as for the nMS. Appendix D illustrates that for this variable the practical (theoretical) coverage ranges between 5.4% (4.7%) in Slovakia and 85.8% (87.2%) in Ireland across the EU-25.

Table 4.1: Coverage and representativeness of EU FADN in 2005

	Practical coverage %		Theoretical coverage %		Difference practical - theoretical coverage %-points		"Weighting error" %	
1. Number of holdings								
EU-25	42.7		45.0		-2.3		-5.1	
EU-15	54.0		57.3		-3.4		-5.9	
nMS	25.6		26.3		-0.7		-2.6	
2. UAA								
EU-25	91.0	(10)	88.0	(12)	3.0	(20)	3.4	(20)
EU-15	91.6	(6)	89.5	(6)	2.2	(11)	2.4	(11)
nMS	88.4	(4)	81.8	(6)	6.5	(9)	8.0	(9)
3. Cereals area								
EU-25	96.7	(4)	92.8	(8)	3.9	(15)	4.2	(15)
EU-15	98.3	(2)	95.2	(4)	3.1	(8)	3.2	(8)
nMS	93.0	(2)	87.0	(4)	6.0	(7)	6.9	(7)
4. Wheat area								
EU-25	98.2	(6)	95.1	(4)	3.1	(19)	3.3	(19)
EU-15	98.2	(3)	96.3	(1)	1.9	(11)	2.0	(11)
nMS	98.0	(3)	90.8	(3)	7.2	(8)	8.0	(8)
5. Oilseed area								
EU-25	101.5	(6)	97.8	(1)	3.6	(18)	3.7	(18)
EU-15	98.8	(4)	97.8	(0)	1.0	(12)	1.0	(12)
nMS	108.5	(2)	97.9	(1)	10.6	(6)	10.8	(6)
6. Number of dairy cows								
EU-25	98.7	(7)	96.6	(3)	2.1	(14)	2.2	(14)
EU-15	101.6	(2)	99.0	(0)	2.6	(7)	2.6	(7)
nMS	87.7	(5)	87.4	(3)	0.3	(7)	0.4	(7)
7. Number fattening pigs								
EU-25	93.0	(13)	97.4	(6)	-4.3	(20)	-4.5	(20)
EU-15	94.9	(6)	98.8	(0)	-3.9	(11)	-3.9	(11)
nMS	85.0	(7)	91.4	(6)	-6.4	(9)	-7.0	(9)

Notes: Weighted averages are calculated. nMS denotes the ten new Member States concerning the enlargement process in 2004. In parenthesis, the number of Member States below or above a certain percentage point threshold is indicated. This threshold is set at $x < 90\%$ for the practical as well as the theoretical coverage while at $|5|\% < x$ for the difference between the practical and the "weighing error".

Source: FADN 2005, FSS 2005 and own computations.

In accordance with the Commission regulation 1555/2001, the field of survey shall cover "at least 90% of total gross margin". If this threshold is applied to the variables under study, 10 (12) Member States would not reach the objectives for the UAA, referring to the practical (theoretical) coverage (see numbers in parentheses in Table 4.1). In contrast, only four (eight) Member States would fall below this threshold for the cereals area. Looking at the theoretical coverage for the variable "oilseed area", there is only one single Member State (Slovenia) which is below the 90% threshold.

As can also be seen from Table 4.1, the difference between the theoretical and the practical coverage is characterized by relatively small values. If an "ad hoc" threshold is set at |5|%-points it would not be exceeded by the average values of the EU-25 and EU-15, but for the average values of the nMS for five of the seven variables. From this, it can be concluded that on average the representativeness of EU FADN data is better in the oMS than in the nMS.

However, considering the results by Member State reveals that significant cross-sectional differences exist. For the United Kingdom, the difference between the practical and theoretical coverage for the variable "UAA" is 16.5%-points, while the corresponding value for the Czech Republic is 2.8%-points. Particularly large differences between the theoretical and the practical coverage can be found for the variable "number of fattening pigs". Here, the value amounts to -57,5%-points for Ireland and to -86.7%-points for Greek. Besides, the difference between the theoretical and the practical coverage for the variable "wheat area" is particularly large in Cyprus (143.7%-points). It is also large for the variable "oilseed area" in the Netherlands (-56.9%-points). It should be remarked that the extreme values mostly appear for variables that are of minor importance in a country (e.g. oilseed production in the Netherlands). The calculations based on these variables have therefore a limited meaning in judging the quality of the sample.

Additionally, the values in brackets in Table 4.1 indicate that the number of countries which exceed the |5|%-points threshold for the difference between the practical and theoretical coverage is rather large. This applies for the majority of countries irrespective if the EU-15 or the nMS are considered. The alleged contradiction to the findings described above can, on the one hand, be attributed to the use of weighted averages. The weights imposed on each Member State are thereby based on the variable under consideration, i.e. the number of farms, the hectares of UAA, etc. Hence, if the difference between the practical and theoretical coverage is small in those Member States with a significant size, the weighted average for the analyzed group of Member States tends to take small values, too. This is, *inter alia*, the case for the variable "wheat area" with nineteen Member States out of the EU-25 exceeding the defined |5|%-points threshold (see Appendix D). Here, Germany and France account for more than one third of the total wheat area within the EU-25 and both Member States are characterized by rather small values for the difference between the practical and theoretical coverage (1.4% and 0.7%-points, respectively).

On the other hand, the low average values for the difference between the practical and theoretical coverage can be explained by the fact that positive values in one Member State tend to offset negative values in another. For example, in Spain this difference is -20.9%-points for the variable "wheat area" while it is 23.8%-points in the UK. Calculating the weighted average for these two Member States yields again -0.7%-points, which is far below the |5|%-points threshold. This illustration shows that the weighted average for the difference between the practical and theoretical coverage should be interpreted carefully[13].

The results for the average "weighting error" are similar to those for the average difference of the practical and theoretical coverage (see Table 4.1) and a high correlation exists between these indicators. This can again be attributed to the fact that the theoretical coverage is for the most part close to 100%. Comparing the average "weighting errors" across the variables under study for the EU-25 shows that the lowest value can be found for the "number of dairy cows." Besides, Table 4.1 reveals that the absolute average "weighting errors" are larger in the nMS than in the oMS except for the variables "number of holdings" and "number of dairy cows".

[13] Indeed, this is true for the average values of each indicator used. For the "weighting error" the same rationale as for the difference between the practical and theoretical average holds. In view of the weighted average for the practical and theoretical coverage values below 100% tend to offset values above 100%.

To identify whether the representativeness of FADN data has increased over time, Table 4.2 compares the average values for the various indicators between the year 1995 and 2005. In Appendix D results on the Member State level are listed for the year 1995 in view of the variables under study.

Table 4.2: Comparison between the coverage and representativeness of EU FADN in 1995 and 2005 for the EU-15 (excluding France and Germany)

	Practical coverage		Theoretical coverage		Difference practical - theoretical coverage		"Weighting error"	
	%		%		%-points		%	
1. Number of holdings								
1995	48.8		57.0		-8.2		-14.3	
2005	53.3		56.3		-3.0		-5.3	
2. UAA								
1995	83.2	(7)	87.4	(6)	-4.2	(10)	-4.8	(10)
2005	89.7	(6)	87.0	(6)	2.7	(10)	3.1	(10)
3. Cereals area								
1995	89.3	(6)	94.3	(2)	-4.9	(9)	-5.2	(10)
2005	98.6	(2)	94.7	(4)	3.9	(8)	4.1	(8)
4. Wheat area								
1995	95.3	(5)	95.5	(1)	-0.2	(10)	-0.2	(11)
2005	98.0	(3)	95.2	(1)	2.8	(11)	2.9	(11)
5. Oilseed area								
1995	84.3	(6)	97.4	(1)	-13.1	(11)	-13.4	(11)
2005	108.9	(3)	97.7	(0)	11.1	(11)	11.4	(11)
6. Number of dairy cows								
1995	97.2	(3)	98.4	(1)	-1.2	(7)	-1.2	(7)
2005	102.6	(2)	99.3	(0)	3.4	(7)	3.4	(7)
7. Number fattening pigs								
1995	81.9	(7)	98.1	(0)	-16.2	(11)	-16.5	(11)
2005	91.2	(6)	99.1	(0)	-7.9	(10)	-7.9	(10)

Notes: Given that for the year 1995 no FSS data for France and Germany exist, these countries are not considered in the two analyzed years here. Weighted averages are calculated. Analogously to Table 4.1, the number of Member States below or above a certain percentage point threshold is indicated in parenthesis.

Source: FADN 1995 and 2005, FSS 1995 and 2005 and own computations.

From Table 4.2 the following conclusions can be drawn. Firstly, the average practical coverage has generally increased from 1995 to 2005 for the variables under study, i.e. the EU FADN values approach the corresponding FSS values. The largest increase is found for the variable "oilseed area." While in 1995 the value was 84.3%, it amounts to 108.2% in 2005. On the other hand, the average practical coverage for the variable "wheat area" shows the smallest increase from 95.3% to 98.0%.

Secondly, the theoretical coverage has stayed fairly constant from 1995 to 2005. For three of the seven variables (number of holdings, UAA and wheat area) the theoretical coverage has slightly decreased, while for the remaining variables it has slightly increased. This is caused by the increase in the lower threshold of the sample in several Member States and the increase in the average size of farms in the population in all Member States. Looking at the results on the Member State level shows that in some cases the theoretical coverage has changed significantly. With regard to the United Kingdom the theoretical coverage has decreased substantially for the variable "UAA" (12.2%-points). An interesting result refers

to Finland which shows a substantial increase in the theoretical coverage for the variables "UAA" (10.2%-points), "cereals area" (10.7%-points) and "wheat area" (8.9%-points).

Thirdly, and in view of the average difference between the practical and theoretical coverage, it can be concluded from Table 4.2 that the degree of representativeness of FADN data has increased from 1995 to 2005 for the majority of variables under study. This applies in particular for the variable "number of holdings" and "number of fattening pigs" but also for the variables "UAA", "cereals area" and "oilseed area." The substantial increase in the average degree of representativeness for the variable "number of holdings" is mainly due to changes concerning Spain and Italy (see Appendix D). Both Member States capture by far the largest shares in the total number of holdings within the EU-15 and show a reduction in the difference between the practical and theoretical coverage from |18.3|%-points to |7.1|%-points and |8.7|%-points to |1.4|%-points, respectively.

Also, the substantial increase in the average degree of representativeness for the variable "number of fattening" pigs can principally be attributed to the changes in Spain and Italy as well as the Netherlands. In absolute terms, the difference between the practical and theoretical coverage decreased in these Member States by 26.4%-points, 52.8%-points and 9.1%-points, respectively. In general, it can be observed that the degree of representativeness became significantly better in Spain for all of the analyzed variables. In contrast, the degree of representativeness generally became worse for the analyzed variables in Austria.

Rather similar results can again be obtained when the average "weighting error" is used. Table 4.2 shows that for five of the seven variables, absolute values decreased from 1995 to 2005. The largest reduction is thereby observed for the variables "number of holdings" and "number of fattening pigs."

At the end of this section, the extent of representativeness of FADN data is evaluated by comparing the mean values based on FSS and EU FADN data. A summary of the findings for the six variables under consideration, i.e. "UAA per farm," "cereals area per farm," "wheat area per farm," "oilseed area per farm," "number of dairy cows per farm" and "number of fattening pigs per farm" is reported in Table 4.3. Detailed results, like the calculated mean values, the relative difference and the coefficient of variation, are put in the Tables D15 to D20 of the Appendix.

Table 4.3 illustrates that the ratio of the relative difference and the coefficient of variation generally takes positive values. In this case, the mean values based on EU FADN data are higher than those based on FSS data and, hence, the underlying sample tends to overestimate the population value. However, for the variable "number of fattening pigs" the opposite is true and for the majority of the Member States the mean value is slightly underestimated in the sample.

Table 4.3: Comparison of mean values per farm based on FSS and EU FADN data

	Ratio of the relative difference and the coefficient of variation for the …					
	UAA per farm	Cereals area per farm	Wheat area per farm	Oilseed area per farm	Number of dairy cows per farm	Number of fattening pigs per farm
EU-15						
AT	0.21	0.08	0.07	0.07	0.08	-0.06
BE	0.11	0.07	0.05	0.03	-0.03	0.02
DE	0.03	0.01	0.01	-0.04	0.01	-0.01
DK	0.04	0.05	0.04	0.02	0.02	-0.05
ES	0.01	0.03	-0.03	0.02	0.04	-0.01
FI	0.15	0.05	0.05	0.08	0.08	0.01
FR	0.12	0.10	0.08	0.07	0.07	0.04
GR	-0.04	0.04	0.04	-0.01	-0.04	-0.15
IE	0.15	-0.03	-0.07	0.02	0.01	-0.07
IT	0.03	0.03	0.03	0.01	0.01	0.00
LU	0.16	0.09	0.11	0.04	0.04	0.02
NL	0.09	-0.01	0.01	-0.07	0.05	0.02
PT	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
SE	0.07	0.06	0.04	0.03	0.00	0.04
UK	0.09	0.06	0.07	0.03	0.01	0.01
nMS						
CY	-0.06	-0.03	0.07		-0.07	-0.04
CZ	0.01	0.03	0.03	0.02	0.03	-0.02
EE	0.08	-0.01	-0.03	-0.02	-0.03	0.01
HU	0.04	0.04	0.04	0.04	-0.01	-0.01
LT	0.12	0.10	-0.07	0.05	0.02	-0.03
LV	0.06	0.02	0.00	0.00	0.01	-0.01
MT	-0.02				0.01	0.05
PL	0.03	0.03	0.02	0.01	0.02	0.00
SI	0.16	-0.04	-0.06	0.00	-0.01	-0.05
SK	0.00	-0.05	-0.03	-0.02	0.00	-0.21

Source: EU FADN - DG AGRI L-3, FSS 2005 and own computations.

Table 4.3 also shows that the ratio of the relative difference and the coefficient of variation is generally low and does not exceed a value of |2| (or even |1|), respectively. In other words, the true mean values of the population fall in the predetermined confidence interval with a 95.5% certainty. The discrepancy between FSS and FADN mean values can therefore be explained by sampling errors and it is not systematic.

The low ratios can again be attributed to the relatively high coefficients of variation in the denominator (see Tables D15 to D20 in the Appendix). This is caused by the fact that all farms are taken into account and not only those farms with a positive value of the variable (or specialized farms). With so many zero values the coefficient of variation (and the standard error) has little relevance. In some Member States and for some of the variables under consideration, the values exceed by far 1000%. As noted by Vrolijk et al. (2009, p. 59) the size of the coefficient of variation is strongly influenced by the absolute mean value. If it is close to zero, the coefficient of variation can take very high values. For example, in Greece the average number of fattening pigs per farm is 0.12 (see Table D20 in the Appendix), while the standard deviation is 5.38. Thus, the coefficient of variation amounts to 43.59 or 4,358.5%, respectively.

In view of the relative difference between the FSS and EU FADN mean values, particularly high values can be observed for the variable “number of fattening pigs per farm” (see Table D20 in the Appendix). Here, in Greece the relative difference amounts to -673.9%, in Ireland the corresponding value is -131.4%. For the variable “oilseed area per farm,” the relative difference between the FSS and EU FADN mean values is -142.3%.

4.3 Conclusions

The chapter has examined the coverage and representativeness of EU FADN by comparing a set of various structural variables between EU FADN data and the FSS for all 25 Member States. Further, it has assessed the change in the coverage and representativeness through time by comparing the representativeness of the EU FADN in 1995 and 2005. Both practical coverage and theoretical coverage are calculated and their differences are considered. In addition, the relative difference between the mean values per farm based on EU FADN and FSS data are calculated.

The low practical as well as theoretical, coverage for the variable “number of holdings” is suggested to be due to the fact that the number of farms with a SGM below the country-specific ESU threshold is significant. At the same time the much higher practical and theoretical coverage for the other variables show that those farms below the ESU threshold have a minor share in UAA or number of dairy cows, for example. The low theoretical and practical coverage for the “number of holdings” versus the other variables are not surprising, as the fundamental aim of the EU FADN is not to gain a high degree of coverage with respect to the number of holdings in the Member States but with respect to the agricultural activity measured in total SGM.

The divergence of the practical as well as the theoretical coverage from 100% is in most cases larger for the average of the nMS than for the average of the EU-15. In other words, FADN data covers a larger part of the whole population in the oMS than in the nMS. This is particularly true for the number of farms where the average values for the EU-15 are more than twice as high as for the nMS.

Moreover, the difference between the theoretical and the practical coverage is characterized by relatively small values. The average values of the EU-25 and EU-15 do not exceed an “ad hoc” threshold of |5|%-points. In contrast, the average values of the nMS exceed an “ad hoc” threshold of |5|%-points for five of the seven variables, which indicates that on average, the representativeness of EU FADN data is better in the oMS than in the nMS. This can also be shown by the share of Member States in the oMS and nMS, respectively, that exceed the given threshold. Except for the variable “oilseed area” this share of Member States is higher in the nMS than in the oMS.

It can also be said that the FADN values approach the corresponding FSS values as the average practical coverage has generally increased from 1995 to 2005 for the variables under study. In contrast, the theoretical coverage has stayed fairly constant. Thus, in view of the average difference between the practical and theoretical coverage, the degree of representativeness of EU FADN data has increased from 1995 to 2005 for the majority of the analyzed variables.

The ratio of the relative difference and the coefficient of variation generally take a positive value and the mean values based on EU FADN data tend to be higher than those based on

FSS data. Nevertheless, these discrepancies are not statistically significant and can be explained by sampling errors.

Finally, it must be noted that the empirical analysis and the conclusions drawn in this chapter are based on the comparison of structural variables such as hectares of major crops and numbers of specific livestock between the sample and the population. It gives, however, no final answer whether estimations of costs of production using EU FADN will reflect the true population value. Following Vrolijk et al. (2009, p. 56) it is possible "that farms with relatively good or bad management skills and therefore performance are over represented in the sample". Validating the estimation results using cost calculations from other sources are therefore necessary topics for future research within the FACEPA project.

5 Excursus: Organic Farming Systems in the EU FADN

Organic farming in the EU has grown from 40,000 farms on less than 1 million ha in 1994 (Foster and Lampkin 1999), to 186,000 farms on more than 7 million ha in 2007, and now accounts for 4% of EU-27 agricultural land (FiBL 2009). Organic farms have thus been present in EU FADNs for a long time whenever true random sampling has been applied. However, in many FADN systems, explicit identification of these farms as 'applying organic production methods' is a relatively new development.

5.1 Identification and Classification of Organic Farms in FADNs

Date of introduction and design of an identifier variable for organic farms differ between the farm structural survey, statistics on certified land area according to Council Regulation (EEC) No 2092/91[14], the EU FADN and national FADN systems. In some countries, organic farms can be identified in the respective national FADN for many years (e.g. Austria, Denmark, Germany). It should be noted that the identification of organic farms is not straightforward, and can lead to inconsistencies when comparing databases with different definitions[15]. An example of the potential complexity is provided by the design of the identifier variable in the Italian FADN, which differentiates six values to describe the organic status:

- partially organic – converting
- partially organic – partly converted, partly converting
- partially organic – converted
- fully organic – converting
- fully organic – partly converted, partly converting
- fully organic – converted

In EU FADN, an identifier variable for organic holdings was introduced in 2000/01 by Commission Regulation 1122/2000. Classification is based on Regulation (EEC) No 2092/1991, and the respective EU FADN variable "A32" indicates whether

1. the holding does not apply organic production methods,
2. the holding applies only organic production methods or
3. the holding is converting to organic production methods or applies both organic and other production methods.

In the latter case (A32=3), the data base does not give indications as to the proportion of the holding that is managed organically. Significant variations exist in how possibilities for partial conversion are implemented nationally.

[14] Replaced by Council Regulation (EC) No 834/2007 as from 1 January 2009.

[15] First of all, it is important how the question is asked. 'Is the holding organic?' leaves it open to non-organic holdings self-identifying themselves. Preferable are formulations like 'Is the holding, or part of it (if so how many ha) certified as organic in accordance with national and EU law?'

Within the EU FADN, types of farming are defined on the basis of the contributions of the different lines of production to the total SGM, which is also used to define economic farm size. As separate SGMs for organic farming are not available, farm type and size for organic farms currently are based on conventional SGMs. This may lead to a misclassification, as levels of inputs and outputs and prices for organic activities generally differ from conventional ones. The extent of this problem is yet unclear. Porskrog et al. (2003) calculated differentiated SGMs for two crop and two livestock activities in Denmark, showing that SGMs for organic farming were in all cases higher than the respective conventional ones. However, Bont et al. (2005, p. 52) see little hope "that (all) Member States will present specific, separate SGM for organic farming," and the European Concerted Action EISfOM recommended to continue with the current system for now and review it when there really is a substantial and comprehensive database of organic holdings in FADN. Based on these studies, it is therefore suggested that for the FACEPA project, farm type classification of organic farms will be made on standard (conventional) SGMs.

5.2 Representation of Organic Farms in EU FADN

Table 5.1 provides an overview of the number of fully organic farms in the EU FADN for the years 2001 to 2006. In 2006, the sample includes accounts from more than 3,000 fully organic farms, however, sample sizes vary strongly between countries. In 10 Members States (of which only two are nMS), organic samples include more than a 100 farms.

Differentiating by principal farm type further reduces sample sizes (Table 5.2). Using the differentiation by farm type as a first indication of the possibilities to estimate production cost for different products, the number of Member States with samples including at least 50 farms is four for the farm type milk, and three for the farm types: field crops, other grazing livestock farms and mixed farms. With respect to permanent crops, only the Italian sample is relatively large. However, due to the greater diversification of organic farms, the 'traditional' farm type definition may be less suited to identify homogenous farms.

The number of farms converting to organic production methods or applying both organic and other production methods is comparatively high in Spain, France and Italy (Table 5.3). Depending on the research question, it might be necessary to exclude these farms as well as the fully organic farms from the general cost estimation model, as production technologies may differ significantly.

Table 5.1: Number of fully organic farms in the EU FADN

	2001	2002	2003	2004	2005	2006
EU-15						
AT	296	289	299	320	337	370
BE		22	26	40	34	39
DE	226	254	251	261	263	284
DK	79	75	73	288	94	296
ES	27	155	92	76	106	123
FI	55	64	70	71	83	85
FR		67	88	87	122	138
GR		.	26	17	26	62
IE				.	15	17
IT	544	658	347	496	580	695
LU	.	.	.	.	.	.
NL	40	49	41	41	51	53
PT	29	30	32	51	36	39
SE		53	156	147	193	200
UK	28	34	55	65	62	117
NMS						
CY				.	.	.
CZ				66	71	72
EE				.	.	35
HU				.	17	24
LT				18	32	66
LV				38	59	106
MT					.	.
PL				119	128	139
SI				53	71	82
SK				15	21	19
EU-25	1 327	1 768	1 566	2 311	2 423	3 071

. = less than 15 sample farms.

Table 5.2: Number of fully organic farms in the EU FADN in 2006; by farm type

	All	Field crops	Horti-culture	Wine	Permanent crops	Milk	Grazing livestock	Pig + Poultry	Mixed
EU-15									
AT	370	45		.	.	230	48	.	26
BE	39				.	.	.	.	.
DE	284	75	.	.	.	77	38	.	67
DK	296	123	.		.	123	.	.	35
ES	123	38	.	.	41	.	.	.	16
FI	85	18				30	22	.	.
FR	138	22	.	15	.	27	37	.	.
GR	62	21	.	.	27		.		.
IE	17	.				.	.		.
IT	695	206	.	36	211	22	143	.	68
LU	.					.	.	.	.
NL	53	.	.			22	.	.	.
PT	39	.	.	.	.	.	.		.
SE	200	38	.			90	39	.	21
UK	117	.	.		.	31	58	.	.
NMS									
CY	.				.				
CZ	72	.		.		.	54		.
EE	35	.	.			.	.		.
HU	24	.			.	.	.		.
LT	66	28	.		.	.	.		21
LV	106	18	.		.	33	18	.	29
MT	.				.				
PL	139	42	.		.	.	24	.	54
SI	82	.		.	.	.	41		20
SK	19	.				.	.	.	.
EU-25	3 071	732	78	80	334	745	606	54	438

. = less than 15 sample farms.

Samples with at least 50 farms are highlighted by bold figures.

Table 5.3: Number of converting or partly organic farms in the EU FADN

	2001	2002	2003	2004	2005	2006
EU-15						
AT	.	19	33	26	.	.
BE		.	.	87	90	76
DE	30	42	40	45	35	40
DK	.	.	.	.	.	.
ES	436	247	346	281	283	271
FI	.	.	.	.		
FR		96	92	87	273	235
GR	.	.	15	17	26	52
IE						.
IT	181	161	99	151	276	261
LU	.	.	.	.	.	.
NL	49	76	85	69	80	74
PT	28	.	68	33	70	75
SE	152	105	43	48	37	40
UK	49	45	52	47	43	49
NMS						
CY				.		
CZ				25	25	31
EE				43	54	41
HU				18	28	24
LT				33	27	30
LV				54	61	45
MT					.	
PL				54	69	83
SI				.	.	.
SK				231	228	41
EU-25	945	834	885	1 371	1 726	1 505

. = less than 15 sample farms.

5.3 Representativeness of EU FADN with Respect to Organic Farming

For FADN, sample farms are selected according to a selection plan that guarantees its overall representativeness, based on a stratification of the universe. The stratification criteria depend on the EU FADN system but usually include region, economic size and type of farming, which also form the basis for the EU FADN. Individual weights are calculated for each farm in the sample by dividing the number of farms in the stratification cell of the field of observations by the number of farms in the corresponding cell in the sample. However, with the exception of a few national FADN systems (e.g. Denmark, the Netherlands), there is no specific methodology in place to ensure that any organic sample thus derived is reliable for organic farms. This represents a problem especially in countries where organic holdings represent only a small proportion of farms. In analogy to the analysis in Chapter 4, a comparison between FSS and EU FADN is carried out for aggregated values of key variables (Table 5.4). The comparison is hampered by possible differences in the definition of organic production status (e.g. FSS data differs from other statistics on the certified organic land area), especially in countries where part conversion is more widespread. Also, the published FSS data does not allow the ESU thresholds valid for

the FADN sample to be taken into account, and thus only the practical coverage could be calculated. FSS data was available only for the number of organic farms and their organic agricultural area. Table 5.4 highlights that with the exception of some countries with comparatively large FADN subsamples of organic farms (DE, CZ, FR, IT, DK, UK), using standard weights would seriously over- or underestimate organic UAA. Therefore, generally no extrapolation of FADN information to all organic farms in the sector can be done.

Table 5.4: Representativeness of organic sample data in EU FADN

	Number of holdings			UAA		
	FSS	FADN	Practical coverage %	FSS	FADN	Practical coverage %
EU-15						
AT	18 760	14 751	79%	429 250	571 704	133%
BE	550	850	155%	24 900	43 783	176%
DE	13 480	9 050	67%	759 720	711 071	94%
DK	2 440	2 024	83%	150 010	132 053	88%
ES	14 450	11 233	78%	797 400	381 581	48%
FI	4 020	4 191	104%	145 980	227 494	156%
FR	9 010	7 072	78%	542 600	433 030	80%
GR	9 610	5 117	53%	123 940	24 039	19%
IE	590	1 178	200%	20 190	60 595	300%
IT	41 000	23 653	58%	883 510	709 388	80%
LU	50	.		2 910	.	
NL	1 190	3 610	303%	48 090	154 879	322%
PT	880	1 969	224%	151 380	73 858	49%
SE	2 810	5 360	191%	252 530	720 281	285%
UK	2 900	1 774	61%	515 920	418 117	81%
NMS						
CY	130	.		800	.	
CZ	600	904	151%	239 140	232 503	97%
EE	670	.		47 020	.	
HU	870	680	78%	167 890	65 087	39%
LT	790	1 758	222%	32 960	81 462	247%
LV	440	1 548	352%	28 520	90 425	317%
MT		.			.	
PL	3 190	16 735	525%	73 320	214 812	293%
SI	1 220	6 250	512%	16 950	100 557	593%
SK	70	127	182%	51 620	109 590	212%
EU-25	129 720	119 834	92%	5506 550	5556 309	101%
EU-15	121 740	91 833	75%	4848 330	4661 873	96%
NMS	7 980	28 001	351%	658 220	894 436	136%

. = less than 15 sample farms.
Source: FADN (2005), FSS (2005) and own computations.

Approaches to improve the representativeness of results can for example comprise including a minimum number of organic farms in the FADN sample (in total or by farm type) or recalculating weights using ex-post stratification (Bont et al., 2005). Individual national solutions to increase representativeness of organic farms, however, can currently lead to conflicts with the uniform calculation of weights in the EU FADN (Vrolijk, 2005).

5.4 Conclusions

Estimating production costs for organic farming using the EU FADN poses a series of challenges. Currently, the often small number of organic farms in the sample will allow an econometric estimation only for a few countries. Using farm type to select specialized farms for more robust estimation is problematic, because, firstly, this classification is based on standard gross margins of conventional farming, and secondly, the greater diversification of organic farms renders the 'traditional' farm type definition less suitable for the identification of homogenous farms. A possible remedy could be using different approaches for clustering organic farms, e.g. according to physical output shares. As organic faming is not a stratification criteria employed when calculating the EU FADN weights, the reliability of these weights might be low, especially in countries where organic holdings represent only a small proportion of farms. Another problem is that some countries do have strata for organic farms on national level which are not taken into account in the EU weighting. More robust and representative estimates may be achieved using national FADNs, which in some countries include a higher number of organic farms, and/or allow a weighting of these farms.

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Appendix A: Descriptive Statistics for EU FADN Weighting Coefficients by Type of Farming (2005)

	Sample size	MIN	MAX	Mean	MED	relMAD %
Austria						
1) Fieldcrops	409	17.2	72.0	32.2	24.7	18.1
2) Horticulture	.					
3) Wine	78	35.1	92.8	55.0	35.1	0.0
4) Other permanent crops	59	30.0	203.3	45.6	30.0	0.0
5) Milk	830	18.7	93.5	34.8	26.9	0.0
6) Other grazing livestock	163	20.9	199.4	69.0	48.1	40.7
7) Granivores	136	26.2	350.0	36.1	26.2	0.0
8) Mixed	268	10.0	72.9	31.5	25.8	24.8
Belgium						
1) Fieldcrops	122	22.4	190.0	42.0	34.8	15.9
2) Horticulture	208	9.2	75.0	17.4	12.5	26.6
3) Wine						
4) Other permanent crops	76	10.0	56.0	21.8	16.0	0.0
5) Milk	250	16.5	166.7	26.4	20.7	16.1
6) Other grazing livestock	229	13.7	163.3	30.4	21.3	35.7
7) Granivores	80	10.0	420.0	41.4	33.2	0.0
8) Mixed	244	10.0	98.0	27.2	24.4	35.0
Germany						
1) Fieldcrops	1,630	2.0	360.0	27.7	21.4	45.1
2) Horticulture	570	2.0	136.7	15.0	8.7	47.2
3) Wine	339	7.5	36.4	22.9	23.9	25.6
4) Other permanent crops	249	3.3	120.0	24.3	17.0	41.2
5) Milk	1,654	1.0	80.0	40.3	40.2	65.3
6) Other grazing livestock	498	1.0	188.0	32.9	30.0	53.7
7) Granivores	274	1.0	106.7	23.9	21.9	49.2
8) Mixed	1,819	1.0	180.0	23.6	22.5	56.3
Denmark						
1) Fieldcrops	639	2.6	124.3	33.5	30.2	57.2
2) Horticulture	192	2.7	8.3	3.9	3.8	28.8
3) Wine						
4) Other permanent crops	63	1.0	30.0	7.2	7.1	20.0
5) Milk	370	6.4	135.0	14.2	13.2	0.0
6) Other grazing livestock	.					
7) Granivores	215	6.6	90.0	9.0	6.6	0.0
8) Mixed	408	3.3	72.1	15.0	10.5	48.2
Spain						
1) Fieldcrops	2,774	1.0	1,700.0	64.1	36.0	56.3
2) Horticulture	930	1.0	280.0	38.6	34.4	55.4
3) Wine	523	8.8	2,870.0	113.4	32.7	31.4
4) Other permanent crops	1,345	1.0	7,196.0	221.5	68.8	69.4
5) Milk	1,067	1.0	450.0	24.5	18.4	72.8
6) Other grazing livestock	1,279	1.0	3,290.0	66.4	31.8	37.9
7) Granivores	556	1.0	310.0	29.5	18.5	53.9
8) Mixed	550	9.6	1,385.8	95.4	48.5	28.5

Notes: "." shows that there are less than 15 sample holdings.

Source: EU FADN - DG AGRI L-3 and own computations.

	Sample size	MIN	MAX	Mean	MED	relMAD %
Finland						
1) Fieldcrops	258	21.6	260.0	72.7	66.4	29.2
2) Horticulture	64	18.8	380.0	29.5	21.6	13.1
3) Wine						
4) Other permanent crops	.					
5) Milk	363	22.8	250.0	39.3	31.1	26.8
6) Other grazing livestock	52	30.0	110.0	45.4	39.8	24.6
7) Granivores	48	17.5	60.0	25.2	19.3	0.4
8) Mixed	107	10.0	190.0	40.1	26.7	27.8
France						
1) Fieldcrops	2,086	1.0	2,080.0	49.2	37.5	37.8
2) Horticulture	381	1.0	290.0	24.4	17.0	41.1
3) Wine	1,033	1.0	2,190.0	48.3	40.0	24.2
4) Other permanent crops	294	1.0	260.0	31.4	21.1	27.1
5) Milk	967	13.3	225.0	58.6	54.2	49.3
6) Other grazing livestock	1,251	1.0	760.0	52.8	45.0	36.3
7) Granivores	163	1.0	500.0	51.8	54.5	44.9
8) Mixed	1,177	1.0	300.0	40.6	33.5	33.3
Greece						
1) Fieldcrops	2,098	4.0	6,180.0	94.3	44.3	46.5
2) Horticulture	111	56.5	1,070.0	112.0	81.1	22.5
3) Wine	186	10.0	915.0	78.5	63.6	29.7
4) Other permanent crops	969	1.0	1,830.0	209.3	110.3	59.9
5) Milk	.					
6) Other grazing livestock	462	30.0	880.0	87.0	62.2	45.2
7) Granivores	.					
8) Mixed	280	17.5	573.3	133.6	81.2	34.9
Ireland						
1) Fieldcrops	41	38.1	600.0	93.0	67.8	43.8
2) Horticulture						
3) Wine						
4) Other permanent crops						
5) Milk	401	36.9	142.5	51.9	42.1	0.0
6) Other grazing livestock	683	36.9	450.9	123.8	116.4	22.4
7) Granivores						
8) Mixed	68	36.9	295.0	68.2	50.0	26.3
Italy						
1) Fieldcrops	4,610	1.0	947.1	56.5	37.3	62.9
2) Horticulture	963	1.0	260.0	26.3	16.7	48.0
3) Wine	1,409	1.0	849.2	68.7	40.0	69.1
4) Other permanent crops	3,058	1.0	1,112.5	71.4	35.2	62.3
5) Milk	1,037	1.0	160.0	28.0	25.0	44.0
6) Other grazing livestock	1,906	1.0	790.0	25.6	21.7	65.4
7) Granivores	455	1.0	160.0	15.6	14.0	67.7
8) Mixed	1,099	1.0	530.0	34.5	22.3	64.1

Notes: "." shows that there are less than 15 sample holdings.

Source: EU FADN - DG AGRI L-3 and own computations.

	Sample size	MIN	MAX	Mean	MED	relMAD %
Luxembourg						
1) Fieldcrops	.					
2) Horticulture						
3) Wine	25	5.0	23.3	7.5	6.3	0.0
4) Other permanent crops	.					
5) Milk	236	2.3	10.0	2.9	2.8	5.4
6) Other grazing livestock	85	1.0	26.0	5.7	5.0	9.1
7) Granivores	.					
8) Mixed	70	1.0	11.7	3.2	2.3	13.3
Netherlands						
1) Fieldcrops	198	17.6	274.3	47.1	49.7	41.6
2) Horticulture	440	6.9	150.0	21.6	16.3	44.7
3) Wine						
4) Other permanent crops	77	8.0	143.3	50.6	49.2	56.5
5) Milk	334	25.5	90.8	61.0	60.2	6.6
6) Other grazing livestock	79	16.0	447.0	114.6	54.6	55.9
7) Granivores	250	5.8	76.3	23.1	22.0	54.0
8) Mixed	72	20.5	274.3	68.7	48.9	56.8
Portugal						
1) Fieldcrops	318	1.0	2,230.0	110.7	34.4	59.9
2) Horticulture	197	1.0	820.0	39.2	16.7	70.0
3) Wine	243	5.0	627.1	74.2	52.0	51.9
4) Other permanent crops	267	10.0	1,250.0	97.5	50.0	56.7
5) Milk	434	6.7	340.0	19.7	13.9	7.5
6) Other grazing livestock	402	7.4	740.0	42.8	27.8	43.5
7) Granivores	31	1.0	200.0	42.7	20.7	44.8
8) Mixed	162	10.0	513.3	101.3	47.5	42.9
Sweden						
1) Fieldcrops	271	22.3	236.4	53.2	38.7	19.0
2) Horticulture	27	4.7	100.0	14.1	4.7	0.0
3) Wine						
4) Other permanent crops	.					
5) Milk	365	10.8	33.6	21.4	20.6	19.9
6) Other grazing livestock	56	10.0	36.3	28.9	36.3	0.0
7) Granivores	74	5.2	10.0	7.4	6.8	23.3
8) Mixed	149	14.4	71.8	25.4	19.1	2.2
United Kindom						
1) Fieldcrops	638	3.3	266.4	46.3	37.3	27.6
2) Horticulture	114	8.8	250.0	23.3	11.5	23.5
3) Wine						
4) Other permanent crops	83	3.3	80.0	14.6	13.8	44.4
5) Milk	568	19.3	160.0	35.2	32.6	24.1
6) Other grazing livestock	1,127	9.4	96.4	27.5	24.1	25.7
7) Granivores	134	9.3	170.0	24.1	21.7	23.1
8) Mixed	272	7.5	172.5	31.3	26.9	18.8

Notes: "." shows that there are less than 15 sample holdings.

Source: EU FADN - DG AGRI L-3 and own computations.

	Sample size	MIN	MAX	Mean	MED	relMAD %
Cyprus						
1) Fieldcrops	140	17.9	590.0	43.9	25.7	30.4
2) Horticulture	.					
3) Wine	22	17.3	538.6	67.9	43.9	60.6
4) Other permanent crops	207	16.3	538.6	85.0	43.9	60.6
5) Milk	.					
6) Other grazing livestock	63	17.5	80.0	32.9	35.8	11.6
7) Granivores	.					
8) Mixed	.					
Czech Republic						
1) Fieldcrops	502	4.0	70.8	12.8	8.7	33.2
2) Horticulture	45	7.8	80.0	17.0	13.1	6.8
3) Wine	38	7.8	80.0	18.5	13.9	6.3
4) Other permanent crops	31	8.2	80.0	17.5	13.1	6.8
5) Milk	99	2.8	40.0	9.2	7.5	38.5
6) Other grazing livestock	98	2.0	25.7	13.5	12.6	23.6
7) Granivores	63	6.9	20.0	8.4	7.8	1.1
8) Mixed	428	2.9	60.0	7.2	2.9	0.0
Estonia						
1) Fieldcrops	190	3.4	79.1	15.2	6.5	40.7
2) Horticulture	19	15.3	15.3	15.3	15.3	0.0
3) Wine						
4) Other permanent crops	.					
5) Milk	158	3.5	17.8	7.7	6.4	45.3
6) Other grazing livestock	16	45.6	45.6	45.6	45.6	0.0
7) Granivores	.					
8) Mixed	97	3.3	45.8	15.5	4.9	31.5
Hungary						
1) Fieldcrops	1100	2.7	960.0	42.5	12.9	41.1
2) Horticulture	64	1.0	925.0	63.8	26.0	73.7
3) Wine	72	3.3	1,280.0	93.6	23.6	58.1
4) Other permanent crops	163	1.0	910.0	51.0	12.7	51.1
5) Milk	98	1.3	290.0	19.5	7.8	48.6
6) Other grazing livestock	42	1.0	120.0	33.2	17.4	65.5
7) Granivores	141	3.3	370.0	25.4	9.6	37.3
8) Mixed	260	1.0	1,950.0	41.1	6.7	42.3
Lithuania						
1) Fieldcrops	592	2.2	125.6	21.8	7.2	69.9
2) Horticulture	31	5.7	80.0	29.9	14.0	59.2
3) Wine						
4) Other permanent crops	27	5.7	80.0	18.3	14.0	47.6
5) Milk	118	2.4	58.8	24.0	16.9	63.1
6) Other grazing livestock	16	12.0	159.2	78.9	51.0	76.5
7) Granivores	.					
8) Mixed	260	2.4	159.2	48.4	27.0	88.9

Notes: "." shows that there are less than 15 sample holdings.

Source: EU FADN - DG AGRI L-3 and own computations.

	Sample size	MIN	MAX	Mean	MED	relMAD %
Latvia						
1) Fieldcrops	345	1.0	141.1	18.1	6.0	55.8
2) Horticulture	.					
3) Wine						
4) Other permanent crops	18	2.5	47.5	18.9	12.0	79.2
5) Milk	264	1.7	60.0	17.6	11.3	66.2
6) Other grazing livestock	22	1.0	58.6	26.4	14.4	48.1
7) Granivores	38	2.0	6.0	3.4	3.3	40.0
8) Mixed	204	1.0	115.8	34.0	20.0	81.8
Malta						
1) Fieldcrops	82	1.0	30.0	6.1	4.0	17.6
2) Horticulture	74	1.0	13.7	5.4	3.9	0.0
3) Wine	.					
4) Other permanent crops	26	1.0	13.7	3.7	3.9	0.0
5) Milk	41	1.3	10.0	2.4	1.3	0.0
6) Other grazing livestock	.					
7) Granivores	68	1.3	6.7	2.4	1.3	0.0
8) Mixed	.					
Poland						
1) Fieldcrops	2,644	5.0	362.3	66.5	33.7	52.4
2) Horticulture	345	12.5	403.3	79.8	54.3	59.3
3) Wine						
4) Other permanent crops	441	10.0	435.0	81.6	25.9	37.7
5) Milk	766	5.6	348.9	61.8	35.1	46.8
6) Other grazing livestock	1,314	5.6	348.9	47.3	21.7	28.0
7) Granivores	1,593	1.0	300.0	36.1	18.9	54.8
8) Mixed	4,794	1.0	394.0	73.2	43.6	63.5
Slovenia						
1) Fieldcrops	63	15.0	740.0	130.2	67.9	55.8
2) Horticulture	.					
3) Wine	22	26.7	175.0	70.5	66.7	52.9
4) Other permanent crops	34	14.3	310.0	77.1	65.0	71.8
5) Milk	266	5.0	445.0	32.6	11.6	56.9
6) Other grazing livestock	134	3.3	400.0	47.5	33.3	37.1
7) Granivores	.					
8) Mixed	124	2.5	314.5	90.3	29.0	82.8
Slovakia						
1) Fieldcrops	320	2.2	13.2	7.1	6.8	54.0
2) Horticulture						
3) Wine	.					
4) Other permanent crops	.					
5) Milk	40	3.0	12.0	5.5	4.8	0.0
6) Other grazing livestock	67	3.0	12.0	7.3	4.8	38.0
7) Granivores	.					
8) Mixed	172	2.4	12.0	3.7	2.4	0.0

Notes: "." shows that there are less than 15 sample holdings.

Source: EU FADN - DG AGRI L-3 and own computations.

Appendix B: Production Shares by Type of Farming (2005)

	Ratio of sample farms to total farms	Cereals	Wheat	Oilseeds	Pig production	Milk
	%	%	%	%	%	%
Austria						
1) Fieldcrops	3	51	66	61	7	
2) Horticulture	1	1				
3) Wine	2	5	6	8		
4) Other permanent crops	2	1	1			
5) Milk	3	6	3	2	1	85
6) Other grazing livestock	1	5	4	3	1	11
7) Granivores	3	11	5	4	58	
8) Mixed	3	21	16	21	32	5
Belgium						
1) Fieldcrops	2	36	44	26	2	1
2) Horticulture	6	1	1			
3) Wine						
4) Other permanent crops	5	1				
5) Milk	4	9	7	4	1	59
6) Other grazing livestock	3	12	12	20	2	15
7) Granivores	2	9	3		68	1
8) Mixed	4	31	32	50	28	24
Germany						
1) Fieldcrops	4	54	63	61	14	4
2) Horticulture	7					
3) Wine	4					
4) Other permanent crops	4					
5) Milk	2	8	6	5	2	70
6) Other grazing livestock	3	3	2	2	1	5
7) Granivores	4	3	2	1	23	
8) Mixed	4	31	27	31	60	22
Denmark						
1) Fieldcrops	3	58	59	53	10	
2) Horticulture	26					
3) Wine						
4) Other permanent crops	14					
5) Milk	7	6	4	3	1	93
6) Other grazing livestock	2					
7) Granivores	11	9	9	13	42	
8) Mixed	7	27	28	31	47	6
Spain						
1) Fieldcrops	2	77	75	89	2	
2) Horticulture	3					
3) Wine	1	1	1			
4) Other permanent crops		2	2	2	1	
5) Milk	4	1	1			85
6) Other grazing livestock	2	4	3	1	3	5
7) Granivores	3	3	3		75	
8) Mixed	1	12	16	7	19	9

Notes: The second column refers to the ratio of the number of sample farms and the total number of farms represented.
Source: EU FADN - DG AGRI L-3 and own computations.

	Ratio of sample farms to total farms %	Cereals %	Wheat %	Oilseeds %	Pig production %	Milk %
Finland						
1) Fieldcrops	1	62	80	88	5	
2) Horticulture	3					
3) Wine						
4) Other permanent crops	1					
5) Milk	3	16	3	3		97
6) Other grazing livestock	2	3	1			1
7) Granivores	4	6	5	1	58	
8) Mixed	2	13	11	9	36	2
France						
1) Fieldcrops	2	69	70	80	4	3
2) Horticulture	4					
3) Wine	2	1	1	2		
4) Other permanent crops	3	1		1		
5) Milk	2	6	6	1	1	60
6) Other grazing livestock	2	4	3	1		8
7) Granivores	2	1	1	1	61	
8) Mixed	2	18	18	15	34	29
Greece						
1) Fieldcrops	1	79	84	100	6	2
2) Horticulture	1					
3) Wine	1					
4) Other permanent crops		3	4		6	
5) Milk	1	1	1			82
6) Other grazing livestock	1	5	4			2
7) Granivores	1				60	
8) Mixed	1	11	7		27	14
Ireland						
1) Fieldcrops	1	40	58	88		
2) Horticulture						
3) Wine						
4) Other permanent crops						
5) Milk	2	7	7			93
6) Other grazing livestock	1	14	4			3
7) Granivores						
8) Mixed	1	39	30	12	100	4
Italy						
1) Fieldcrops	2	74	80	89	1	1
2) Horticulture	4					
3) Wine	1	1	3	2		
4) Other permanent crops	1	3	5	3		
5) Milk	4	3	2			76
6) Other grazing livestock	4	3	3	1		9
7) Granivores	6	6	1	1	94	2
8) Mixed	3	9	6	4	5	11

Notes: The second column refers to the ratio of the number of sample farms and the total number of farms represented.
Source: EU FADN - DG AGRI L-3 and own computations.

	Ratio of sample farms to total farms %	Cereals %	Wheat %	Oilseeds %	Pig production %	Milk %
Luxembourg						
1) Fieldcrops	17	7	6	9		
2) Horticulture						
3) Wine	13					
4) Other permanent crops	4	1				
5) Milk	34	38	38	29	3	75
6) Other grazing livestock	18	28	33	27	7	17
7) Granivores	48	2	2	4	55	
8) Mixed	31	24	21	31	35	8
Netherlands						
1) Fieldcrops	2	76	81	59		
2) Horticulture	5	2	2			
3) Wine						
4) Other permanent crops	2	1	1		1	
5) Milk	2	5	4	16	6	92
6) Other grazing livestock	1	2	1			1
7) Granivores	4	4	1		81	
8) Mixed	1	10	10	25	12	6
Portugal						
1) Fieldcrops	1	70	58	100	5	
2) Horticulture	3	1				
3) Wine	1	3	7			
4) Other permanent crops	1	2	4			
5) Milk	5	1				93
6) Other grazing livestock	2	7	10		1	6
7) Granivores	2	1			88	
8) Mixed	1	16	20		5	1
Sweden						
1) Fieldcrops	2	68	74	78	31	1
2) Horticulture	7					
3) Wine						
4) Other permanent crops	1	5	8	6		
5) Milk	5	10	5	2	2	92
6) Other grazing livestock	3	1				1
7) Granivores	13	2	1	1	32	
8) Mixed	4	14	11	12	35	7
United Kingdom						
1) Fieldcrops	2	84	88	91	7	1
2) Horticulture	4				1	
3) Wine						
4) Other permanent crops	7					
5) Milk	3	3	3	1	1	91
6) Other grazing livestock	4	2	1			1
7) Granivores	4	1	1		70	
8) Mixed	3	10	8	8	21	7

Notes: The second column refers to the ratio of the number of sample farms and the total number of farms represented.
Source: EU FADN - DG AGRI L-3 and own computations.

	Ratio of sample farms to total farms %	Cereals %	Wheat %	Oilseeds %	Pig production %	Milk %
Cyprus						
1) Fieldcrops	2	79	85			
2) Horticulture	2	4	7			
3) Wine	1					
4) Other permanent crops	1	4	6			
5) Milk	3	1				100
6) Other grazing livestock	3	9	1			
7) Granivores	5				100	
8) Mixed	3	4	1			
Czech Republic						
1) Fieldcrops	8	61	62	58	25	25
2) Horticulture	6					
3) Wine	5					
4) Other permanent crops	6					
5) Milk	11	2	2	1		12
6) Other grazing livestock	7	1	1	1		3
7) Granivores	12				44	
8) Mixed	14	35	35	40	30	60
Estonia						
1) Fieldcrops	7	61	72	75	15	2
2) Horticulture	7					
3) Wine						
4) Other permanent crops	13					
5) Milk	13	14	9	9		72
6) Other grazing livestock	2	1				2
7) Granivores	10	1	1	1	64	
8) Mixed	6	23	18	15	21	24
Hungary						
1) Fieldcrops	2	79	79	87	25	12
2) Horticulture	2					
3) Wine	1					
4) Other permanent crops	2	1		1		
5) Milk	5	2	2	1		47
6) Other grazing livestock	3					1
7) Granivores	4	1	1	1	43	
8) Mixed	2	16	17	11	32	40
Lithuania						
1) Fieldcrops	5	75	84	91	23	18
2) Horticulture	3					
3) Wine						
4) Other permanent crops	5					
5) Milk	4	2			1	22
6) Other grazing livestock	1	1			1	4
7) Granivores	5				36	
8) Mixed	2	21	14	9	39	56

Notes: The second column refers to the ratio of the number of sample farms and the total number of farms represented.
Source: EU FADN - DG AGRI L-3 and own computations.

	Ratio of sample farms to total farms %	Cereals %	Wheat %	Oilseeds %	Pig production %	Milk %
Latvia						
1) Fieldcrops	6	71	84	90	11	7
2) Horticulture	6					
3) Wine						
4) Other permanent crops	5					
5) Milk	6	7	3	1	2	61
6) Other grazing livestock	4					1
7) Granivores	29				54	
8) Mixed	3	21	13	9	33	31
Malta						
1) Fieldcrops	16				2	1
2) Horticulture	18					
3) Wine	97					
4) Other permanent crops	27					
5) Milk	41				1	85
6) Other grazing livestock	16				1	4
7) Granivores	43				94	4
8) Mixed	21				2	6
Poland						
1) Fieldcrops	2	42	57	66	8	4
2) Horticulture	1					
3) Wine						
4) Other permanent crops	1					
5) Milk	2	3	1			23
6) Other grazing livestock	2	5	3	1	1	36
7) Granivores	3	10	4	3	39	
8) Mixed	1	40	33	29	51	36
Slovenia						
1) Fieldcrops	1	37	50	49	27	3
2) Horticulture	4	1	2			
3) Wine	1		1	1		
4) Other permanent crops	1	1		4		
5) Milk	3	10	10		1	87
6) Other grazing livestock	2	8	11	21	2	4
7) Granivores	5	6	1		9	
8) Mixed	1	37	25	26	62	6
Slovakia						
1) Fieldcrops	14	62	58	67	51	15
2) Horticulture						
3) Wine	11					
4) Other permanent crops	15					
5) Milk	18	2	2	1	1	18
6) Other grazing livestock	14	2	3	1	2	11
7) Granivores	34					
8) Mixed	27	34	37	30	46	55

Notes: The second column refers to the ratio of the number of sample farms and the total number of farms represented.
Source: EU FADN - DG AGRI L-3 and own computations.

Appendix C: Description of the Variables Under Consideration for Assessing the Coverage and Representativeness of EU FADN

	FADN code	FSS code
1. Number of holdings	SYS02	HOLD_HOLD
2. UAA	SYS02 × SE025	AGRAREA_HA
3. Cereal area	SYS02 × SE035	D01_08_HA
4. Wheat area	SYS02 × (K120AA + K121AA)	D01_HA + D02_HA
5. Oilseed area	SYS02 × (K331AA + K332AA)	D13D1A_HA + D13D1B_HA
6. Dairy cows	SYS02 × SE085	J07_NBR
7. Number of fattening pigs	SYS02 × D45AV	J13_NBR

Abbreviations:

FADN

SYS02	Farms represented
SE025	Total UAA
SE035	Cereals hectare
K120AA	Common wheat and spelt hectare
K121AA	Durum wheat hectare
K331AA	Rape hectare
K332AA	Sunflower hectare
SE085	Dairy cows (livestock units)
D45AV	Pigs for fattening

FSS

HOLD_HOLD	Number of holdings
AGRAREA_HA	UAA
D1_08_HA	Cereals hectare
D01_HA	Common wheat and spelt hectare
D02_HA	Durum wheat hectare
D13D1A_HA	Rape and turnip hectare
D13D1B_HA	Sunflower hectare
J07_NBR	Dairy cows number
J13_NBR	Pigs - others number

Appendix D: Various Indicators on the Coverage and Representativeness of EU FADN on the Member State Level

Table D1: Coverage and representativeness of 2005 data for the number of holdings

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
EU-15								
AT	170,640	73,770	43.2	8	75,950	44.5	-1.3	-2.9
BE	51,540	33,910	65.8	16	34,730	67.4	-1.6	-2.4
DE	389,880	200,071	51.3	16	202,600	52.0	-0.6	-1.2
DK	51,680	36,581	70.8	8	39,360	76.2	-5.4	-7.1
ES	1,079,420	751,068	69.6	2	827,740	76.7	-7.1	-9.3
FI	70,620	43,380	61.4	8	44,740	63.4	-1.9	-3.0
FR	567,140	350,133	61.7	8	398,500	70.3	-8.5	-12.1
GR	833,590	508,311	61.0	2	534,080	64.1	-3.1	-4.8
IE	132,670	113,790	85.8	2	115,700	87.2	-1.4	-1.7
IT	1,728,530	723,762	41.9	4	748,780	43.3	-1.4	-3.3
LU	2,450	1,715	70.0	8	1,840	75.1	-5.1	-6.8
NL	81,830	62,890	76.9	16	62,990	77.0	-0.1	-0.2
PT	323,920	130,486	40.3	2	141,650	43.7	-3.4	-7.9
SE	75,810	28,630	37.8	8	28,910	38.1	-0.4	-1.0
UK	286,750	96,110	33.5	16	94,070	32.8	0.7	2.2
NMS								
CY	45,170	28,940	64.1	2	20,640	45.7	18.4	40.2
CZ	42,250	14,300	33.8	4	14,370	34.0	-0.2	-0.5
EE	27,750	6,740	24.3	2	6,730	24.3	0.0	0.1
HU	714,790	83,489	11.7	2	95,930	13.4	-1.7	-13.0
LT	252,950	31,180	12.3	2	52,390	20.7	-8.4	-40.5
LV	128,670	19,059	14.8	2	19,200	14.9	-0.1	-0.7
MT	11,070	1,355	12.2	8	1,530	13.8	-1.6	-11.4
PL	2,476,470	757,402	30.6	2	757,670	30.6	0.0	0.0
SI	77,170	38,940	50.5	2	39,860	51.7	-1.2	-2.3
SK	68,490	3,680	5.4	8	3,220	4.7	0.7	14.3
EU-25			42.7			45.0	-2.3	-5.1
EU-15			54.0			57.3	-3.4	-5.9
NMS			25.6			26.3	-0.7	-2.6
EU-15*			53.3			56.3	-3.0	-5.3

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D2: Coverage and representativeness of 1995 data for the number of holdings

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
AT	221,750	90,240	40.7	8	92,010	41.5	-0.8	-1.9
BE	70,980	45,280	63.8	12	50,850	71.6	-7.8	-11.0
DE			0.0	8		0.0	0.0	0.0
DK	68,770	53,310	77.5	8	53,300	77.5	0.0	0.0
ES	1,277,600	524,360	41.0	2	758,070	59.3	-18.3	-30.8
FI	100,950	49,241	48.8	8	55,260	54.7	-6.0	-10.9
FR			0.0	8		0.0	0.0	0.0
GR	802,410	510,089	63.6	2	529,020	65.9	-2.4	-3.6
IE	153,420	128,700	83.9	2	129,840	84.6	-0.7	-0.9
IT	2,482,100	955,542	38.5	2	1,171,810	47.2	-8.7	-18.5
LU	3,180	2,000	62.9	8	2,150	67.6	-4.7	-7.0
NL	113,200	86,180	76.1	16	87,220	77.0	-0.9	-1.2
PT	450,640	335,299	74.4	1	342,020	75.9	-1.5	-2.0
SE	88,830	42,170	47.5	8	44,400	50.0	-2.5	-5.0
UK	234,500	139,180	59.4	8	140,460	59.9	-0.5	-0.9
EU-15*			48.8			57.0	-8.2	-14.3

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D3: Coverage and representativeness of 2005 data for the UAA

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
EU-15								
AT	3,266,240	2,490,152	76.2	8	2,108,110	64.5	11.7	18.1
BE	1,385,580	1,387,192	100.1	16	1,290,580	93.1	7.0	7.5
DE	17,035,220	16,270,489	95.5	16	15,314,200	89.9	5.6	6.2
DK	2,707,690	2,532,743	93.5	8	2,605,290	96.2	-2.7	-2.8
ES	24,855,130	21,356,071	85.9	2	22,915,750	92.2	-6.3	-6.8
FI	2,263,560	2,134,366	94.3	8	1,972,830	87.2	7.1	8.2
FR	27,590,940	26,178,409	94.9	8	26,600,840	96.4	-1.5	-1.6
GR	3,983,790	3,371,991	84.6	2	3,737,690	93.8	-9.2	-9.8
IE	4,219,380	4,598,815	109.0	2	4,067,870	96.4	12.6	13.1
IT	12,707,850	11,425,288	89.9	4	11,128,930	87.6	2.3	2.7
LU	129,130	129,477	100.3	8	124,730	96.6	3.7	3.8
NL	1,958,060	2,033,038	103.8	16	1,852,230	94.6	9.2	9.8
PT	3,679,590	2,985,344	81.1	2	3,286,500	89.3	-8.2	-9.2
SE	3,192,450	2,709,213	84.9	8	2,512,020	78.7	6.2	7.8
UK	15,956,960	14,888,271	93.3	16	12,257,800	76.8	16.5	21.5
NMS								
CY	151,500	159,095	105.0	2	129,810	85.7	19.3	22.6
CZ	3,557,790	3,536,365	99.4	4	3,436,450	96.6	2.8	2.9
EE	828,930	810,037	97.7	2	692,220	83.5	14.2	17.0
HU	4,266,550	4,175,158	97.9	2	3,889,820	91.2	6.7	7.3
LT	2,792,040	1,554,756	55.7	2	1,774,510	63.6	-7.9	-12.4
LV	1,701,680	1,175,378	69.1	2	1,019,020	59.9	9.2	15.3
MT	10,250	3,802	37.1	8	4,390	42.8	-5.7	-13.4
PL	14,754,880	13,018,396	88.2	2	11,814,840	80.1	8.2	10.2
SI	485,430	442,024	91.1	2	372,990	76.8	14.2	18.5
SK	1,879,490	2,017,902	107.4	8	1,768,050	94.1	13.3	14.1
EU-25			91.0			88.0	3.0	3.4
EU-15			91.6			89.5	2.2	2.4
NMS			88.4			81.8	6.5	8.0
EU-15*			89.7			87.0	2.7	3.1

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D4: Coverage and representativeness of 1995 data for the UAA

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
AT	3,425,130	2,147,522	62.7	8	2,141,370	62.5	0.2	0.3
BE	1,354,410	1,399,111	103.3	12	1,290,330	95.3	8.0	8.4
DE			0.0	8		0.0	0.0	0.0
DK	2,726,610	2,559,984	93.9	8	2,590,460	95.0	-1.1	-1.2
ES	25,230,340	15,396,694	61.0	2	21,381,050	84.7	-23.7	-28.0
FI	2,191,700	1,614,841	73.7	8	1,685,740	76.9	-3.2	-4.2
FR			0.0	8		0.0	0.0	0.0
GR	3,578,210	3,098,554	86.6	2	3,295,580	92.1	-5.5	-6.0
IE	4,324,520	4,829,270	111.7	2	4,128,020	95.5	16.2	17.0
IT	14,685,450	11,216,844	76.4	2	13,121,390	89.3	-13.0	-14.5
LU	126,860	108,012	85.1	8	118,880	93.7	-8.6	-9.1
NL	1,998,880	2,081,056	104.1	16	1,878,050	94.0	10.2	10.8
PT	3,924,620	4,196,331	106.9	1	3,747,410	95.5	11.4	12.0
SE	3,059,730	2,044,242	66.8	8	2,565,680	83.9	-17.0	-20.3
UK	16,446,620	18,393,314	111.8	8	14,662,920	89.2	22.7	25.4
EU-15*			83.2			87.4	-4.2	-4.8

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D5: Coverage and representativeness of 2005 data for the cereals area

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
EU-15								
AT	805,050	782,612	97.2	8	715,450	88.9	8.3	9.4
BE		328,097	101.8	16	301,570	93.6	8.2	8.8
DE	6,838,950	6,452,056	94.3	16	6,311,910	92.3	2.0	2.2
DK	1,510,830	1,465,211	97.0	8	1,468,460	97.2	-0.2	-0.2
ES	7,134,280	6,986,800	97.9	2	7,042,280	98.7	-0.8	-0.8
FI	1,185,110	1,045,391	88.2	8	1,027,370	86.7	1.5	1.8
FR	9,013,940	9,064,954	100.6	8	8,893,080	98.7	1.9	1.9
GR	1,208,190	1,201,005	99.4	2	1,137,240	94.1	5.3	5.6
IE		240,598	85.4	2	281,200	99.9	-14.4	-14.4
IT	3,914,490	3,743,770	95.6	4	3,490,540	89.2	6.5	7.3
LU	28,500	28,139	98.7	8	27,610	96.9	1.9	1.9
NL		196,626	90.6	16	202,410	93.3	-2.7	-2.9
PT		298,947	79.2	2	337,060	89.3	-10.1	-11.3
SE	1,030,540	1,016,963	98.7	8	938,160	91.0	7.6	8.4
UK	2,923,030	3,309,485	113.2	16	2,853,440	97.6	15.6	16.0
NMS								
CY	48,220	53,868	111.7	2	44,180	91.6	20.1	21.9
CZ	1,569,950	1,651,882	105.2	4	1,543,700	98.3	6.9	7.0
EE		265,986	93.7	2	269,150	94.8	-1.1	-1.2
HU	2,377,610	2,355,126	99.1	2	2,174,330	91.5	7.6	8.3
LT	1,015,390	707,296	69.7	2	811,940	80.0	-10.3	-12.9
LV		417,396	94.6	2	391,710	88.8	5.8	6.6
MT			0.0			0.0	0.0	0.0
PL	8,328,850	7,602,825	91.3	2	6,941,280	83.3	7.9	9.5
SI	94,640	71,257	75.3	2	81,220	85.8	-10.5	-12.3
SK		765,606	97.8	8	738,710	94.3	3.4	3.6
EU-25			96.7			92.8	3.9	4.2
EU-15			98.3			95.2	3.1	3.2
NMS			93.0			87.0	6.0	6.9
EU-15*			98.6			94.7	3.9	4.1

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D6: Coverage and representativeness of 1995 data for the cereals area

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
AT	809,140	656,216	81.1	8	699,100	86.4	-5.3	-6.1
BE	305,600	286,788	93.8	12	294,390	96.3	-2.5	-2.6
DE			0.0			0.0	0.0	0.0
DK	1,447,490	1,332,429	92.1	8	1,366,300	94.4	-2.3	-2.5
ES	7,053,150	5,766,375	81.8	2	6,854,910	97.2	-15.4	-15.9
FI	989,630	707,982	71.5	8	751,570	75.9	-4.4	-5.8
FR			0.0			0.0	0.0	0.0
GR	1,108,610	1,183,531	106.8	2	1,010,750	91.2	15.6	17.1
IE	262,990	301,089	114.5	2	262,640	99.9	14.6	14.6
IT	4,216,600	3,535,580	83.8	2	3,871,000	91.8	-8.0	-8.7
LU	28,770	24,623	85.6	8	26,820	93.2	-7.6	-8.2
NL	193,670	194,419	100.4	16	182,740	94.4	6.0	6.4
PT	657,550	663,128	100.8	1	641,410	97.5	3.3	3.4
SE	1,099,870	860,403	78.2	8	1,000,030	90.9	-12.7	-14.0
UK	3,461,870	3,813,613	110.2	8	3,433,800	99.2	11.0	11.1
EU-15*			89.3			94.3	-4.9	-5.2

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D7: Coverage and representativeness of 2005 data for the wheat area

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
EU-15								
AT	289,360	301,104	104.1	8	268,650	92.8	11.2	12.1
BE	213,810	218,381	102.1	16	204,680	95.7	6.4	6.7
DE	3,173,750	3,052,299	96.2	16	3,008,680	94.8	1.4	1.4
DK	678,740	677,811	99.9	8	669,160	98.6	1.3	1.3
ES	2,275,670	1,780,276	78.2	2	2,254,770	99.1	-20.9	-21.0
FI	215,080	222,270	103.3	8	202,540	94.2	9.2	9.7
FR	5,249,250	5,237,355	99.8	8	5,198,130	99.0	0.7	0.8
GR	789,650	799,933	101.3	2	736,370	93.3	8.0	8.6
IE	93,090	54,477	58.5	2	93,070	100.0	-41.5	-41.5
IT	2,093,740	1,999,805	95.5	4	1,838,820	87.8	7.7	8.8
LU	11,930	12,693	106.4	8	11,750	98.5	7.9	8.0
NL	136,710	135,581	99.2	16	130,340	95.3	3.8	4.0
PT	118,970	98,616	82.9	2	115,250	96.9	-14.0	-14.4
SE	357,450	383,794	107.4	8	346,680	97.0	10.4	10.7
UK	1,868,120	2,278,709	122.0	16	1,834,810	98.2	23.8	24.2
NMS								
CY	4,080	9,543	233.9	2	3,680	90.2	143.7	159.3
CZ	810,600	856,494	105.7	4	798,450	98.5	7.2	7.3
EE	85,470	75,229	88.0	2	82,540	96.6	-8.6	-8.9
HU	955,110	979,268	102.5	2	909,850	95.3	7.3	7.6
LT	377,480	291,043	77.1	2	339,020	89.8	-12.7	-14.2
LV	173,170	163,894	94.6	2	163,750	94.6	0.1	0.1
MT			0.0			0.0	0.0	0.0
PL	2,218,090	2,148,117	96.8	2	1,886,590	85.1	11.8	13.9
SI	30,060	20,534	68.3	2	26,570	88.4	-20.1	-22.7
SK	364,600	374,915	102.8	8	344,990	94.6	8.2	8.7
EU-25			98.2			95.1	3.1	3.3
EU-15			98.2			96.3	1.9	2.0
NMS			98.0			90.8	7.2	8.0
EU-15*			98.0			95.2	2.8	2.9

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D8: Coverage and representativeness of 1995 data for the wheat area

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
AT	256,060	258,018	100.8	8	232,070	90.6	10.1	11.2
BE	207,040	212,149	102.5	12	201,840	97.5	5.0	5.1
DE			0.0			0.0	0.0	0.0
DK	606,670	560,440	92.4	8	589,610	97.2	-4.8	-4.9
ES	2,312,090	1,506,081	65.1	2	2,261,630	97.8	-32.7	-33.4
FI	98,820	87,133	88.2	8	84,270	85.3	2.9	3.4
FR			0.0			0.0	0.0	0.0
GR	756,260	767,387	101.5	2	680,950	90.0	11.4	12.7
IE	68,160	80,654	118.3	2	68,170	100.0	18.3	18.3
IT	2,343,780	1,931,856	82.4	2	2,145,900	91.6	-9.1	-10.0
LU	9,330	8,080	86.6	8	8,990	96.4	-9.8	-10.1
NL	135,410	142,075	104.9	16	129,840	95.9	9.0	9.4
PT	234,600	207,571	88.5	1	232,030	98.9	-10.4	-10.5
SE	258,700	860,403	332.6	8	248,870	96.2	236.4	245.7
UK	2,075,970	2,298,720	110.7	8	2,065,970	99.5	11.2	11.3
EU-15*			95.3			95.5	-0.2	-0.2

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: EU FADN - DG AGRI L-3, FSS (2005) and own computations.

Table D9: Coverage and representativeness of 2005 data for the rape, turnip and sunflower area

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
EU-15								
AT	64,590	75,664	117.1	8	60,770	94.1	23.1	24.5
BE	5,650	6,727	119.1	16	5,480	97.0	22.1	22.8
DE	1,371,040	1,100,836	80.3	16	1,315,140	95.9	-15.6	-16.3
DK	113,410	110,954	97.8	8	112,390	99.1	-1.3	-1.3
ES	532,650	568,685	106.8	2	524,500	98.5	8.3	8.4
FI	77,030	89,819	116.6	8	72,050	93.5	23.1	24.7
FR	1,845,930	1,917,176	103.9	8	1,832,000	99.2	4.6	4.6
GR	4,670	3,439	73.6	2	4,390	94.0	-20.4	-21.7
IE	3,540	4,860	137.3	2	3,530	99.7	37.6	37.7
IT	110,910	115,878	104.5	4	100,450	90.6	13.9	15.4
LU	4,060	4,033	99.3	8	4,000	98.5	0.8	0.8
NL	2,480	989	39.9	16	2,400	96.8	-56.9	-58.8
PT	6,520	4,939	75.7	2	6,510	99.8	-24.1	-24.1
SE	82,360	87,552	106.3	8	80,570	97.8	8.5	8.7
UK	578,270	653,531	113.0	16	573,410	99.2	13.9	14.0
NMS								
CY			0.0			0.0	0.0	0.0
CZ	304,620	324,855	106.6	4	303,820	99.7	6.9	6.9
EE	46,650	42,833	91.8	2	46,480	99.6	-7.8	-7.8
HU	570,730	607,112	106.4	2	556,310	97.5	8.9	9.1
LT	105,100	93,972	89.4	2	104,320	99.3	-9.8	-9.9
LV	62,140	59,250	95.3	2	61,410	98.8	-3.5	-3.5
MT			0.0			0.0	0.0	0.0
PL	554,530	655,564	118.2	2	535,920	96.6	21.6	22.3
SI	2,300	2,060	89.6	2	2,010	87.4	2.2	2.5
SK	200,150	216,972	108.4	8	197,270	98.6	9.8	10.0
EU-25			101.5			97.8	3.6	3.7
EU-15			98.8			97.8	1.0	1.0
NMS			108.5			97.9	10.6	10.8
EU-15*			108.9			97.7	11.1	11.4

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D10: Coverage and representativeness of 1995 data for the rape, turnip and sunflower area

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
AT	117,940	132,568	112.4	8	108,790	92.2	20.2	21.9
BE	8,510	9,360	110.0	12	8,430	99.1	10.9	11.0
DE			0.0			0.0	0.0	0.0
DK	153,270	144,667	94.4	8	149,460	97.5	-3.1	-3.2
ES	1,171,450	857,760	73.2	2	1,143,560	97.6	-24.4	-25.0
FI	84,280	68,292	81.0	8	74,430	88.3	-7.3	-8.2
FR			0.0			0.0	0.0	0.0
GR	19,020	16,911	88.9	2	17,930	94.3	-5.4	-5.7
IE	3,870	5,504	142.2	2	3,860	99.7	42.5	42.6
IT	213,990	262,853	122.8	2	207,870	97.1	25.7	26.5
LU	1,950	2,255	115.6	8	1,880	96.4	19.2	19.9
NL	1,490	854	57.3	16	1,480	99.3	-42.0	-42.3
PT	74,390	60,044	80.7	1	74,160	99.7	-19.0	-19.0
SE	105,430	97,748	92.7	8	101,890	96.6	-3.9	-4.1
UK	488,380	402,066	82.3	8	487,050	99.7	-17.4	-17.4
EU-15*			84.3			97.4	-13.1	-13.4

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D11: Coverage and representativeness of 2005 data for the number of dairy cows

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
EU-15								
AT	535,790	544,260	101.6	8	497,530	92.9	8.7	9.4
BE	549,330	506,671	92.2	16	546,290	99.4	-7.2	-7.3
DE	4,235,960	4,198,761	99.1	16	4,136,950	97.7	1.5	1.5
DK	564,270	548,317	97.2	8	564,150	100.0	-2.8	-2.8
ES	1,001,920	1,171,427	116.9	2	999,220	99.7	17.2	17.2
FI	318,760	361,157	113.3	8	318,000	99.8	13.5	13.6
FR	3,883,840	3,940,477	101.5	8	3,874,690	99.8	1.7	1.7
GR	167,920	101,112	60.2	2	167,640	99.8	-39.6	-39.7
IE	1,081,960	1,087,964	100.6	2	1,081,840	100.0	0.6	0.6
IT	1,860,180	1,876,252	100.9	4	1,842,070	99.0	1.8	1.9
LU	39,340	38,383	97.6	8	39,340	100.0	-2.4	-2.4
NL	1,433,200	1,560,397	108.9	16	1,431,400	99.9	9.0	9.0
PT	287,290	253,741	88.3	2	285,960	99.5	-11.2	-11.3
SE	393,260	388,961	98.9	8	393,030	99.9	-1.0	-1.0
UK	2,065,070	2,127,885	103.0	16	2,054,760	99.5	3.5	3.6
NMS								
CY	24,250	17,254	71.1	2	24,240	100.0	-28.8	-28.8
CZ	440,500	491,828	111.7	4	436,700	99.1	12.5	12.6
EE	115,230	95,662	83.0	2	107,750	93.5	-10.5	-11.2
HU	286,830	225,980	78.8	2	283,730	98.9	-20.1	-20.4
LT	493,890	181,731	36.8	2	286,290	58.0	-21.2	-36.5
LV	172,360	127,714	74.1	2	122,250	70.9	3.2	4.5
MT	7,270	6,565	90.3	8	7,220	99.3	-9.0	-9.1
PL	2,853,740	2,665,732	93.4	2	2,550,060	89.4	4.1	4.5
SI	130,680	122,563	93.8	2	127,250	97.4	-3.6	-3.7
SK	193,200	204,780	106.0	8	178,170	92.2	13.8	14.9
EU-25			98.7			96.6	2.1	2.2
EU-15			101.6			99.0	2.6	2.6
NMS			87.7			87.4	0.3	0.4
EU-15*			102.6			99.3	3.4	3.4

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D12: Coverage and representativeness of 1995 data for the number of dairy cows

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
AT	705,680	619,040	87.7	8	582,320	82.5	5.2	6.3
BE	688,380	698,508	101.5	12	686,080	99.7	1.8	1.8
DE			0.0			0.0	0.0	0.0
DK	702,470	740,264	105.4	8	701,600	99.9	5.5	5.5
ES	1,356,840	1,022,669	75.4	2	1,321,450	97.4	-22.0	-22.6
FI	396,050	387,018	97.7	8	383,030	96.7	1.0	1.0
FR			0.0			0.0	0.0	0.0
GR	183,600	180,017	98.0	2	180,040	98.1	0.0	0.0
IE	1,312,080	1,329,395	101.3	2	1,311,460	100.0	1.4	1.4
IT	2,173,310	2,033,287	93.6	2	2,155,890	99.2	-5.6	-5.7
LU	48,600	45,132	92.9	8	48,530	99.9	-7.0	-7.0
NL	1,707,880	1,807,250	105.8	16	1,702,270	99.7	6.1	6.2
PT	381,760	341,942	89.6	1	380,760	99.7	-10.2	-10.2
SE	481,390	475,903	98.9	8	480,380	99.8	-0.9	-0.9
UK	2,555,370	2,656,677	104.0	8	2,552,200	99.9	4.1	4.1
EU-15*			97.2			98.4	-1.2	-1.2

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: EU FADN - DG AGRI L-3, FSS (2005) and own computations.

Table D13: Coverage and representativeness of 2005 data for the number of fattening pigs

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
EU-15								
AT	2,088,010	1,615,930	77.4	8	2,006,420	96.1	-18.7	-19.5
BE	4,064,340	4,146,203	102.0	16	4,056,520	99.8	2.2	2.2
DE	17,186,320	16,132,754	93.9	16	16,775,340	97.6	-3.7	-3.8
DK	7,945,580	6,418,970	80.8	8	7,938,110	99.9	-19.1	-19.1
ES	13,333,980	11,375,563	85.3	2	13,292,980	99.7	-14.4	-14.4
FI	773,350	785,395	101.6	8	771,260	99.7	1.8	1.8
FR	8,103,700	9,617,374	118.7	8	8,086,360	99.8	18.9	18.9
GR	516,370	62,744	12.2	2	510,200	98.8	-86.7	-87.7
IE	1,002,720	426,132	42.5	2	1,002,580	100.0	-57.5	-57.5
IT	6,294,310	6,368,033	101.2	4	6,236,740	99.1	2.1	2.1
LU	47,300	51,154	108.1	8	47,250	99.9	8.3	8.3
NL	5,631,760	5,956,410	105.8	16	5,556,430	98.7	7.1	7.2
PT	1,031,000	778,655	75.5	2	981,970	95.2	-19.7	-20.7
SE	1,088,000	1,337,200	122.9	8	1,084,250	99.7	23.2	23.3
UK	3,010,030	3,386,366	112.5	16	2,905,160	96.5	16.0	16.6
nMS								
CY	236,650	204,224	86.3	2	236,500	99.9	-13.7	-13.6
CZ	1,721,550	1,459,138	84.8	4	1,700,950	98.8	-14.0	-14.2
EE	193,650	203,404	105.0	2	188,270	97.2	7.8	8.0
HU	2,689,480	1,600,383	59.5	2	2,069,140	76.9	-17.4	-22.7
LT	819,850	247,085	30.1	2	560,210	68.3	-38.2	-55.9
LV	277,550	205,429	74.0	2	225,140	81.1	-7.1	-8.8
MT	41,900	44,323	105.8	8	34,260	81.8	24.0	29.4
PL	9,982,710	9,859,559	98.8	2	9,617,870	96.3	2.4	2.5
SI	292,120	193,769	66.3	2	261,270	89.4	-23.1	-25.8
SK	606,600	316,589	52.2	8	512,970	84.6	-32.4	-38.3
EU-25			93.0			97.4	-4.3	-4.5
EU-15			94.9			98.8	-3.9	-3.9
NMS			85.0			91.4	-6.4	-7.0
EU-15*			91.2			99.1	-7.9	-7.9

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: EU FADN - DG AGRI L-3, FSS (2005) and own computations.

Table D14: Coverage and representativeness of 1995 data for the number of fattening pigs

	[A] FSS	[B] FADN	[C] Practical coverage % [B/A]	[D] Thres-hold (ESU)	[E] Farms above thres-hold	[F] Theoretical coverage % [E/A]	[G] Difference practical - theoretical coverage %-points [C-F]	[H] 'Weighting error' % [(B-E)/E]
AT	2,359,800	1,934,358	82.0	8	2,174,550	92.1	-10.2	-11.0
BE	4,454,930	3,737,901	83.9	12	4,446,140	99.8	-15.9	-15.9
DE			0.0			0.0	0.0	0.0
DK	6,461,960	6,450,040	99.8	8	6,441,510	99.7	0.1	0.1
ES	7,788,550	4,500,781	57.8	2	7,680,250	98.6	-40.8	-41.4
FI	791,970	887,665	112.1	8	784,050	99.0	13.1	13.2
FR			0.0			0.0	0.0	0.0
GR	469,320	58,431	12.5	2	463,710	98.8	-86.4	-87.4
IE	948,160	1,028,772	108.5	2	947,970	100.0	8.5	8.5
IT	5,936,040	2,525,819	42.6	2	5,783,560	97.4	-54.9	-56.3
LU	37,070	42,007	113.3	8	36,870	99.5	13.9	13.9
NL	7,123,920	8,009,622	112.4	16	6,855,430	96.2	16.2	16.8
PT	1,271,900	924,325	72.7	1	1,252,530	98.5	-25.8	-26.2
SE	1,280,780	921,314	71.9	8	1,271,920	99.3	-27.4	-27.6
UK	4,904,760	4,889,235	99.7	8	4,867,560	99.2	0.4	0.4
EU-15*			81.9			98.1	-16.2	-16.5

Notes: EU-15* stands for the EU-15 excluding France and Germany.
Source: FADN (2005), FSS (2005) and own computations.

Table D15: Mean values per farm based on FSS and FADN data for the UAA in 2005

	[A]	[B]	[C]	[D]	[E]
	Average calculated based on		"Relative difference"	Coefficient of variation based on FADN	Ratio of the relative difference and the coefficient of variation
	FSS	FADN	%	%	
			[1-([A]/[B])		[C]/[D]
EU-15					
AT	27.76	33.76	17.8	85.1	0.21
BE	37.16	40.91	9.2	85.0	0.11
DE	75.59	81.32	7.1	247.2	0.03
DK	66.19	69.24	4.4	123.0	0.04
ES	27.68	28.43	2.6	238.7	0.01
FI	44.10	49.20	10.4	69.6	0.15
FR	66.75	74.77	10.7	86.2	0.12
GR	7.00	6.63	-5.5	126.6	-0.04
IE	35.16	40.41	13.0	87.5	0.15
IT	14.86	15.79	5.8	228.7	0.03
LU	67.79	75.50	10.2	62.0	0.16
NL	29.41	32.33	9.0	105.9	0.09
PT	23.20	22.88	-1.4	279.1	-0.01
SE	86.89	94.63	8.2	116.0	0.07
UK	130.31	154.91	15.9	176.1	0.09
NMS					
CY	6.29	5.50	-14.4	234.8	-0.06
CZ	239.14	247.30	3.3	230.0	0.01
EE	102.86	120.18	14.4	184.6	0.08
HU	40.55	50.01	18.9	428.0	0.04
LT	33.87	49.86	32.1	264.7	0.12
LV	53.07	61.67	13.9	238.4	0.06
MT	2.87	2.81	-2.3	94.8	-0.02
PL	15.59	17.19	9.3	307.0	0.03
SI	9.36	11.35	17.6	106.8	0.16
SK	549.08	548.34	-0.1	153.4	0.00

Source: FADN (2005) and own computations.

Table D16: Mean values per farm based on FSS and FADN data for the cereals area in 2005

	[A]	[B]	[C]	[D]	[E]
	Average calculated based on		"Relative difference"	Coefficient of variation based on FADN	Ratio of the relative difference and the coefficient of variation
	FSS	FADN	%	%	
			[1-([A]/[B])		[C]/[D]
EU-15					
AT	9.42	10.61	11.2	141.0	0.08
BE	8.68	9.68	10.3	139.4	0.07
DE	31.15	32.25	3.4	300.8	0.01
DK	37.31	40.05	6.9	141.1	0.05
ES	8.51	9.30	8.5	303.6	0.03
FI	22.96	24.10	4.7	101.3	0.05
FR	22.32	25.89	13.8	138.7	0.10
GR	2.13	2.36	9.9	258.6	0.04
IE	2.43	2.11	-14.9	438.4	-0.03
IT	4.66	5.17	9.9	304.7	0.03
LU	15.01	16.41	8.5	90.4	0.09
NL	3.21	3.13	-2.8	281.1	-0.01
PT	2.38	2.29	-3.9	454.4	-0.01
SE	32.45	35.52	8.6	156.6	0.06
UK	30.33	34.43	11.9	215.3	0.06
NMS					
CY	2.14	1.86	-15.0	466.9	-0.03
CZ	107.43	115.52	7.0	257.4	0.03
EE	39.99	39.46	-1.3	265.8	-0.01
HU	22.67	28.21	19.6	453.2	0.04
LT	15.50	22.68	31.7	320.7	0.10
LV	20.40	21.90	6.8	372.7	0.02
MT	0.00	0.00			
PL	9.16	10.04	8.7	328.1	0.03
SI	2.04	1.83	-11.4	312.0	-0.04
SK	229.41	208.05	-10.3	191.6	-0.05

Source: FADN (2005) and own computations.

Table D17: Mean values per farm based on FSS and FADN data for the wheat area in 2005

	[A]	[B]	[C]	[D]	[E]
	Average calculated based on		"Relative difference"	Coefficient of variation based on FADN	Ratio of the relative difference and the coefficient of variation
	FSS	FADN	%	%	
			[1-([A]/[B])		[C]/[D]
EU-15					
AT	3.54	4.08	13.3	203.8	0.07
BE	5.89	6.44	8.5	168.2	0.05
DE	14.85	15.26	2.7	377.7	0.01
DK	17.00	18.53	8.2	201.3	0.04
ES	2.72	2.37	-14.9	513.4	-0.03
FI	4.53	5.12	11.6	221.9	0.05
FR	13.04	14.96	12.8	163.9	0.08
GR	1.38	1.57	12.4	332.3	0.04
IE	0.80	0.48	-68.0	990.1	-0.07
IT	2.46	2.76	11.1	354.3	0.03
LU	6.39	7.40	13.7	124.0	0.11
NL	2.07	2.16	4.0	344.2	0.01
PT	0.81	0.76	-7.7	668.2	-0.01
SE	11.99	13.41	10.5	240.9	0.04
UK	19.50	23.71	17.7	272.1	0.07
NMS					
CY	0.18	0.33	45.9	621.7	0.07
CZ	55.56	59.89	7.2	269.0	0.03
EE	12.26	11.16	-9.9	349.4	-0.03
HU	9.48	11.73	19.1	526.8	0.04
LT	6.47	9.33	30.7	452.3	0.07
LV	8.53	8.60	0.8	722.6	0.00
MT	0.00	0.00			
PL	2.49	2.84	12.2	583.2	0.02
SI	0.67	0.53	-26.4	451.3	-0.06
SK	107.14	101.88	-5.2	193.6	-0.03

Source: FADN (2005) and own computations.

Table D18: Mean values per farm based on FSS and FADN data for the rape, turnip and sunflower area in 2005

	[A]	[B]	[C]	[D]	[E]
	Average calculated based on		"Relative difference"	Coefficient of variation based on FADN	Ratio of the relative difference and the coefficient of variation
	FSS	FADN	%	%	
			[1-([A]/[B])		[C]/[D]
EU-15					
AT	0.80	1.03	22.0	296.4	0.07
BE	0.16	0.20	20.5	801.5	0.03
DE	6.49	5.50	-18.0	461.1	-0.04
DK	2.86	3.03	5.9	268.4	0.02
ES	0.63	0.76	16.3	841.3	0.02
FI	1.61	2.07	22.2	283.5	0.08
FR	4.60	5.48	16.0	245.6	0.07
GR	0.01	0.01	-21.5	2955.8	-0.01
IE	0.03	0.04	28.6	1756.1	0.02
IT	0.13	0.16	16.2	1205.5	0.01
LU	2.17	2.35	7.5	211.4	0.04
NL	0.04	0.02	-142.3	2162.4	-0.07
PT	0.05	0.04	-21.4	2510.0	-0.01
SE	2.79	3.06	8.9	285.5	0.03
UK	6.10	6.80	10.4	363.7	0.03
NMS					
CY	0.00	0.00			
CZ	21.14	22.72	6.9	304.4	0.02
EE	6.91	6.36	-8.7	389.0	-0.02
HU	5.80	7.27	20.3	540.7	0.04
LT	1.99	3.01	33.9	709.4	0.05
LV	3.20	3.11	-2.9	872.4	0.00
MT	0.00	0.00			
PL	0.71	0.87	18.3	1310.2	0.01
SI	0.05	0.05	4.7	1342.2	0.00
SK	61.26	58.96	-3.9	219.2	-0.02

Source: FADN (2005) and own computations.

Table D19: Mean values per farm based on FSS and FADN data for the number of dairy cows in 2005

	[A]	[B]	[C]	[D]	[E]
	Average calculated based on		"Relative difference"	Coefficient of variation based on FADN	Ratio of the relative difference and the coefficient of variation
	FSS	FADN	%	%	
			[1-([A]/[B])		[C]/[D]
EU-15					
AT	6.55	7.38	11.2	132.3	0.08
BE	15.73	14.94	-5.3	152.5	-0.03
DE	20.42	20.99	2.7	255.5	0.01
DK	14.33	14.99	4.4	286.3	0.02
ES	1.21	1.56	22.6	625.8	0.04
FI	7.11	8.33	14.6	177.2	0.08
FR	9.72	11.25	13.6	186.3	0.07
GR	0.31	0.20	-57.8	1598.7	-0.04
IE	9.35	9.56	2.2	241.1	0.01
IT	2.46	2.59	5.1	820.5	0.01
LU	21.38	22.38	4.5	108.1	0.04
NL	22.72	24.81	8.4	162.8	0.05
PT	2.02	1.94	-3.8	446.4	-0.01
SE	13.59	13.59	-0.1	247.9	0.00
UK	21.84	22.14	1.3	240.2	0.01
NMS					
CY	1.17	0.60	-97.0	1383.8	-0.07
CZ	30.39	34.39	11.6	344.0	0.03
EE	16.01	14.19	-12.8	407.9	-0.03
HU	2.96	2.71	-9.3	1463.0	-0.01
LT	5.46	5.83	6.2	400.3	0.02
LV	6.37	6.70	5.0	360.4	0.01
MT	4.72	4.84	2.6	404.6	0.01
PL	3.37	3.52	4.4	264.5	0.02
SI	3.19	3.15	-1.4	240.2	-0.01
SK	55.33	55.65	0.6	240.2	0.00

Source: FADN (2005) and own computations.

Table D20: Mean values per farm based on FSS and FADN data for the number of fattening pigs in 2005

	[A]	[B]	[C]	[D]	[E]
	Average calculated based on		"Relative difference"	Coefficient of variation based on FADN	Ratio of the relative difference and the coefficient of variation
	FSS	FADN	%	%	
			[1-([A]/[B])		[C]/[D]
EU-15					
AT	26.42	21.90	-20.6	335.1	-0.06
BE	116.80	122.27	4.5	275.0	0.02
DE	82.80	80.64	-2.7	337.7	-0.01
DK	201.68	175.47	-14.9	294.9	-0.05
ES	16.06	15.15	-6.0	1186.3	-0.01
FI	17.24	18.10	4.8	601.4	0.01
FR	20.29	27.47	26.1	685.1	0.04
GR	0.96	0.12	-673.9	4358.5	-0.15
IE	8.67	3.74	-131.4	1776.0	-0.07
IT	8.33	8.80	5.3	2374.0	0.00
LU	25.68	29.83	13.9	795.0	0.02
NL	88.21	94.71	6.9	440.7	0.02
PT	6.93	5.97	-16.2	2089.7	-0.01
SE	37.50	46.71	19.7	509.4	0.04
UK	30.88	35.23	12.3	842.6	0.01
NMS					
CY	11.46	7.06	-62.4	1718.3	-0.04
CZ	118.37	102.04	-16.0	737.6	-0.02
EE	27.97	30.18	7.3	1396.2	0.01
HU	21.57	19.17	-12.5	1826.0	-0.01
LT	10.69	7.92	-34.9	1061.1	-0.03
LV	11.73	10.78	-8.8	1741.4	-0.01
MT	22.39	32.71	31.5	593.6	0.05
PL	12.69	13.02	2.5	943.0	0.00
SI	6.55	4.98	-31.7	672.4	-0.05
SK	159.31	86.03	-85.2	400.8	-0.21

Source: FADN (2005) and own computations.

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