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# Analysing behavioural differences of farm households: An example of income diversification strategies based on European farm survey data

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ABSTRACT

Different forms of income diversification represent important strategies of farmers to either cope with the changing economic framework conditions or to valorise given territorial potentialities. Nevertheless, the decision to diversify economic activities on or off the farm will heavily depend on the agricultural business and household characteristics. Our study used a survey of 2154 farms from eleven European regions to identify distinct farm types in order to investigate differences regarding the willingness to diversify in the future. Two scenario situations with continuation (baseline) and without any market intervention ("No CAP") were tested. A factor and cluster analysis depicted six farm types both previously described and novel. The typology proved validity across all case studies, whereas single types occurred more frequently under specific site conditions. The six farm types showed strong variations in the stated future diversification behaviour. Young farm households with organic production are most likely to diversify activities particularly on-farm, whereas farm types characterised by intensive livestock holding and also already diversified and part-time farm households are least likely to apply this strategy. Results have further shown that under hypothetical conditions of termination of economic support by the Common Agricultural Policy (CAP) an increasing share of farmers – throughout all types – would apply income diversification, mainly off-farm diversification, as a survival strategy.



## 1. Introduction

Among other strategies, such as intensification and specialisation, diversification as an extension of on-farm and off-farm business activities represents an important adaptation strategy to cope with market pressures and changing political framework conditions, and to reduce economic risk. Pluriactivity is a widely-used concept that includes all agricultural or non-agricultural income generating activities of farm households (Præstholm and Kristensen, 2007; Robinson, 2013). In this paper, we exclusively focus on diversification of the income basis into non-agricultural activities. According to Bowler (1992) this represents a distinct farm development path. We subdivide this path by location of the respective activity and define on-farm diversification as any business activity on the farm holding different from crop or livestock production and refer to off-farm (self-) employment of any farm household member as off-farm diversification. Particularly small-scale and family farms tend to broaden their off-farm income basis by employing additional family labour (Gasson et al., 1988; Maye et al., 2009; McNamara and Weiss, 2005; Meert et al., 2005). On-farm diversification includes agricultural services or access to new markets, like tourism or direct marketing (Ilbery et al., 1997; Piorr et al., 2007; Præstholm and Kristensen, 2007).

The regional and institutional environment in which farms are embedded affects decision-making for on and off-farm diversification. A number of studies have provided evidence for the role of regional labour market conditions for off-farm employment (McNamara and Weiss, 2005), and for the access to (urban) consumer markets or the prevalence of natural amenities especially to adopt on-farm diversification strategies (Lange et al., 2013; Meraner et al., 2015; Pascucci et al., 2011; Zasada et al., 2013;

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Zasada and Piorr, 2015). The support measures of the European Common Agricultural Policy (CAP) also frame farmers' diversification strategies. First pillar payments, now mostly decoupled from production, represent direct income support. The Rural Development Programmes (RDP) included in the second pillar are focused on specific objectives. Some of them are explicitly aimed at income diversification, often at the boundary between agriculture and non-agricultural activities. Other measures provide support to investment, including, in some cases, non-agricultural activities.

The decisions for on and off-farm diversification have been studied on the theoretical basis of agricultural household models of optimal labour allocation in which households maximise their utility over consumption and leisure time subject to time and budget constraints, formally derived for example in Loughrey et al. (2013). Main motives introduced in these models have been efficiency by allocating work according to a comparison of marginal returns from farming with off-farm wages (Huffman, 1980) and stabilization of income variability associated with farming by compensating risk with off-farm work (Mishra and Goodwin, 1997) or increasing the number of different farm enterprises (McNamara and Weiss, 2005). These models as well as empirical applications show that the optimal allocation depends on household and farm business characteristics, including intrinsic perceptions, attitudes and value settings, the socio-demographic farm household characteristics, economic business structure, ownership or local labour market conditions (Barbieri and Mahoney, 2009; García-Arias et al., 2015; Hansson et al., 2013; McNamara and Weiss, 2005; Sharpley and Vass, 2006).

In the framework of the agricultural household model, decoupled payments influence the labour allocation decision by providing a non-labour source of income (wealth effect) and more freedom for the use of labour resources (substitution effect) (Loughrey et al., 2013) or by reducing income variability (Hennessy and Rehman, 2008; Mishra and Goodwin, 1997). Considering that farmers are in general rather risk adverse, the higher the risk-free support payments, the more farmers are likely to take riskier business decisions on-farm (Hennessy, 1998). Overall, the wealth effect appears less relevant than the risk reduction effect in assessing the effects of the CAP (Moro and Sckokai, 2013). Most studies have focused on single farm payments although second pillar payments might have more direct effects due to their targeted nature. As one example, evaluating first and second pillar CAP payments based on a theoretical partial labour adjustment model, Petrick and Zier (2012) found positive on-farm employment effects for investment aids to farmers. Comprehensive studies on the overall impact of the CAP are rare, and the effects even less straightforward to interpret due to the interplay of different CAP components. Considering the effects of the CAP in different French regions, Latruffe et al. (2013) found that having it in place reduces the propensity to diversify off-farm although the effect varies across different farming systems.

Considering the theoretically and empirically established drivers of income diversification decisions, an increasing number of diversification pathways can be expected with increasing diversity of the investigated farm population. Moro and Sckokai (2013) claim that in order to use results for policy adjustments individual farm-level responses need to be coherently aggregated. To differentiate driving effects, the use of farm types as a consolidated model is particularly helpful for representing this diversity of the farming community (Huynh et al., 2014; Præstholm and Kristensen, 2007; Schwarz et al., 2009).

Farm typologies generally aim to enhance understanding about decision-making behaviours and strategic development trajectories of individual farm households and holdings. Examples include the elaboration of farm-type specific development pathways (Iraizoz et al., 2007) or land and resource use behaviour (Kurz, 2008; Schwarz et al., 2009). In the field of income diversification, several typologies have been developed in the past, for instance to identify (potential) initiators or adopters of alternative farm enterprises (Daskalopoulou and Petrou, 2002; Præstholm and Kristensen, 2007) or to depict differences in the willingness to diversify (Chaplin et al., 2004; Lange et al., 2013; López-i-Gelats et al., 2011). However, empirical evidence is often restricted to specific regional contexts and farming communities for which the study has been conducted. Explanatory value for decision-making behaviour beyond the regional context is limited in much the same way as the rare knowledge of inter-regional distribution of farm types and their responsiveness to changes in the policy framework. Especially for agricultural policies such as the CAP, a wider perspective which takes the diversity of farming communities into account is required to improve targeting of addressees and financial cost-effectiveness (Pacini et al., 2015).

As any other classification effort, farm typologies aim at maximisation of heterogeneity between and homogeneity within individual types (Köbrich et al., 2003). Therefore either qualitative assignments, e.g. through self-perception or behavioural studies (van der Ploeg and Marsden, 2009), or statistical clustering methods using farm household and business structure characteristics (Bidogeza et al., 2009; Landais, 1998) are applied in order to differentiate farm types and their behaviour. Cluster analysis often used in combination with factor analysis is an explorative structure-seeking method to detect patterns in a population based on a predefined statistical measure of distance (Aldenderfer and Blashfield, 1984) and thus has a relatively high objectivity assigning farms to types compared to other assignment measures. However, many empirical applications do not critically derive the choice of cluster building components such as fusion algorithms or distance measures dependent on the data format. This means that results are in danger to impose a certain structure rather than to reveal one (Dolnicar, 2002).

The main research objective of this paper is to contribute to an enhanced understanding of the willingness of farmers to employ diversification on and off the farm. In contrast to many regionally defined studies, our ambition is to analyse future farm behaviour based on empirical data from a large sample covering a variety of case study regions and farms across the European Union. To analyse behavioural differences between farms and acknowledge their diversity, we aim at identifying different farm types based on their household and business structure using a quantitative modelling approach of factor and cluster analysis. We expect to find distinct diversification pathways across types. Relevant factors describing these farm types are depicted as well as their distribution across the case study regions. To additionally account for the relevance of the policy setting for the analysis of future diversification strategies, we are interested in the influence of the CAP as a whole, including single farm payments and rural development measures. Therefore, we investigate the variation between different scenario settings, including the assumption of abolishment of any financial support, in order to identify farm type related benchmark reactions to policy shocks. We explicitly take into account potential shortcomings arising from inadequate use of standard factor and cluster method by focusing on the selection and connection of methods that address mixed-variable datasets. Methodology is explained in detail in Section 2. Section 3 presents the results from an analytical and a thematic perspective, pointing to the regional distribution and decision behaviour. The following discussion takes up these aspects and contextualizes them with the literature and the policy dimension. Finally, we conclude on how our results add to an improved understanding of farmers' diversification behaviours across diverse regional settings.

## 2. Data and methodology

### 2.1. Case study regions and structure of the dataset

The data used for analysis are derived from an extensive questionnaire based survey of farm households in eleven case study regions in nine European countries, which was carried out within the European research project CAP-IRE in the year 2009. The stratification of the regional samples is described in Viaggi et al. (2013) and information on ways of interviews and regional response rates can be find in Viaggi (2011). In total, the dataset encompasses 2363 responses. Due to missing values the dataset had to be reduced to 2154 responses to generate the farm typology.

Fig. 1 gives an overview and a brief description of the included regions, which cover a broad variety of geographical and agricultural structure settings. Varying unemployment rates and GDP p.c. across regions reflect the capacity of the local labour markets to absorb demand for off-farm employment. Disposable household income serves as a proxy indicator for regional demand for diversification outputs produced by the farms. Policy preferences for rural development including on-farm diversification, as well as the uptake of support by the farms, are reflected by the intensity of regional RDP spending. All data are provided around the survey year 2009 to describe the decision situation faced by farmers.

Along with information on social characteristics of the households as well as structural, organizational and economic information on their farm business, farmers were also asked about various aspects of their future behaviour, including diversification strategies under two policy scenario settings: (1) a baseline situation with a continuation of the European Common Agricultural Policy (CAP) and (2) a "No CAP" scenario with termination of the financial support. Under the baseline scenario, respondents should imagine that all CAP subsidies including single farm payments, RDP, and milk quota stay constant, whereas the "No CAP" scenario referred to the hypothetical situation that all these measures would be abolished from 2014 onwards. In order to construct an income diversification strategy variable that refers to our defined on and off-farm diversification paths, we distinguished whether a farm household (i) decide to neither increase current levels of both on and off-farm diversification or even reduce them, (ii) and (iii) choose to increase only one type, or (iv) increase both (see Table 1).

For the scenario questions, farmers had the option to state that they plan to quit farming in the future and therefore did not have to answer all subsequent strategy questions. Under the baseline scenario, 363 farm households planned to leave the farming business, whereas under the "No CAP" scenario this number increased to 951. Those farms were excluded from the later analysis on different income diversification strategy choices.

### 2.2. Statistical modelling

The typology was generated using a joint factor and cluster analysis similar to those in the studies of Bidogeza et al. (2009); Daskalopoulou and Petrou (2002); Köbrich et al. (2003);

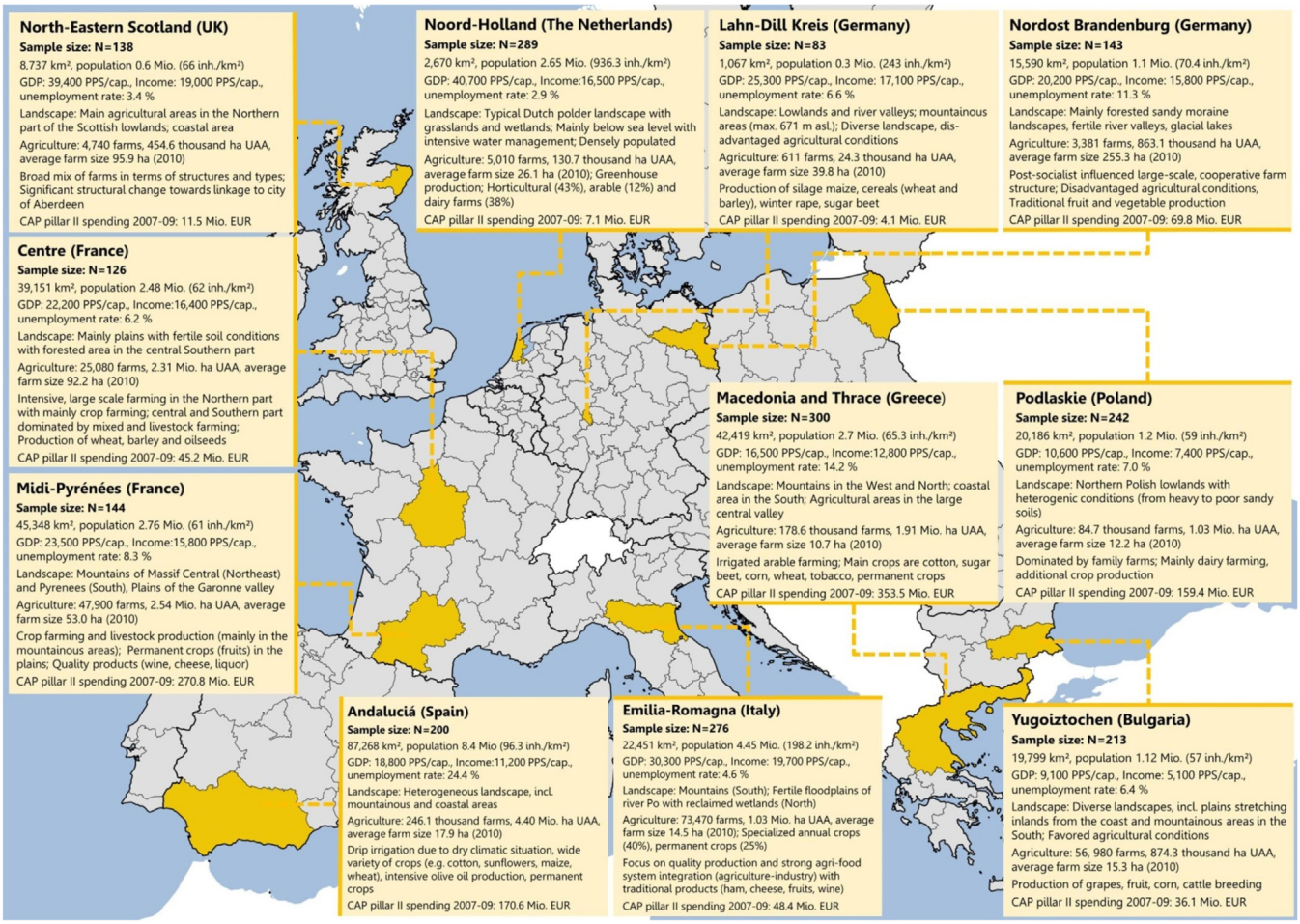


**Fig. 1.** Spatial distribution and description of the eleven case study regions, including socio-economic context, landscape and agricultural structure and Rural Development spending. Sources: EUROSTAT 2016 for population, GDP, disposable income and unemployment rate; Clearance of Audit Trail System (CATS) Database for regional CAP spending: Own representation.

**Table 1**
Four types of diversification choices derived from survey questions.

| | | *Question*: Activities different from farming and animal rearing will be... | |
|---|---|---|---|
| | | ... not changed/decreased | ... increased |
| *Question:* Household labour used in off-farm activities will be... | ... not changed/decreased | (i) No diversification | (ii) On-farm diversification |
| | ... increased | (iii) Off-farm diversification | (iv) Both diversification strategies |

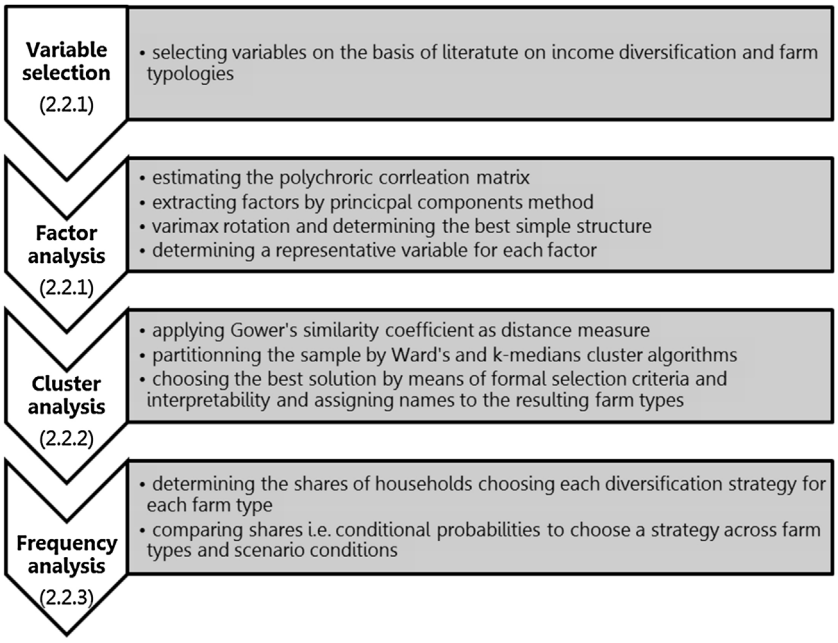


**Fig. 2.** Overview of statistical modelling.

Source: own representation.

Moreno-Pérez et al. (2011); Schwarz et al. (2009). However, the methodology was modified in order to meet the specific challenges of a mixed-variable dataset containing binary, ordinary and metric variables for which standard methods of factor and cluster analysis deliver distorted results (Backhaus et al., 2011; Kolenikov and Ángeles, 2004) due to lacking normal distribution and non-metric scaling. Therefore, the statistical analysis is explained step by step. Fig. 2 gives an overview on the methodological procedure, which is explained in detail in the following subsections.

### 2.2.1. *Variable selection and factor analysis*

Variable selection was based on research findings on farm typologies and income diversification from the literature. Special attention was paid to the final purpose of the typology that is to identify distinct behavioural patterns regarding the propensities to change the income structure of the farm household.

In order to prepare the data for a cluster analysis, factor analysis was applied to the selected variables because it reveals the structure of the variables in the dataset and reduces the number of variables to a set of uncorrelated underlying latent variables called factors. Also we intended to avoid implicitly overweighting certain characteristics which are represented by several variables (Dolnicar, 2002). Factors were extracted from the correlation matrix using the principal components method. In standard applications, the Pearson correlation matrix is used. Our data, however, encompassed a large number of non-metric and non-normally distributed variables for which the Pearson correlation coefficient would be distorted (Kolenikov and Ángeles, 2004). Therefore, polychoric correlation coefficients were estimated that treat ordinal and binary variables as coming from latent bivariate normally distributed metric variables. These variables are only observed in a polychotomised form. The observed categories of a variable imply that the latent variable crosses a certain threshold level. When variables are independent and identically distributed, the correlation coefficient between the latent variables can consequently be estimated by maximizing the likelihood function over the correlation coefficient and the thresholds. A detailed derivation is provided in Kolenikov and Ángeles (2004). The result is an estimate of the Pearson correlation coefficient of the latent variables (Juras and Pasaric, 2006). We transformed some variables by either narrowing the ranges for discrete variables when extreme ranges were occupied by very few households or using logarithmic transformations for metric variables that have many small values and few big outliers as indicated in Table 2. Transformations made the normality assumption more plausible.

In order to select the best factor solution, i.e. the most appropriate number of factors, the factors were rotated using orthogonal varimax rotation (Everitt and Dunn, 2001, p.278f.), which led in convincing cases to a simple structure. In a simple structure solution, each variable loads high on only one factor and has low loadings regarding all other factors. This structure improves the comprehensibility of the solution where factors can be meaningfully interpreted using the variables which highly load on them. For each factor, an appropriate representative variable, usually the one with the highest loading was chosen as an input into the subsequent cluster analysis.

### 2.2.2. *Cluster analysis*

To perform a cluster analysis, an adequate measure of similarity between observations, an appropriate fusion algorithm, and the most convincing partition of the sample (i.e. the number of clusters that represent the farm types) need to be chosen. Aldenderfer

**Table 2**
Descriptive statistics of the variables included in the factor analysis.

| Variable | N | Min | Max | Mean | StDev. |
|---|---|---|---|---|---|
| *Social and demographic household characteristics* | | | | | |
| Household size | 2356 | 1 | 12 | 3.5 | 1.43 |
| Number of children (<18 years) living in household[f] | 2345 | 0 | 6 | 0.7 | 1.02 |
| Number of old people (>65 years) living in household[f] | 2342 | 0 | 5 | 0.5 | 0.75 |
| Members working full-time on farm[f] | 2345 | 0 | 9 | 1.2 | 0.80 |
| Members working on farm (total)[f] | 2337 | 0 | 9 | 1.9 | 1.05 |
| Highest educational level in household | 2346 | 1 | 6[b] | 3.6 | 1.13 |
| *Income* | | | | | |
| Income share from agricultural production | 2290 | 1 | 6[c] | 4.25 | 1.76 |
| *Characteristics of the agricultural holding* | | | | | |
| Land owned (in ha)[g] | 2333 | 0 | 5000 | 45.9 | 163.96 |
| Land operated (in ha)[g] | 2304 | 0 | 7500 | 93.4 | 300.20 |
| Specialisation in cropping[a] | 2363 | 0 | 1 | 0.41 | 0.49 |
| Specialisation in livestock[a] | 2363 | 0 | 1 | 0.28 | 0.45 |
| Organic farming activities[a] | 2363 | 0 | 1 | 0.11 | 0.31 |
| *Farm structure and organization* | | | | | |
| Number of employees (all)[g] | 2302 | 0 | 104 | 2.1 | 6.60 |
| Number of full-time employees[g] | 2312 | 0 | 40 | 0.7 | 2.51 |
| Sole proprietorship[a] | 2363 | 0 | 1 | 0.72 | 0.45 |
| Participation in agri-environmental scheme[a] | 2324 | 0 | 1 | 0.26 | 0.44 |
| Use of farm advisory service[a] | 2348 | 0 | 1 | 0.57 | 0.49 |
| *Specific variables regarding income diversification* | | | | | |
| Labour share for on-farm diversification | 2276 | 0 | 6[c] | 0.4 | 1.05 |
| Direct sale to final consumer[a] | 2331 | 0 | 1 | 0.12 | 0.33 |
| Less-favoured area | 2359 | 0 | 2[d] | 0.98 | 0.95 |
| Altitude | 2358 | 1 | 3[e] | 1.5 | 0.65 |

[a] Dummy variables, coded 0 and 1; 0 equals "no" and 1 equals "yes".
[b] coding: 1 "none and primary", 2 "lower secondary education", 3 "upper secondary education", 4 "post-secondary non-tertiary education", 5 "first stage of tertiary education", 6 "second stage of tertiary education".
[c] coding: 1 "<10%", 2 "10%–20%", 3 "30%–49%", 4 "50%–69%", 5 "70%–89%", 6 ">89%". For labour share on-farm diversification 0 means "no on-farm diversification".
[d] coding: 0 "not", 1 "partly", 2 "completely".
[e] coding: 1 "lowland", 2 "hill", 3 "mountain".
[f] Range adjusted for factor analysis.
[g] Used in logarithms for factor analysis.

and Blashfield (1984) suggest the application of the Gower similarity coefficient due to its flexibility, because it allows combination of different types of data into a single measure. The Gower coefficient (Gower, 1971) determines the similarity for two objects $i$ and $j$ with respect to a variable $k$ with a similarity score $s_{ijk}$that is defined on a scale between zero and one. A value of one means that the objects are identical regarding $k$ and zero means that they are maximally dissimilar. For binary variables, $s_{ijk}$is equal to one when the categories are the same and zero when they differ. In the case of ordinal or quantitative variables, $s_{ijk}$is calculated as $s_{ijk} = 1 - \left(|x_i - x_j|/R_k\right)$ with $R_k$ being the range of the variable $k$ in the sample. The overall similarity coefficient is then just the average of all similarity scores$s_{ijk}$. Gower (1971) provides details on the calculation. Clustering was performed by combining hierarchical and partitioning fusion algorithms. Single linkage clustering revealed that no outliers existed. Then Ward's clustering method was applied. This always merges the observation to a cluster that leads to the minimal increase of the sum of squared deviations from the cluster centroids over all clusters (Backhaus et al., 2011, p. 389 ff.). The Ward solution was further optimized by k-medians clustering that allowed us to reduce the sum of squared deviations further by switching observations between clusters (Bacher et al., 2010, p.345 ff.). The median in the cluster is thereby used as centroid.

To determine the optimal number of clusters, i.e. farm types, formal criteria were used to select promising solutions. Among the formal criteria, we checked the Calinski-Harabasz pseudo-F-index and the Duda-Hart Je(2)/Je(1)-index which were found to be the two best-performing indices among thirty single value decision criteria in simulation studies (Milligan and Cooper, 1985). Further, the proportional reduction of error (PRE) when choosing more clusters (Bacher et al., 2010, p. 307 ff.) and the dendrogramm, which depicts the fusion process graphically, were considered. The candidate solutions identified were then investigated by means of their interpretability and stability. The crucial criterion in arguing that a farm type was identified is that clusters can then be meaningfully interpreted and named according to their most important and distinguishing characteristics (Bacher et al., 2010, p.348 f.).

#### 2.2.3. Frequency analysis

The decision patterns of farm types regarding future income diversification strategies are depicted in relative frequencies which are the respective shares of farm households of each farm type that choose one of the four strategy options. The basis for investigation consisted of all households that stated they would continue the farming activity and had a valid answer for the strategy variable. The share of farms in a type for a strategy option Y can also be interpreted as the probability of a farm choosing Y with Y [1; 4] conditional on the farm type X. We therefore compare differences in the conditional probability P(Y|X). Relative frequencies for all strategy options of income diversification can be compared across types and scenarios.

## 3. Results

### 3.1. Preparatory outcomes

#### 3.1.1. Variable selection

We selected 21 relevant variables for the farm typology. They can be assigned to five blocks: socio-demographic characteristics of the household, income, characteristics of the agricultural holding, farm organisation and structure, and specific variables for income

**Table 3**
Extracted factors and representative variables.

| Factor Name | Representative (loadings in brackets) | Other variables with high (>\|0.5\|) loadings (loadings in brackets) |
|---|---|---|
| F1: Land | Land owned (0.846) | Land operated (0.836)<br>Sole proprietorship (−0.561)<br>Agri-environmental scheme (0.504) |
| F2: Household work on farm | Full-time household workers (0.897) | All household workers (0.813)<br>Income share from agriculture (0.703) |
| F3: Specialisation | Specialisation in livestock (0.976) | Specialisation in cropping (−0.927) |
| F4: Employees | Full-time employees (0.910) | Employees (0.877) |
| F5: Location | Less-favoured area (0.841) | Altitude (0.865) |
| F6: Household size | Number of children (0.932) | Household size (0.833) |
| F7: On-farm diversification | Labour share on-farm diversification (0.890) | Direct sale to final consumer (0.521) |
| F8: Organic | Organic farming (0.939) | Agri-environmental scheme (0.501) |
| F9: Retirement | Number of old people (0.901) | – |
| F10: Education | Highest educational level (0.925) | – |
| F11: Advisory service | Farm advisory service (0.902) | – |

diversification. This last block contains the labour share farm households dedicate to on-farm diversification activities. Activities such as contract work, food processing and manufacturing, retailing, and recreational services belong to this category except direct sale of products which was covered in a separate question and is thus included as a separate variable. Location specific variables were included as farms situated in LFAs were found to be more attractive for rural tourism (McNally, 2001) and farms in remote areas might often be forced to engage in diversification due to lacking market access (Lange et al., 2013) which is reflected by the altitude indicator. An overview of all variables including descriptive statistics is provided in Table 2.

### 3.1.2. Factor analysis

The number of variables could be reduced to eleven factors, explaining 86% of the total variance in the data. The reduction of information is thus small. The lowest communality, i.e. explained variance of a single variable by the factors, is 0.78. Hence, the content of all variables is fairly represented. Factors and representatives are displayed with assigned names in Table 3.

## 3.2. Farm typology

### 3.2.1. Description of farm types

The cluster analysis revealed the presence of six clusters in the sample. They differ in many relevant characteristics. Fig. 3a-d displays characteristics which particularly well illustrate farm type differences. They include family composition and size (Fig. 3a), household labour deployed on the farm business (Fig. 3b), specialisation (Fig. 3c), and the income share from primary agricultural production (Fig. 3d). These differences are used for the following description of farm types which is extended by other characteristics if it enhances interpretation. Detailed values concerning all variables included in the analysis across clusters are provided in the Appendix A. Analysis of variance tests confirmed that variable mean vectors differ across clusters.

Type 1 *"Diversified small farm households"* represents comparably small households. 35% of the households have fewer than two members. The households are rather old, indicated by a low share of households with children (36%), accompanied by an identical share of households with old people. The holdings are either mixed (45%) or crop farms (55%). They have the lowest share of households generating over 90% of their income from agricultural production (25%). In 21% of the holdings, no member is working full-time. 20% of the household are engaged in on-farm diversification activities. However, this is similar for most other types. Taken together, farms of this type are likely to use other income sources already to a substantial extent and can be termed diversified. This is the second biggest type, representing 540 farm households.

Type 2 *"Young organic farm households"* consists of only 12% households with less than two members. The share of old people is lowest (25%) and the share of households with children is with 70% the highest. Household labour resources deployed on-farm are relatively high (for 46% at least two members). Nevertheless, the income share from agriculture (40% generate over 90% of income from agriculture) is not as high as for type 6 thus there are some diversification activities present. Specific for this type is that all households are engaged in organic production and almost half of them participate in an agri-environmental scheme. A quarter of them sell products directly to the final consumer. More than half of the households hire additional employees. The type is the rarest, only representing 138 farms in the sample.

Type 3 *"LFA-adapted mixed farms"* represents mainly mixed farms (59%). It consists of rather young and average-sized households (42% with children, 26% with old people, 27% small). In terms of household labour and the rather high income share from agriculture, the type is similar to type 2. The characteristics that set this farm type apart is that households have the best education (most frequent category is "first stage of tertiary education") and that they lie to a large extent in less-favoured areas (88%). 23% are situated in mountainous areas. Education might enable a rather good adaption to less-favourable external conditions. Households additionally hire 3.4 employees on average which are comparably many. On the other hand, a reason for the presence of highly educated household members would be that other employment opportunities are not available due to the external situation. 328 farm households belong to this type.

Type 4 *"Traditional part-time crop farms"* consists mainly of crop specialist farms (69%). The share of households with children is the smallest (31%). Household labour deployed on the farm full-time is rather low (for 70% less than two members). Compared to the other types, on-farm income diversification is rarely present (10%). Households seem to favour off-farm diversification. The farm type thus might be considered as rather traditional and less innovative. Employment figures are similar high as for type 3 which might be driven by using seasonal short-term work in times when a lot of labour is needed. Households mainly lie outside less-favoured areas (94%). It is the most frequent type with 586 farm households in the present sample.

Type 5 *"Small-scale livestock specialists"*, consisting exclusively of livestock farms, is characterised by small households with 34% of households consisting of a maximum of two members. Income shares from agriculture are around average (35% generate over 90% of income from agriculture). The number of household members working full-time on the farm is comparably low (for 68% less than two members). In terms of land, it is the smaller (median 26 ha) of the two livestock types. Employment figures of hired workers are

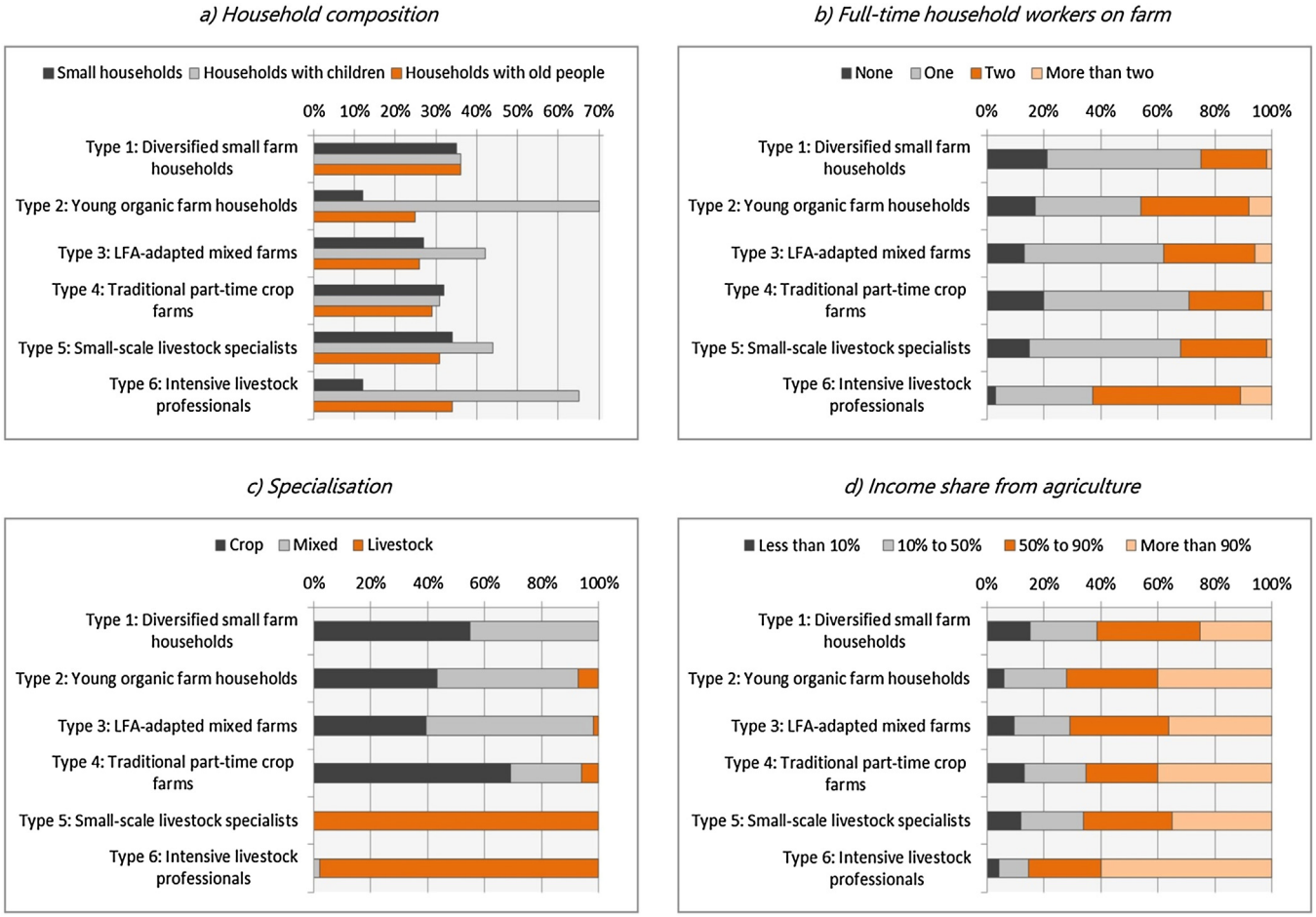


**Fig. 3.** a–d Cluster characterisation by important cluster representatives.

Source: own calculations.

the lowest among all types (mean 0.6 employees, 0.3 full-time). On-farm diversification activities are the highest, with 23% of the included farms. When on-farm diversification is present, the labour share devoted to it is the highest (24% of households use over 50% of their labour force) but identical to type 4. 329 households in the sample can be collected under this description.

Type 6 *"Intensive livestock professionals"* encompasses the other type of livestock specialists (98%). Households are big (only 12% are small). Two thirds have children. The type accounts for the most intensive agricultural production of all farm types. In 60% of the household at least two members work full-time on the farm. 60% of the holdings generate over 90% of their income through primary agricultural production. Almost three quarters of holdings lie in less-favoured areas. 34% of the farms participate in an agri-environmental scheme. When on-farm diversification activities exist, the labour share devoted to them is the lowest among all farm types (6% use over 50% of labour force). It is the second smallest type, describing 233 farm households in the sample.

### 3.2.2. Regional distribution of farm types

With few exceptions all farm types are represented in each case study area. This supports the hypothesis that agriculture in Europe is diverse within each region and farm types are not restricted by regional boundaries. However, regional tendencies of higher or lower abundance exist as shown in Fig. 4.

The share of traditional part-time crop farms is high in the southern European regions Emilia-Romagna, Macedonia and Thrace, Centre and Andalusia. More than half of the farms in Noord-Holland belong to small-scale livestock specialists followed by Podlaskie and the German Lahn-Dill Kreis. Podlaskie also encompasses the highest relative occurrence of the intensive livestock professionals, who are additionally quite frequently present in Midi-Pyrénées. Young organic farm households can be found especially in Macedonia and Thrace, followed with lower shares in the two German case studies. LFA-adapted mixed farms are frequently present in Macedonia and Thrace and Midi-Pyrénées. Diversified small farm households dominate the German regions and have a high share in North-Eastern Scotland.

### 3.3. Income diversification decision-making behaviour

Looking at the baseline scenario decisions, in general, a minority of farms opt to increase income diversification in the future. The discussion here exclusively focuses on those farm households that chose to continue their farming business. The questions arise why farms rarely choose income diversification and whether the actual level of income diversification is already too pronounced to leave space for further action. However, results clearly indicate unused potential regarding on-farm income diversification across all types because a maximum of 23% of households state that they are currently engaged in such activities. Almost all farm types show a clear preference towards increasing future on-farm diversification over the other two alternatives. Nonetheless, in line with results from theoretical farm household models and their empiri-

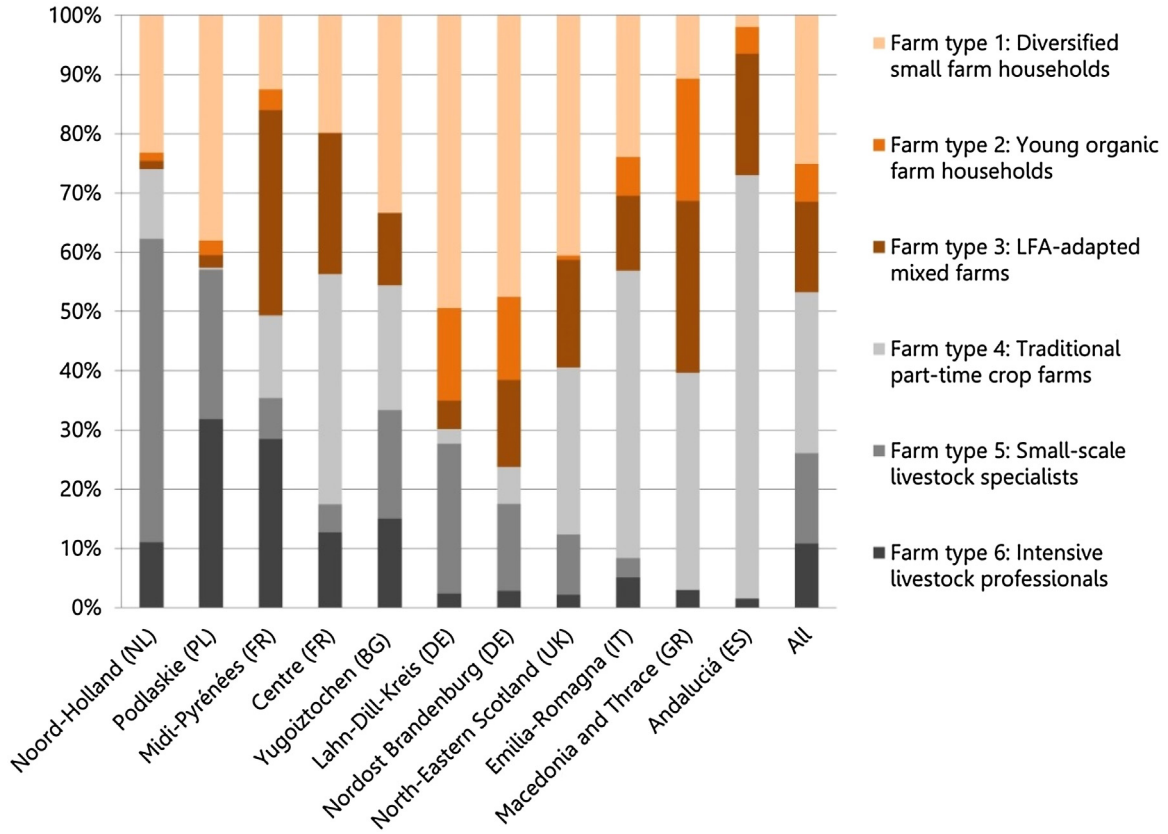


**Fig. 4.** Regional distribution of farm types.

Source: Own calculations.

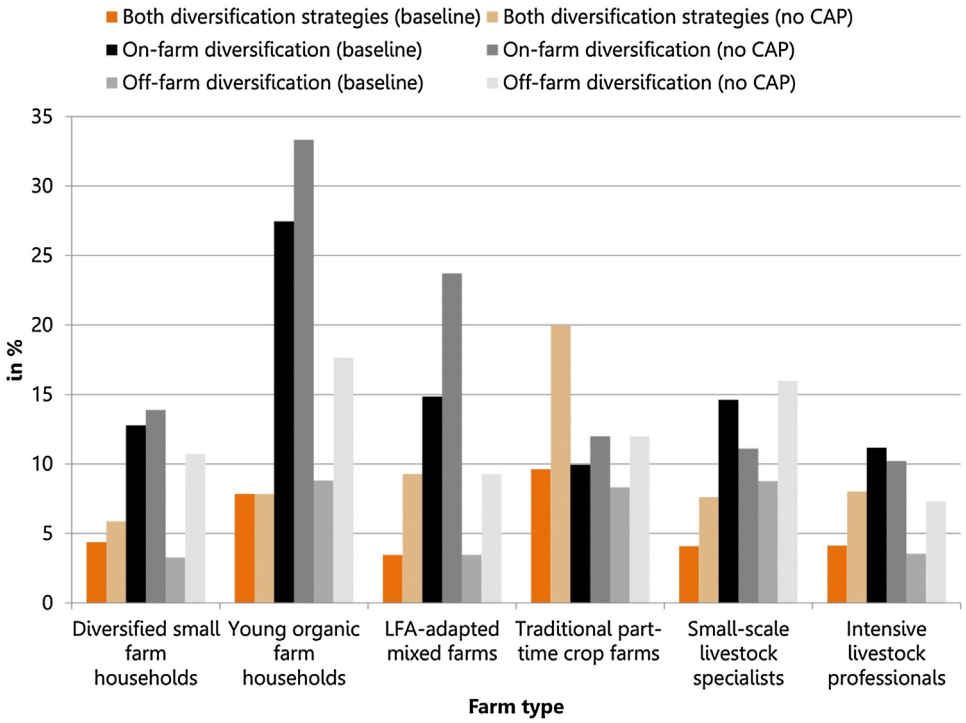


**Fig. 5.** Willingness to increase diversification activities (on-farm, off-farm, both) per farm type under two scenario conditions for farm households that continue farming. Note: No diversification under baseline/no CAP scenario: pluriactive small farm households = 80%/70%; young organic farm households = 56%/41%; LFA-adapted mixed farms = 78%/58%; traditional part-time crop farms = 72%/56%; small-scale livestock specialists = 73%/65%; intensive livestock professionals = 81%/74%.

Source: own calculations.

cal applications, the diversification behaviour of farm types differs substantially. The propensities for the diversification options across farm types, i.e. shares of farms choosing a certain strategy, are depicted in Fig. 5 and are described in the next subsection.

#### 3.3.1. Farm-type differences

The diversification leaders are the young organic farm households. 44% plan to diversify under the baseline scenario and more than half of them choose on-farm diversification. Closest to the young organic farm households, and thus also relatively likely to choose on-farm diversification, come the LFA-adapted mixed farms and the small-scale livestock specialists. The latter have the highest present level of on-farm diversification activities. The traditional part-time crop farms are an interesting case, showing the highest share of households choosing simultaneously both diversification strategies of all types (10%). Except for the traditional part-time crop farms, the tendency to opt for both diversification strategies is low across all other types. Only the young organic farm households have a probability of over 5%. Off-farm diversification never crosses 10% for any type. Across farm types, it is rather likely for the young organic farm households, the traditional part-time crop farms and the small-scale livestock specialists. Off-farm diversification is hardly chosen among the diversified small farm households or the LFA-adapted mixed farms.

The least likely to diversify are the intensive livestock professionals (overall 19%) although their family structure is quite similar to the young organic farm households. Their behaviour, however, is in line with their intensive production structure represented by a high income shares from primary agriculture. Their behaviour differs extensively from the other livestock type which is at third place regarding diversification (overall 27%). Like the intensive livestock professionals, the diversified small farm households are similarly unlikely to diversify.

#### 3.3.2. Scenario differences

So far, farm-type behaviour was only discussed under the baseline scenario that closely matches the new CAP horizon after 2014. The "No CAP" scenario, although unrealistic, represents an important benchmark case for investigating the maximal magnitude of reduced subsidies. One result of this scenario is, as mentioned in Section 2, that the number of farms that choose to stop farming increases. However, the more striking fact is that diversification is a response to an abolishment of CAP subsidies across all farm types as shown by the behaviour of those households that would not quit farming. Propensities to choose an income diversification strategy rise. The conditional probabilities to diversify across farm types can again be compared in Fig. 5.

Again, the response behaviour is distinct across the farm types. For the first time, there is a farm type, the young organic farm households, for which the majority of all farm households opts for income diversification. The lowest propensity to diversify is observed again for the intensive livestock professionals with 26% compared to 19% under the baseline scenario. A second important notion is that across all farm types the probability to increase off-farm diversification increases substantially. Except for the traditional part-time crop farms, shares at least double. Therefore, the abolishment of the CAP seems to increase the pressure on the labour market driven not only by exit but also by diversification decisions. Strong increases in the propensity to diversify on-farm can be observed for the LFA-adapted mixed farms (plus nine percentage points) and the young organic farm households (plus five percentage points). An increased share of LFA-adapted mixed farms also chooses both diversification strategies (plus six percentage points) which is even more substantial for traditional part-time crop farms (plus ten percentage points). The two livestock types both slightly reduce on-farm diversification. They represent the only farm types for which a diversification option becomes less likely compared to the baseline scenario.

## 4. Discussion

### 4.1. Farm types and income diversification decision-making behaviour

The farm typology exhibits a mixture of traditionally established types like "diversified small farm households" or "LFA-adapted mixed farms" for which diversification strategies already generate a substantial share of farm activities, as described in the literature (Bessant, 2006; López-i-Gelats et al., 2011; McNally, 2001; Robinson, 2013), and rather novel ones like "young organic farm households" or "intensive livestock professionals". In particular for those latter types the constellations between spatial conditions (e.g. LFA), different settings and entrepreneurial decision-making seem to cover a broader range and more diverse pattern of individual settings and decisions than described for the well-known types. We expected a distinct variation of diversification decisions across these farm types as farm household models show that optimal decisions are dependent on farm characteristics as well as external constraints (Huffman, 1980; McNamara and Weiss, 2005; Mishra and Goodwin, 1997) which should be especially observed in larger and heterogeneous samples. This is supported by our results (see Fig. 5).

Main motives for diversifying the farm income base have been found to be the optimal use of existing farm resources, uncertainty and risk perception, the relative attractiveness of food production, local constraints in labour demand, and entrepreneurial reactions to changes in external conditions such as the political support (Hansson et al., 2010; Hennessy and Rehman, 2008; Mann, 2009; McNamara and Weiss, 2005). The typology enables interpretation of the investigated farm households in relation to their generic behavioural patterns which can thus be linked to these motives. This is done by taking into consideration behavioural variations across farm types, their regional distribution, and different responses to a policy shock (i.e. "No CAP" scenario). The methodological aspects are discussed in the second part of this section. The interrelation of driving motives of different farm types represents an important outcome to inform the policy discourse as discussed in the last sub-section.

#### 4.1.1. Farm type differences in diversification

The availability and efficient use of labour resources is a key constraint to the feasibility of income diversification (Huffman, 1980; McNamara and Weiss, 2005). Therefore family size and structure plays a role in motivating future diversification activities. Young organic farm households with a young age structure and larger families tend to further increase diversification activities on-farm. In contrast, traditional, older, and smaller farm households have difficulties to generate sufficient synergy effects on-farm due to missing economic size. Previous research found livestock farms less likely to diversify as it binds labour resources for production activities (Hennessy and Rehman, 2008; Pieniadz et al., 2009). Our result of clearly distinct diversification behaviour of livestock types is thus contradictory. Intensive livestock professionals comply with known patterns, although having big families, whereas small-scale livestock specialists show a comparably high propensity to reallocate labour for diversification activities. However, few recent articles deal with diversification options of specialized professional farms (see e.g. Chavez et al., 2014).

A further important motive for income diversification relates to the risk perception of farmers (Hansson et al., 2010; Mishra and Goodwin, 1997) and the related relative attractiveness of food pro-

duction (Mann, 2009). Diversification as a tool of risk management might be a motive for young organic farms as organic farming is known to be found more frequently in regions with less high-yield potentials. Diversification can also represent an institutional option for family farming in the case of low relative attractiveness of food production, due to the location in LFA. This is particularly found for young organic farm households and LFA-adapted mixed farms.

When observing diversification decisions within and across all types, already diversified farms have a stronger tendency to diversify further. This result is in line with economic theory on path dependency (Arthur, 1989) as farming is a business with a high amount of fixed assets and changing paths includes transaction cost (Mann, 2009; McNamara and Weiss, 2005). More research is needed to investigate the assumption that diversification decisions in particular of novel described types might increasingly follow new pathways, aiming to integrate aspects of security, flexibility, and individuality.

Our results indicate that non-monetary aspects, e.g. intrinsic values such as 'farmership', are also relevant for diversification decisions (Jongeneel et al., 2008). It is further known that with the establishment of the concept of multifunctionality, the self-perception of livestock farmers has undergone changes, e.g. a pronounced feeling of responsibility for regional economic development (Huynh et al., 2014). It might be assumed that this also gives new incentives for adopting diversification strategies which might be a reason that we observe a comparably high propensity for diversification among the small-scale livestock specialists.

#### 4.1.2. Scenario comparison

An external policy shock generating completely different framework conditions should evoke an entrepreneurial response (Hansson et al., 2010). Evidence based on agricultural household models has shown that political support alters labour allocation by generating wealth and risk balancing effects (Moro and Sckokai, 2013). Magnitude and probability of adjustment formally depend on a set of exogenous characteristics (Loughrey et al., 2013) which we accounted for by the six farm types. Such a policy shock was introduced in our research design by a scenario of abolishment of all financial support as an alternative to the baseline represented by the current policy. Across all farm types, the willingness to diversify on and off the farm is more likely under the "No CAP" scenario but magnitudes differ across types. The results are thus in line with the expectations from theory. The scenario approach provides a benchmark comparison of the magnitudes of reactions across farm types for a complete CAP abolishment. However, it is difficult to identify how this effect emerges as we cannot disentangle the responses to the different interwoven CAP components.

Taken together, results confirm that farms respond as entrepreneurs to changes and those activities need to be at least partly interpreted as survival strategies, which has been found in other studies (López-i-Gelats et al., 2011; Meert et al., 2005). Off-farm diversification plays an important role for the persistence of small farms (Maye et al., 2009), like small-scale livestock specialists and diversified small farm households in our study, which need to look out for new business opportunities also in other sectors of the rural economy. However, the relative incompatibility between specialisation and diversification strategies is also revealed here, as livestock specialists (type 5 and 6) are even less willing to diversify on-farm under conditions of missing market incentives. Carrying out additional on-farm activities at least does not show strong dependency on the policy scenario, as also found by Pieniadz et al. (2009), suggesting curbing effects of the overall CAP instrument, which is dominated by production-oriented single farm payments. Here the shifting of budget to rural development measures in the current funding period 2014–2020 represents an important step.

#### 4.1.3. Distribution of farm types across the regions

With few exceptions every farm type is represented in each of the eleven case study regions. Rather than relying on limited regional settings when investigating farm types and their behaviours, the extent of cross-regional commonalities of the findings indicates their generic validity. Nevertheless, differences of regional diversification patterns are observed (see Fig. 4). These variations can be attributed to the diversity of the case study regions and their specific framework conditions, including socio-economic and geographical characteristics, such as the consumer demand for goods and services diversification activities, general economic performance, income levels and the situation of the labour market outside agriculture as well as the policy setting, such as payments for the Rural Development pillar of the CAP (Pascucci et al., 2011; Weingarten et al., 2010; Zasada and Piorr, 2015).

For example, small-scale livestock specialists (type 5) comprise the largest off-farm diversification tendency and predominate in Noord-Holland region where more alternatives to income generation exist due to proximity to labour markets and low unemployment rate, which have been frequently found to be influential for diversification processes (McNamara and Weiss, 2005). Similarly, but with a much larger share of intensive livestock farms (type 6), tendencies to adopt on-farm diversification is even lower in the Polish region, which is very much a result of traditional agricultural production role of farms. Lacking domestic demand due to low purchasing power and population density might further discourage on-farm diversification. In contrast, the dominance of farm types which are already diversified (type 1) or plan to diversify in the future (type 2) in the two German case study regions can be explained both by the supportive socio-economic background with their proximity to urban centres, high income levels and the high CAP spending in RDP. Previous findings that farm accommodation and other diversification activities represent major income sources in mountainous regions (Bergmann et al., 2007; López-i-Gelats, 2013) could also be observed in Midi-Pyrénées or Macedonia and Thrace, where on-farm diversification-oriented farm types (2 and 3) prevail. In these cases the role of natural amenities and capital is clearly highlighted.

In general, regional variations of the occurrence of farm types and willingness to diversify clearly depend on long-term farming traditions and point to existing effects of a multitude of external factors, which are difficult to disentangle. In this regard, the advantage of the cross-case study approach is the ability to identify similarities such as the presence of similar types across regions. However, broader samples within regions would bring about more detailed results on regional specificities to elaborate where farms can utilise existing assets such as natural amenities or urban proximities more effectively through diversification strategies, such as tourism or direct marketing activities.

### 4.2. Quantitative typology-building methods to assess behavioural differences

The discussed results show that typology approaches are useful for describing motivations, behaviours, and decisions of farm households (Kurz, 2008; Schwarz et al., 2009), and for distinguishing between different behavioural patterns among the farm population (Cortez-Arriola et al., 2015). The distinct willingness to diversify inherent in the detected types demonstrates that farm typologies are an appropriate tool for generating hypotheses on farm behaviour. As basic conceptual models, they can inform the process of complex theory building on strategy choice (Doty and Glick, 1994; Meredith, 1993), which can then be further tested. In return, the typology results are validated because distinct diversification behaviour had been expected from theory and could be linked to the empirical findings on diversification motives in the

literature. We also paid a lot of attention to interpretation and in-depth discussion of different solutions in order to take into account that factor and cluster analysis belong to explorative and descriptive quantitative methods and it is difficult to directly establish causal links.

Nevertheless, a combined approach of factor and cluster analysis is often considered the most objective way to identify the structure of a population (Bidogeza et al., 2009; Köbrich et al., 2003). We further addressed weaknesses of mixed-variable datasets by tailoring the method to the purpose of income diversification and their specific requirements rather than ignoring potential biases in the correlation matrix (Kolenikov and Angeles, 2004) or the distance measure (Gower, 1971). Due to the sample selection in specific regions, the typology has to some extent a case-study character and should not be interpreted as representative either for the European Union or for any of the included countries. Nevertheless, the presented approach widens the effective use of quantitative typologies addressing questions of income diversification, for example by Chaplin et al. (2004); Daskalopoulou and Petrou (2002); Lange et al. (2013); Præstholm and Kristensen (2007), beyond a regional scale. Additionally, this effectiveness of such cross-regional quantitative modelling approaches sheds light on generic behavioural patterns and feeds into the discussion on ways of typology-building, regardless that the survey dates back to 2009.

### 4.3. Policy relevance

On and off-farm diversification encompass a decision-making for adaptation of farm activity and assets. There is broad evidence for a variety of factors influencing this decision-making behaviour. This includes farm business and household, but also the external business environment and financial policy incentives, such as the CAP (Barbieri and Mahoney, 2009; García-Arias et al., 2015; Hansson et al., 2013; Hennessy and Rehman, 2008) as we have also shown in our study.

The heterogeneity of regional settings and adaptation processes implies specific challenges to an appropriate financial incentive, which is generally applicable. In general, RD policy acknowledges the diversity of needs across regions and accordingly offers flexibility of targets and adjustment in policy formulation in order to achieve better effectiveness (Yang et al., 2015). Comprehension about farm type specific investment choices and strategic behaviour have been highlighted as increasingly relevant for an efficient policy design (Viaggi et al., 2010). As a means of policy information, typologies can help to improve spatial or group targeting of payments for voluntary measures and contribute to incentivising and steering (primarily on-farm) diversification decisions and to overcome their structural barriers in a more cost-effective manner for both public and private investments. In addition, the investigation of farm behaviour under changing policy conditions, i.e. the abolishment of the agricultural policy, eventually reveals the degree of its influence as the substantial shifts in responses to either find alternative income sources or to quit farming shows. However, for targeted policy adjustment particular consideration is needed on the individual, possibly contrary effects of the different elements of the CAP on the farm decision-making regarding diversified activities. A focus shift from the first to the second pillar, specifically supporting innovation and entrepreneurship of farmers, is likely to encourage a broader range of farms to diversify, including traditional family and small-scale farms.

## 5. Conclusion

Changing drivers, economic conditions, and societal trends affecting farm diversification behaviour represent ongoing topics for European farms and rural development policy. Despite a comparably long history of valuable research on the topic, the evidence base largely refers to in-depth investigations of single factors in specific case studies. Filling knowledge gaps on patterns of future diversification strategies and their causes is required. This study takes a broad empirical approach based on a survey of 2154 farms from eleven European regions. It asked for on and off-farm diversification choices in relation to the CAP. In order to disentangle the complexity of determining factors, we developed and applied a joint approach of factor and cluster analysis to derive a typology striving for a high methodological quality and transparency. The farm types, assigned to six clusters, exhibit a mixture of types traditionally established under specific site conditions such as “diversified small farm households” or “LFA-adapted mixed farms” where longer term adoption of diversification strategies already generates a substantial share of farm activities, and novel ones such as “young organic farm households” or “intensive livestock professionals”. The typology proves relevant, because it is valid from a theoretical perspective of farm household models, clearly reflects distinctive diversification intentions between types, and almost all types occur in all regions (though certain types prevail in certain regional settings). Using the typology allowed us to explain diversification choices under baseline or “No CAP” scenarios. For almost all farm types, results showed a clear preference towards on-farm diversification. In particular, a high share of young organic farms indicated willingness to diversify. It is significant that even for types with a high fixed capital, like intensive livestock farms, the probability of intensifying off-farm diversification increases substantially when assuming loss of CAP payments.

Though suggested by multiple previous studies, we aimed to specifically explain the concurrence of determining factors based on empirical data across various European regions. Beyond the confirmation of previously described factors, such as specialisation and household composition, our findings reveal the importance of farms, driven by young farmers with a high affinity for the adoption of environmental management and diversification measures. This gives some indication on new path dependencies that might have been triggered by recent economic and societal developments. New circumstances and constellations for entrepreneurial activity, the commitment to organic farming, a higher educational level, and even new household models might result in new and completely different adaptation paths for young farmers and new entrants to farming than for older part-time farmers. For future research, the generic farm type behaviour should be contrasted with responses to current changes in policy design, e.g. reduced political support due to the abolishment of milk quotas. Further drivers that have not been fully understood yet such as path dependence in diversification or the role of intrinsic motivations should be further tested.

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## Appendix A.

*Characterisation of farm types by important variables*

| Farm type (HH = household) | | **1** | **2** | **3** | **4** | **5** | **6** | **all** |
|---|---|---|---|---|---|---|---|---|
| | Number of farm households | 540 | 138 | 328 | 586 | 329 | 233 | 2154 |
| HH size | Mean | 3.1 | 4.3 | 3.5 | 3.4 | 3.5 | 4.2 | 3.5 |
| | Median | 3 | 4 | 4 | 4 | 3 | 4 | 4 |
| | Share of HH with ≤2 members | 35 | 12 | 27 | 32 | 34 | 12 | 29 |
| HH structure | Share of HH with children | 36 | 70 | 42 | 31 | 44 | 65 | 42 |
| | Mean number of children | 0.6 | 1.2 | 0.7 | 0.5 | 0.9 | 1.2 | 0.7 |
| | Share of HH with old people | 36 | 25 | 26 | 29 | 31 | 34 | 31 |
| | Mean number of old people | 0.6 | 0.3 | 0.3 | 0.5 | 0.5 | 0.5 | 0.5 |
| HH labour on-farm | Mean number of members (full-time) | 1.1 | 1.4 | 1.3 | 1.2 | 1.2 | 1.7 | 1.2 |
| | Share of HH with 0 members (full-time) | 21 | 17 | 13 | 20 | 16 | 3 | 16 |
| | Share of HH with ≥2 members (full-time) | 25 | 46 | 38 | 30 | 32 | 62 | 35 |
| Education | Mean of levels | 3.6 | 3.7 | 3.8 | 3.4 | 3.6 | 3.5 | 3.6 |
| | Most frequent level | 3 | 3 | 5 | 3 | 4 | 3 | 3 |
| Income from agriculture | Mean category | 3.9 | 4.5 | 4.4 | 4.2 | 4.2 | 5.1 | 4.3 |
| | Share of HH with <10% | 15 | 6 | 10 | 13 | 12 | 4 | 12 |
| | Share of HH with ≥10% and <50% | 23 | 22 | 19 | 22 | 22 | 10 | 20 |
| | Share of HH with ≥50% and <90% | 36 | 32 | 35 | 25 | 31 | 25 | 31 |
| | Share of HH with ≥90% | 25 | 40 | 36 | 40 | 35 | 60 | 37 |
| Specialisation | Share of crop specialist farms | 55 | 43 | 40 | 69 | 0 | 0 | 41 |
| | Share of mixed farms | 45 | 49 | 59 | 25 | 0 | 2 | 31 |
| | Share of livestock specialist farms | 0 | 7 | 2 | 6 | 100 | 98 | 28 |
| Organic | Share of HH producing organic products | 5 | 100 | 0 | 4 | 9 | 5 | 11 |
| Land | Mean owned land in ha | 50 | 69 | 69 | 38 | 25 | 41 | 46 |
| | Mean operated land in ha | 103 | 148 | 138 | 81 | 44 | 77 | 93 |
| | Median owned land in ha | 10 | 15 | 10 | 10 | 16 | 28 | 12 |
| | Median operated land in ha | 19 | 22 | 35 | 20 | 26 | 50 | 25 |
| Employment | Mean full-time employees | 0.5 | 1.5 | 1.0 | 0.6 | 0.3 | 0.7 | 0.7 |
| | Share of HH with full-time employees | 18 | 31 | 30 | 21 | 15 | 27 | 22 |
| | Mean all employees | 1.3 | 2.5 | 3.4 | 3.4 | 0.6 | 1.2 | 2.1 |
| | Share of HH having employees | 31 | 55 | 52 | 52 | 25 | 39 | 42 |
| Location | Share of HH not located in LFA | 44 | 34 | 0 | 94 | 41 | 15 | 47 |
| | Share of HH completely located LFA | 48 | 60 | 88 | 0 | 54 | 73 | 45 |
| | Share of HH located in lowland | 60 | 28 | 21 | 74 | 74 | 49 | 57 |
| | Share of HH located in mountainous area | 5 | 18 | 23 | 1 | 4 | 21 | 9 |
| Farm organisation | Share of HH with sole proprietorship | 78 | 83 | 69 | 69 | 65 | 73 | 72 |
| | Share of HH with farm advisory service | 0 | 73 | 100 | 100 | 0 | 96 | 58 |
| | Share of HH with agri-environmental scheme | 19 | 45 | 30 | 24 | 28 | 34 | 27 |
| On-farm diversification | Share of HH with activities | 20 | 20 | 17 | 10 | 23 | 14 | 17 |
| | Share of active HH with labour share for on-farm diversification >50% | 15 | 15 | 18 | 24 | 24 | 6 | 18 |
| | Share of HH with direct sale of products | 13 | 26 | 15 | 9 | 13 | 6 | 12 |

Note: Shares in%. Refer to Table 2 regarding the coding of variables.

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