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Does EU rural expenditure correspond to regional development needs?

Abstract

The EU offers a complex system of rural development interventions as part of its Common Agricultural Policy. A Common Monitoring and Evaluation Framework (CMEF) has been developed for the programming period 2007-2013 in response to challenges faced with the evaluation of rural development measures in earlier programming periods.

Statistical and multivariate analysis of CMEF baseline (regional characteristics) and input (expenditure) indicator data at the NUTS2 subdivision level is used to compare four typical expenditure allocation patterns (Competitiveness, Environment, Rural Viability, Equal Spending) in terms of associated regional characteristics and development trends.

The results suggest expenditure priorities are generally in line with regional needs and that there are some positive development trends, for example higher increase of agricultural labour productivity in the Competitiveness Group, while for environmental topics the level of data required remains unsatisfactory for trend assessment. 17% of the regions have a budget allocation pattern deviating from other regions with similar characteristics, which could indicate ineffective priority setting.

Consistent CMEF data over multiple programming periods would be desirable to support the relationships found and to facilitate time series analysis, but this seems questionable given that the European Commission has discontinued the CMEF in 2014 with further adaptations for the 2014-2020 programming period underway.

Keywords: Targeting, rural development, land use change

1 Introduction

The European Union (EU) sustainable development strategy emphasizes the need for a cost-effective implementation of political measures especially in a situation of decreasing absolute public funds as a result of the EU enlargement (COM, 2001, 2006b). Cost-effectiveness is also relevant for funding programs for rural areas based on the Council Regulations 1257/1999 and 1698/2005 implemented through rural development plans (RDPs) in the EU member states.

In addition to market interventions, such as taxes, export subsidies or quotas, and direct income transfers, pillar one of the European Common Agricultural Policy (CAP), rural development (RD) is a core element of the CAP and is implemented in a more targeted and programmed approach compared to the other CAP measures. The RD policy has a set of defined objectives, within which sit a suite of more detailed rural development measures (**Table 1**), the focus is on achieving specific outcomes, with detailed criteria for their use. Based on the principle of subsidiarity, Member States are given the flexibility to select RD measures, to fit national or regional circumstances. RD measures are grouped into thematic "axes" according to their overarching objectives:

- improving the competitiveness of the agricultural and forestry sectors (axis 1),
- improving the environment and the countryside (axis 2),
- improving the quality of life in rural areas (axis 3), and
- the LEADER[1] approach (axis 4), enabling bottom-up community initiatives.

For the 2014-2020 programming period six specific rural development priorities have been defined that further underpin the original axes; axis 1: Knowledge transfer, Competitiveness, Food chain; axis 2: Ecosystems, Resource efficiency; axis 3: Social inclusion, as well as cross-cutting topics, formerly horizontal topics, related to economic development (e.g. gross domestic product, employment rate).

<<**Table 1**>>

In order to ensure that all objectives are met, there is a requirement for a minimum proportion of the RD budget (period 2007-2013) to be allocated to the single axes (10% for axes 1 and 3; 25% for axis 2; and 5% on axis 4: the LEADER program). Other key characteristics of the RD pillar are the requirement for European funds to be co-financed by the Member States, and that selected RD measures require also a proportion of private funding (e.g. 121 "Modernisation of agricultural holdings", **Table 1**).

Apart from these minimum thresholds, the RD programming regions in the EU Member States are relatively free in the allocation of budget to the four axes, leaving room for regional priority setting.

The objective of this article is to analyse regional expenditure for the thematic rural development axes at the NUTS2[2] level and assess whether the expenditure allocation resulting from priority setting adequately matches regional needs, and to identify possible cases where needs and budget priorities are inconsistent.

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[1] French abbreviation for Liaison Entre Actions de Développement de l'Economie Rurale, an EU initiative to support rural development projects with a focus on creating networks and supporting cooperation among different actors and which are managed by Local Action Groups (LAGs)

[2] The administrative sub-divisions in the EU are referenced according to the Nomenclature of Territorial Units for Statistics (NUTS). Depending on the respective national context, NUTS2 refers, for example, to regions, provinces, or states. The population density in central Europe is much higher, resulting in smaller physical NUTS2 regions, while periphery regions, e.g. in the Northern, Southern, or Eastern Europe are often much larger. Germany, for example, has 39 NUTS2 regions (2010), while in other cases NUTS2 refers to the entire country (Cyprus, Estonia Latvia, Lithuania, Luxembourg, and Malta). Due to administrative territorial reforms taking place the number and codes of NUTS regions change slightly over the years.

Regional priorities for the thematic RD axes are derived from past RD expenditure data, while regional needs are measured through a set of objective- and context-related baseline indicators, as defined by the Common Monitoring and Evaluation Framework (CMEF, see next section). This article attempts to use the structure defined by the CMEF to analyse the development trends (change indicators) of groups of regions with a similar expenditure pattern, and examines whether they are in line with expectations, which would support that the regional RD interventions are to some extent successful.

Several reports question EU rural development measures (e.g. ECA, 2006, 2011, 2012), and the academic literature provides a number of wide ranging studies also. Studies ranging from EU-wide assessment of spatial potentials for general rural development options (van Berkel and Verburg, 2011), to selected case studies, dealing with spatial patterns and targeting of forestry (van der Horst, 2006) and agri-environment payments (Allaire et al.; Desjeux et al.; Uthes et al., 2010b; van der Horst, 2007; Yang et al., 2014), modernisation grants (Travnikar and Juvancic, 2013) and farm diversification (Hyytiä, 2014; Lange et al., 2012; Watts et al., 2009), as well as tourism development and village renewal (Zasada and Piorr) all contribute to assessment of EU RD measures.

RD expenditure data were used for example to develop a concept for a place-based RD approach (Zasada et al., 2015) to determine optimum budget allocations for RD measures (Schmid et al., 2010; Ziolkowska, 2009), and to analyse allocation distortions resulting from the multi-level co-financing system in the EU (Kirschke et al., 2007) as well as distributional effects (Uthes et al., 2010a). Implementation costs of RD programmes have also been analysed (Fährmann and Grajewski, 2013).

The conceptual structure provided by the CMEF has not been extensively used in the literature. No attempt has been made to link the indicator categories of the CMEF for a combined, and EU-wide analysis, which is the focus of the present article.

2 Data and methods

2.1 Common Monitoring and Evaluation Framework (CMEF)

The Common Monitoring and Evaluation Framework (CMEF) for EU agriculture and rural development instruments, developed for the RD programming period 2007-2013, brings together the most complete set of indicators for evaluation of CAP instruments referring to the sub-divisions (NUTS levels) of the EU Member States. The CMEF is based on the evaluation frameworks used in previous programming periods, but implemented in a more systematic manner and adapted to new requirements in the RD regulation (COM, 2006a) and in reaction to several studies and evaluation reports (e.g. COM, 2005; Renda, 2006), criticising various RD interventions for a lack of clear objectives , which prevented effective monitoring and evaluation in earlier programming periods.

The concept and completeness of the CMEF has been questioned meanwhile (e.g. Dax et al., 2014) and with the reporting year 2014, the CMEF was “discontinued […] and replaced by the annual CAP context indicator update”[3,4]. The analysis in this paper is therefore based on the original CMEF indicator structure (2007-2013 programming period) and refers to the EU-27[5].

The original structure of the CMEF, as laid down in several guidance documents published on the RD website of the European Commission (EC), differentiated baseline, input, output, result, and impact indicators (COM, 2006a).

Baseline indicators

Data tables referring to the original CMEF structure and for the NUTS levels 0-3 (roughly from country to district level) are published on the RD website for the years 2007-2013, but they include only the CMEF baseline indicators, and particularly the data tables published for the years 2007-2009 show large data gaps, while the data tables published after 2009 achieve greater completeness. These baseline indicator tables provide an overview of what data is available for the European Commission (EC) to evaluate CAP policies and for which topics and at which NUTS levels data gaps occur. The data tables also contain meta data, such as the sources of the data, revealing that the CMEF baseline indicator tables basically gather only indicators that are available from other sources (**Table 2**) however, the added value of the CMEF is the logical structure that it provides to the otherwise scattered, non-connected data.

<<Table 2>>

Input indicators

Apart from the CMEF baseline indicator data tables, the only other CMEF publicly available tables are the input indicators (referring to financial input), but these are only at the (for *rural* development) relatively meaningless national level (NUTS0). Below national NUTS levels, the CMEF input data can only be obtained through a data enquiry to the Directorate General ‘Agricultural and Rural Development’ (DG AGRI).

Output, result and impact indicators

CMEF output (e.g. number of participants in training), result (e.g. number of participants that successfully ended a training activity) and impact indicators (e.g. economic growth) are not published in a format similar to the baseline indicator tables. *Target* values for these indicator types as estimated by the EU Member States can be obtained from DG AGRI, while actually *achieved* values are only reported in the single rural development plan evaluation reports, in the respective national languages

[3] http://ec.europa.eu/agriculture/rural-area-economics/index_en.htm
[4] http://ec.europa.eu/agriculture/cap-indicators/context/2014/indicator-table_en.pdf

[5] (excluding Croatia, including UK)

and in a non-standardized format. In addition, these three indicator groups refer to the RD programming regions (n=97), which are often not identical with the NUTS levels used for the CMEF baseline indicators, making it difficult to relate them to the baseline indicators without further assumptions and disaggregation methods, and, while output and result indicators refer to the individual RD interventions (Table 1), *impact* indicators measure the success of the entire RD *programme* (=all individual interventions together).

This leaves baseline and (financial) input indicators as the only possible CMEF indicator sources for analysis in this study, as they are accessible with reasonable effort and refer to the NUTS levels. Data retrieval and processing for these two indicator groups is described in the following two sections.

2.1.1 CMEF baseline indicators

The original CMEF baseline indicators referred to 36 long-term objectives (=objective-related baseline indicators) accompanied by 23 context-related baseline indicators (n_{Total}=36+23=59). CMEF Guidance Note F[6], contains the original CMEF indicator list, assigning the CMEF objective and context-related baseline indicators to the thematic RD axes, and defines also horizontal indicators that are not related to the single axes (**Table 6** and **Table 7**).

Horizontal are the context-related indicators “designation of rural areas” (C1) and “importance of rural areas” (C2), and the objective-related indicators “GDP” (O1), “employment rate” (O2), “and unemployment rate” (O3). All other baseline indicators are in chronological order assigned to the thematic RD axes:

- Axis 1: C3 to C6 and O4 to O16
- Axis 2: C7 – C16 and O17 to O26
- Axis 3: C17 to C23 and O27 to O35.
- Axis 4: O36

The 59 baseline indicators are so-called *lead* indicators which are each underpinned with specific sub-indicators (resulting in 218 single indicators altogether published in 2013[7]). The number of sub-indicators per lead indicator ranges between one (e.g. for O4: Training and education in agriculture) and 12 (for C2: importance of rural areas) sub-indicators. Sub-indicators can include state and change indicators (Table 3). *State* indicators measure performance in a single year, while *change* indicators measure developments in state indicators over a time period, which is not identical among the individual change indicators.

Data set used and data processing

[6] http://ec.europa.eu/agriculture/rurdev/eval/guidance/note_f_en.pdf

[7] http://ec.europa.eu/agriculture/statistics/rural-development/2013/regional_tables_en.xlsx

The data table published in 2013[7] contains the most complete data set of the 2007-2013 programming period, and is the empirical setting for this article.

The original EXCEL data tables published on the Rural Development website of the European Commission were imported into an MS ACCESS database, together with meta data tables and other necessary definition tables. A unique identifier was assigned to each sub-indicator, combining the code of the baseline lead indicator (e.g. O1) with alphabetical letters (O1a – state indicator, O1b change indicator). Data cleaning checks for outliers and consistency checks were applied for all indicators, for example, empty fields where "0" is a valid response, miscalculations and errors in use of percentages, either as a fraction of 1 or 100, etc. such errors were all corrected before undertaking analysis. SQL queries were used to perform the data checks and to create the table structures needed for further analysis (section **Error! Reference source not found.**).

Data availability (years, NUTS levels, thematic axes)

The publishing year is not identical with the year of the data. The majority of the state indicators published in 2013 refer to the year 2010, followed, in terms of frequency, by 2012 and 2011, and for selected cases, also earlier years. The change indicators refer to more than 20(!) different time periods, most often from the period 2007-2012.

Data at the national level are relatively complete, thus the number of indicators shown for the national level (**Table 3**) constitute the maximum possible number of indicators to measure the data availability at lower administrative levels against, with one limitation: the CMEF actually defines *23* context indicators, however, the "designation of rural areas" (C1) is only meaningful at below national levels, leaving 22 context-related CMEF baseline lead indicators at the national level.

An analysis at the national level was not desirable due to the heterogeneity of regional characteristics within Member States which may overlay possible developments (cf. Desjeux et al.). However, as can be seen in **Table 3**, the number of available indicators decreases strongly on lower NUTS levels.

<**Table 3**>

Breaking the data availability down to the EU Member States (**Figure 1**) shows the number of available indicators at NUTS2 varied between 107 (Greece EL) and 127 (Austria AT, Czech Republic CZ, Finland FI, France FR, Netherlands NL, Portugal PT, Slovakia SK, United Kingdom UK) out of 218 possible indicators (total number of sub-indicators published in 2013).

<Figure 1>

Regarding the data availability for the single thematic RD axes, as shown in **Table 3**, the data situation is best for axis 3, while agriculture and forestry sector related economic indicators (axis 1) show several data gaps. Data for the environmental axis (axis 2) is particularly sparse below national scales, although further disaggregation would be specifically informative along this axis. For some indicators, a further breakdown below the national level could be achieved through further efforts by the EU Member States, while for others, such as the population of farmland birds (O17), the data availability is poor in various countries, particularly in the New Member States, where no bird monitoring systems exist for reasons of cost.

Facing a trade-off between data completeness on the one hand, and relevance of indicators for the analysis on the other hand, NUTS2 (n=263 usable regions) proved to be the most suitable level for this study, though data availability is limited.

2.1.2 CMEF input indicators

EU rural development expenditure ('input' indicator) includes three components that vary depending on the RD measure code and the "convergence" status of a region: EU expenditure, national expenditure of the EU Member States and private expenditure (e.g. of farmers in investment schemes).

Private expenditure data are only available at the national level and not for the NUTS2 level, therefore the focus of this paper is restricted to public expenditure, which equates to the sum of EU and national expenditure.

EU expenditure data relating to the EAFRD and Temporary Rural Development Instrument (TRDI) funds are stored in the Clearance of Audit Trail System (CATS) database and could be obtained from DG AGRI for the years 2007-2011. Thus the years of the CMEF baseline and input indicators are not perfectly matching but the differences seemed tolerable. Ideally, data would be available for multiple years, and since possible indicator changes occur with a time lag for example, at the earliest 2-3 years after modernisation investments (Bergschmidt et al., 2008), change indicators should be available for a several years after the intervention but this could not be achieved due to the mentioned data problems.

Total public funding (EU + national contributions of the EU member states) was estimated using officially published co-financing rates for each thematic axis[8] and the respective RD measure codes (Table 4). These factors vary depending on the classification of the NUTS2 regions according to the Cohesion Policy. Co-financing rates for regions affected by the convergence objective (regions with a Gross Domestic Product (GDP) per capita below 75% of the EU-27 average) are higher than for non-convergence regions (all other regions).

<<Table 4>>

The relative allocation of expenditure for each thematic axis was calculated and used instead of absolute expenditure. Relative expenditure has the advantage that it is not affected by differences in purchasing power parity and differences in opportunity cost (which are often the basis for payment rates and thus budgetary expenditure).

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[8] URL: http://ec.europa.eu/agriculture/publi/fact/rurdev2007/2007_en.pdf, p. 17 (Last access: 2015/04/15)

In a next step, the NUTS2 regions were grouped based on their relative expenditure for the thematic RD axes. The axes 3 and 4 were summarized in one axis, as they are closely related and axis 4 has only a relatively small financial relevance.

The grouping of the regions was done using following conditions (simplified expression):

- Expenditure Group 'Competitiveness' (1)
  Axis1percentage > (Axis2percentage + Axes34percentage)
- Expenditure Group 'Environment' (2)
  Axis2percentage > (Axis1percentage + Axes34percentage)
- Expenditure Group 'Rural Viability' (3)
  Axes34percentage > (Axis2percentage + Axis1percentage)

By definition, the first three groups have a dominant focus on one particular axis. All regions not meeting any of these conditions fall automatically in a forth group, which is characterized by a relatively equal budget spending among the thematic axes:

- Expenditure Group 'Equal Spending' (4)
  All other cases

2.2 Hypotheses

The expenditure grouping assists in identifying whether regions belonging to the same expenditure group have similar characteristics and development trends according to the CMEF baseline indicators.

Assuming European regions apply a *needs*-oriented budget allocation, it can be expected that regions spending large parts of their funding in a particular axis, have deficits in the *state* indicators related to this axis (assignment of indicators to axes according to Guidance Note F). For the scope of this article, "needs" for RD funding exist if the regions belonging to a particular expenditure group perform below average and worse than the other expenditure groups with regard to the state indicators assigned to the corresponding RD axis.

For example, regions in the Competitiveness Group are expected to have deficits in the state indicators assigned to axis 1, e.g. with regard to training and education in agriculture (O4) or agricultural labour productivity (O6). One would also expect an underperformance in the horizontal indicators (lower GDP, higher unemployment). These potential deficits could explain the spending behaviour of the regions in this group: Their overall intention should be to reduce the existing deficits justifying a high expenditure priority in terms of budget allocation for axis 1.

Hypothesis 1: *Underperformance in the CMEF state indicators assigned to a particular axis leads to a high spending priority for this axis*

This thinking is straightforward for expenditure groups 1-3, as their spending pattern shows a dominant priority for one axis.

For the Equal Spending Group, however, the assumptions are less clear, as these regions have no clear priority for a particular axis. Potential causes for the relatively evenly spread expenditure pattern could be that these regions have either (1) less severe problems in all three thematic axes can thus afford the “luxury” to prioritize all axes equally, or (2) severe, but equally important problems in all three areas thus hampering a prioritization of a single axis. Both causes would explain that money is spent relatively evenly.

Second, if the policy interventions designed to fix typical deficits related to the single axes are effectively working or have started to work, one would expect that starting from the low performing state indicators, there is some positive development trend in the CMEF *change* indicators for a particular axis, e.g. increased growth rates. So for the scope of this article it is assumed that if the expenditure priorities are correctly set by the regions and the policy interventions successful, the regions in a particular expenditure group should perform better than the other groups in the change indicators assigned to the corresponding RD axis.

Hypothesis 2: *Higher expenditure on a particular axis leads to improved CMEF change indicators assigned to this axis*

The link between higher expenditure and improving change indicators is expected to be clearer for the expenditure groups 1-3, for expenditure group 4 (‘Equal Spending’), the change indicators are expected to show no clear pattern consequently the analysis will be of an exploratory nature. However, apart from the four regions in the Rural Viability Group, the regions in the Equal Spending Group spend on average the largest proportion for the axes 3 and 4 from all groups, which could be interpreted as an indirect prioritization compared to the other groups. Therefore, one could expect a positive behaviour of the change indicators for the axes 3 and 4.

2.3 Data analysis

The statistical and multivariate analysis was carried out using SPSS, version 22. Typical for socio-economic data sets, the normality distribution assumption was violated by most of the CMEF indicators according to a Shapiro-Wilks test, therefore non-parametric techniques were used for the statistical analysis. Spearman rank correlation coefficients were calculated to analyse the degree and significance of correlation among the CMEF baseline indicators. Differences in the group means of the CMEF indicators were tested for significance ($p < 0.05$) with a Kruskal-Wallis test, followed by a Games-Howell post-hoc pairwise comparison test to identify which specific groups differed.

Euclidean distances from the z-standardized indicator values were calculated to have an overall measure of similarity across all indicators between the different expenditure groups.

Step-wise linear discriminant analysis (DA) based on the minimization of the Wilks' Lambda statistic was used to quantify the association between CMEF baseline indicators and membership in the different expenditure groups. Rural Viability and Equal Spending Group were not included in the DA due to their small sample sizes, limiting the DA to the groups 'Competitiveness' and 'Environment'.

Only a sub-set of the available CMEF indicators was included in the DA as otherwise due to the heterogeneous data availability a massive reduction in the number of complete cases would have resulted. A complete data set for these indicators could be obtained for 207 NUTS2 regions (= DA sample), 56 out of which belonged to the Competitiveness Group and 151 to the Environment Group.

3 Results and discussion

3.1 Occurrence of expenditure groups

Figure 2 shows a map of the location of the four expenditure groups, which are spatially dispersed across Europe, and **Table 5** summarizes some general group statistics (see **Table 5**),

<<Figure 2 and **Table 5** >>

The Competitiveness Group includes 60 out of 263 NUTS2 regions (22.8%), almost equally concerning convergence regions (n=28; total number of convergence regions: 81) and non-convergence regions (n=32; total number of non-convergence regions: 182). 34 regions belong to EU-15 (total number of regions: 208), 26 to EU-12 (total number of regions: 55). Spatial clusters (Figure 2) of regions prioritizing axis 1 can be found in Spain, North France, and in Eastern Europe (Poland, Lithuania, Latvia, Hungary, Slovakia, parts of Romania and Bulgaria. In contrast, spatial clusters with little axis 1 spending occur in the UK and Ireland, South Germany and parts of Austria, in South Italy, and Scandinavia.

The Environment Group is the largest group (**Table 5**). 174 regions (66.2%) assign more than 50% of their rural development budget to axis 2, including 42 convergence regions and 132 non-convergence regions. 155 regions are located in EU-15 countries (Figure 2), 19 in EU-12 countries. Regions spending more than 75% for axis 2 (n=92; "Environmentalists") are mostly located in the United Kingdom (30 NUTS2 regions), while only three NUTS2 regions in EU-12 countries give that much priority to axis 2.

The Rural Viability Group consists of four regions (Bulgaria: Yugozapaden; Germany: Berlin; Netherlands: Flevoland and Zeeland) with high spending priority for the axes 3 and 4 together. Due to their exceptional character, these regions were excluded from further analysis and statistical tests, but they are included in the tables for a complete picture.

The Equal Spending Group (n=25) is, by definition, characterized by a relatively balanced budget allocation pattern without clear priority for a particular axis (**Table 5**). These regions are scattered across the EU with cases in different countries (e.g. Spain, Bulgaria, Netherlands) and the only real spatial cluster of regions belonging to this expenditure group occurs in Northern Germany (Figure 2).

3.2 Analysis of CMEF baseline indicators: overall correlations and relationships

Spearman correlation coefficients ρ (rho) confirmed general relationships between the CMEF objective-related baseline indicators, thus supporting the overall suitability of the data set for the planned analysis (Appendix). Gross Domestic Product (GDP, O1a), for example, shows at a significant level ($p<0.01$), moderately positive correlation ($\rho >0.5$) with the employment rate (O2a, ρ=0.621**), the employment percentage in the secondary and tertiary sectors (O28b, ρ=0.651**) and life-long learning (O35a, ρ=0.544**), while it is negatively correlated, for example, with the unemployment rate (O3a; ρ= -0.517**) and the employment percentage in the primary sector (O8b, ρ= -0.650**).

Regarding the agriculture-related indicators, agricultural labour productivity (O6a), for example, is positively correlated with the level of training of agricultural managers (O4, ρ=0.508**), and negatively with the occurrence of semi-subsistence farms (O16, ρ=-0.698**).

The environment-related CMEF indicators have fewer and generally smaller correlations not exceeding +/- 0.5. HNV farmland (O18b), for example, is moderately negatively correlated with agricultural labour productivity (O6a, ρ=-0.437**) and positively with the area percentage at risk for erosion (O22f, ρ=0.421**), while organic farming (O23b) shows weaker correlations (< 0.3) with the employment rate (O2a, ρ =0.266**), the change in life-long learning (O35b ρ =0.254**) and the level of training of agricultural managers (O4a, ρ =0.221**).

3.3 Competitiveness Group

In the following, the results are presented for each of the four expenditure groups in terms of context indicators, followed by Hypothesis 1, state indicators, and Hypothesis 2, change indicators.

3.3.1 Context-related CMEF baseline indicators

Table 6 shows the mean values of the CMEF context-specific baseline indicators for the four expenditure groups.

Significant differences for regions in the Competitiveness Group exist mainly in comparison to the Environment Group (**Table 6**): they have on average more arable land and less permanent grassland (both sub-indicators of C3), a smaller physical and economic average farm size and a greater labour force (all C4), less territory in Less Favoured Areas (LFA) (C8), a higher share of *extensive* arable crops and a lower share of extensive arable grazing (C9).

3.3.2 Objective-related CMEF baseline state indicators (Hypothesis 1)

In line with expectations, the regions in the Expenditure Group are underperforming in several objective-related CMEF state indicators related to axis 1 (**Table 7**). Hence it seems justified that the regions in this group put highest priority on axis 1, confirming hypothesis 1.

Statistically significant characteristics are a lower employment (O2a) and consequently higher unemployment (O3a) rate, a generally higher importance of the primary sector (O8b, O9b), a higher share of employment in the food industry (O12b) and a higher level of semi-subsistence farms (O16).

Differentiating the group further by convergence and non-convergence regions and testing again for significance (Appendix), confirmed the differences found for the whole sample and showed in addition that there is a significantly lower percentage of trained farm managers (O4) in non-convergence regions prioritizing axis 1 ($O4_{ComNon}$=39.8%, $O4_{EnvNon}$=43.2%, $O4_{EquNon}$=65.8%), also confirming hypothesis 1. In convergence regions, the percentage of trained farm managers is generally lower and not significant between the expenditure groups ($O4_{ComCon}$=26.9%, $O4_{EnvCon}$=33.8%, $O4_{EquCon}$=26.2%), therefore a possible need for axis 1 funding with regard to this indicator exists in all expenditure groups, and not specifically in the Competitiveness Group.

Agricultural labour productivity (O6a), which was insignificant for the whole sample, showed a significant difference in convergence regions between Competitiveness and Environment Group ($O6a_{ComCon}$=5,400 Euro/AWU, $O6a_{EnvCon}$=10,400 Euro/AWU), thus the motivation to boost development in the lacking-behind Competitiveness Group regions explains priority setting on axis 1. In non-convergence regions, in contrast, agricultural labour productivity is generally higher and, with regard to regions prioritizing axis 1, in between Environment and Equal Spending Groups ($O6a_{ComNon}$=25,400 Euro/AWU, $O6a_{EnvNon}$=22,600 Euro/AWU, $O6a_{EquNon}$=32,800 Euro/AWU). Thus the motivation for allocating the majority of RD funding to axis 1 seems to be maintenance of an already relatively high level of agricultural labour productivity and stimulating future innovation and adaptation processes.

3.3.3 Objective-related CMEF baseline change indicators (Hypothesis 2)

Positive developments with regard to CMEF change indicators assigned to axis 1 (also **Table 7**), are significantly higher average growth rates for GDP (O1b) and agricultural labour productivity (O6b) compared to the Environment Group. However, also significant is the highest increase in the unemployment rate (Competitiveness +4.1%; Environment +1.6%, **Table 7**). The employment development in the primary sector (O8c), in the food industry (O12c) and in the non-agricultural sectors (O28c) is negative, suggesting that the objective of reducing overall unemployment is still not sufficiently addressed by effective interventions in these regions. All other CMEF change indicators for axis 1 are insignificant.

A breakdown by the convergence status shows that starting from a lower absolute GDP level (55.7 index, Appendix), real GDP growth rates can be observed mainly in the convergence regions prioritizing axis 1 (+ 4.9% GDP increase on average). In contrast, the absolute GDP level in non-convergence regions in the Competitiveness Group is more than twice that high (114.4 index) and slightly decreasing (-0.8%), however the decrease is lower than in the Environment Group (-3.6%), so it would be more appropriate to speak of a relatively lower *loss* instead of growth rates.

Similarly, agricultural labour productivity gains are higher in convergence regions belonging to the Competitiveness Group (+11.3%), while in non-convergence regions the increase is only +0.6% but still higher than in the Environment (-1.9) and Equal Spending Group (+/-0).

3.4 The Environment Group

3.4.1 Context-related CMEF baseline indicators

Regions in the Environment Group show several statistically significant characteristics ($p<0.05$) that can be expected for regions in this group (**Table 6**), for example, less arable Utilised Agricultural Area (UAA) and more permanent grassland (both sub-indicators of C3), a higher UAA percentage of natural areas (C7), less favoured area (C8) and extensive arable grazing (C9). Also significant is a larger average physical farm size ($C4_{Env}$= 46.5 ha) compared to Competitiveness regions ($C4_{Com}$=22.6 ha, which have more very small and semi-subsistence farms reducing the mean value), and a slightly lower share of people in the age group 15-64 years ($C18_{Env}$=66.0).

3.4.2 Objective-related CMEF baseline state indicators (Hypothesis 1)

Regarding the horizontal objective-related CMEF indicators (**Table 7**), the Environment Group regions perform slightly better in terms of the employment indicators (higher employment rate, lower unemployment rate; $p<0.05$) when compared to the Competitiveness Group. The average GDP appears higher compared to the other two expenditure groups, but this was not confirmed by the post-hoc test. A breakdown by convergence/non-convergence regions shows that, in non-convergence regions, GDP is much higher and relatively equal among the groups, and only in convergence regions it is higher than in the other groups, though not significant (Appendix).

With regard to the objective-related CMEF indicators for axis 2, CMEF guidance note F lists ten relevant objective-related baseline lead indicators (O17 to O26) covering the environmental topics 'biodiversity' (O17, O18, O19), 'water quality' (O20, O21), 'soil' (O22, O23) and 'climate change' (O24, O25, O26).

Out of these, at NUTS2 level, only three baseline state indicators (O18 – High Nature Value (HNV) farmland as % of UAA; O22 - Share of estimated agricultural area affected by moderate to severe water erosion, O23 - % UAA under organic farming) are available, and several limitations have to be considered regarding these three indicators.

The first indicator, HNV farmland (O18), is based on an unclear foundation. CMEF guidance note G[9], which contains a detailed description of the CMEF indicators ('indicator fiches'), outlines that this indicator is still subject to debate, and therefore the Member States are encouraged "to make use of a national definition for this indicator". Different approaches for defining HNV farmland have consequently been worked out across the EU, therefore the validity and comparability of this indicator has to be questioned.

The second indicator, the area at risk of soil erosion (O22), is not measured but based on estimations using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE values reflect rather

[9] http://ec.europa.eu/agriculture/rurdev/eval/guidance/note_g_en.pdf

biophysical characteristics (originating from slope, rainfall erosivity, soil erodibility) and crop associated erosion rates, while typical management adaptations such as no-tillage, adapted ploughing techniques in hilly areas or the growing of intercrops and undersown crops which are typically supported by erosion-reducing interventions are usually not accounted for given that EU-wide information on the cropping management related P-factors used in this equation is usually lacking. Thus the RUSLE values may overestimate existing erosion risk and therefore are of limited usefulness. Model-based estimates, such as RUSLE for erosion or other models for N-pollution are probably the best alternative to *no* data. However, when applied at EU-scale, the extent to which these approaches are sensitive to changes in agricultural management practices and thus suitable for policy evaluation needs to be made clear, or whether they reflect only rather non-policy responsive, natural conditions.

The third indicator, the area under organic farming (O23), is measuring a direct output of axis 2 support and therefore identical with the corresponding output indicator, and at most a very indirect measure of environmental quality.

Apart from these limitations, regions in the Environment Group have higher mean values compared to the other expenditure groups (**Table 7**). Statistically significant are a higher share of area at risk for soil erosion ($O22f_{Env}$=6.6 % UAA) and a higher share of organic farming ($O23b_{Env}$=5.4 % UAA). HNV farmland ($O18b_{Env}$=31.6 % UAA) is also higher than in the other groups but not significant which may reflect the aforementioned indicator definition problems.

Higher values in the axis-related CMEF state indicators actually violate hypothesis 1, according to which an underperformance would be expected to justify the expenditure priority on axis 2. However, the indicators assigned to axis 2 are not measuring performance; therefore the argumentation has to be different. Different from the Competitiveness Group where the corresponding CMEF state indicators measured performance and thus *lower* values were used as a justification for increased priority on axis 1, the argumentation for the Environment Group must be that *higher* values in the state indicators reflect specific regional production disadvantages (regional needs) and thus explain the expenditure priority for axis 2 in this group.

For example, regions with more HNV farmland, high erosion rates or a high share of organic farming are usually not the most favourable agricultural production areas, but instead prime candidates for axis 2 support. Axis 2 funding would be used to maintain existing HNV and organically managed farm land and to support interventions against erosion. Overall, the regions in the Environment Group seem less needy with regard to competitiveness support from axis 1, while having more of the typical natural assets targeted by axis 2 interventions, thus supporting the appropriateness of the priority setting in these regions.

3.4.3 Objective-related CMEF baseline change indicators (Hypothesis 2)

No conclusions can be drawn with regard to hypothesis 2, as change indicators are not available given that the indicators have been reported for the first time in 2013. Change rates over time could indicate possible positive development trends but would not be comparable unless the same calculation method is used for all regions (HNV farmland) and the calculation method is sensitive to agricultural management changes and thus RD interventions (water erosion), which is not the case at the moment.

3.5 The Equal Spending Group

3.5.1 Context-related CMEF baseline indicators

The Equal Spending Group has at a significant rate(**Table 6**), a lower percentage of GVA generated in rural areas (C2: 18.6%), a higher share of arable land (C3: 69.0%) similar to the Competitiveness Group (and therefore less grassland and permanent crops), the highest average physical farm size (C4: 67.4 ha on average), the lowest share of LFA (C8: 31.9%) and thus potentially good conditions for farming, and the highest percentage of population in the age class >65 years (C18: 18.7%).

3.5.2 Objective-related CMEF baseline state indicators (Hypothesis 1)

The state indicators of the objective-related CMEF indicators show that regions in the Equal Spending Group have less clear needs with regard to a particular axis than the other groups (**Table 7**).

The only statistically confirmed differences across all objective-related indicators, and only in comparison to the Competitiveness Group, are a higher employment rate (O2a: 67.2%) and a lower share of employment in the food industry (O12: 2.2%), and, compared to the Environment Group, a lower share of area at risk for soil erosion (O22f).

Regarding the horizontal indicators (**Table 7**), and excluding the Rural Viability Group, regions in the Equal Spending Group have a GDP (O1a= 90.4 index) and unemployment rate (O3a: 8.9%) that is in between Competitiveness and Environment Group (**Table 7**), while they have the highest employment rate[10] (O2a).

There are no clear needs that would justify the prioritization of a particular axis. Typical axis 1 interventions (**Table 1**), such as vocational training (measure code 111) or the early retirement aid (113) are less suitable given that these regions have already a high level of managers with basic or full agricultural training ($O4_{Equ}$=49.9%) and the share of farmers that are older than 55 years (O5) is similar to the Competitiveness and Environment Group. Equal Spending regions have also a relatively high agricultural labour productivity ($O6a_{Equ}$=21,900 EURO/AWU) despite the medium-high level of semi-subsistence farms ($O16_{Equ}$=36.2%).

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[10] "The employment rate is defined as the employment-to-population ratio. Thus, the employment and the unemployment rate do not sum up to 100 %", http://ec.europa.eu/agriculture/cap-indicators/context/2014/full-text_en.pdf p.29

Regarding axis 2 interventions, the Equal Spending regions have less HNV farm land (O18b) and area at risk for soil erosion (O22f) compared to the Competitiveness and Environment Group, and a medium high percentage of organic farming (O23b: 3.8 % of total UAA), also supporting that there is no specific spending priority for this axis. The situation for the axes 3/4 is similar.

Therefore, the data supports that the regions in this group have multiple less clear and less severe challenges than the groups "specialized" on a single axis, thus explaining that no clear prioritization of a single axis is present.

3.5.3 Objective-related CMEF baseline change indicators (Hypothesis 2)

The only significant change indicator is O1b, Change in Economic Development; GDP (in pps[11])/capita (EU-27=100), which is significantly higher compared to the Environment Group but insignificant from the Competitiveness Group. All other indicators are insignificant.

3.6 Overall similarity between expenditure groups

To have an overall measure for the similarity between the four groups Euclidean distances were calculated from the z-standardized objective-related indicator values, shown in **Table 8**.

The smallest Euclidean distance (0.37) and thus greatest similarity characterized the pair Environment/Equal spending, while the greatest difference occurred for the pair Competitiveness/Rural Viability (1). The Environment Group is most similar to the average of the sample, which is due to the fact, that this group constitutes the greatest group and is thus strongly determining the mean.

Euclidean distances for the three axes show that, regarding axis 1 indicators, the regions in the Equal Spending Group are a bit more similar to the Environment Group, while for axis 2 and axes 3/4 indicators they resemble more the Competitiveness Group. This is also supported by the fact that the Games-Howell test identified significant differences mostly between the Competitiveness and the Environment Group, and less often with regard to the Equal Spending Group.

3.7 Prediction of expenditure groups

The step-wise DA identified one canonical discriminant function including following CMEF indicators, listed in order of their discriminating power:

- Objective16 - Importance of semi-subsistence farming; % of farms < 1 ESU (O16)
- Objective 23 - Soil: Organic Farming; % UAA under organic farming (O23b)
- Objective 12 - Employment Development in Food Industry; Share of employment in food industry (% total employment) (O12b)
- Objective 1 – Economic Development; Change in GDP (in pps)/capita (EU-27=100) (O1b)

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[11] purchasing power standards

- Context 3 - Agricultural Land Use; % arable area (C3a)
- Context 9 - Areas of Extensive Agriculture; % UAA for extensive arable grazing (C9b)

With these indicators it is possible to correctly predict the expenditure group for 172 out of 207 cases (83.1% accuracy). The accuracy was a bit lower for the Competitiveness Group (76.8% compared to 85.4% for the Environment Group), but overall the discriminant function delivers a relatively suitable result.

The estimated (raw) canonical discriminant function coefficients can be used to calculate a discriminant score (DS) for each NUTS2 region according to following equation:

$$DS = -1.580 + 0.043*O1b + 0.375*O12b + 0.025*O16 - 0.094*O23b + 0.011*C3a - 0.008*C9b$$

The resulting DS value compared to the estimated group centroids ($D_{Competitiveness}$= 1.344, $D_{Environment}$ = -0.490), and the smallest absolute distance (modulus) is decisive for classification into a particular group.

Example: The UAA percentages of an example NUTS2 region are 53.8% arable land, 22.0% extensive arable grazing, and 2.1% organic farming. 22.9% of the farms are semi-subsistence farms. The share of employment in the food industry is 1.8%, and the GDP shows a negative development of -4.2.

The resulting discriminant for this region score can be calculated as follows:

$$DS = -1.580 + 0.043*-4.2 + 0.375*1.8 + 0.025*22.9 - 0.094*2.1 + 0.011*53.8 - 0.008*22.0$$
$$= -0.254$$

$$Distance_{CentroidCompetitiveness} = |DS - D_{Competitiveness}| = |-0.254 - 1.344| = 1.598$$
$$Distance_{CentroidEnvironment} = |DS - D_{Environment}| = |-0.254 - (-0.490)| = 0.235$$

The absolute distance to the Environment Centroid is smaller; therefore this NUTS region is classified into the Environment Group, and is thus expected to spend more than 50% of its RD funding for axis 2.

A further analysis of the 35 falsely classified regions (17% of the DA sample) was done, showing that their respective characteristics differed from their group peers and resembled more the respective other expenditure group (**Table 9**), explaining the DA classification result. For example, regions of the Environment Group falsely classified by the DA as Competitiveness regions, have at a significant rate, a more positive GDP development (O1: +2.01%), a higher share of employment in the food industry (O12: 3.12%), a higher share of semi-subsistence farms (O16: 47.86%), and a lower share of organic farming (O23), and resemble thus more the regions in the Competitiveness Group.

Such deviations can be a hint for non-optimal priority setting in terms of RD budget allocation in the falsely classified regions. Possible explanations for a deviating priority setting could be that decision-making on rural development expenditure in several countries is made at the national level, potentially overlooking differing regional needs, particularly in periphery regions, thus leading to a less suitable expenditure allocation. The demand for RD measures by rural actors is also not completely predictable or steerable, given the voluntary nature of RD measures, leading to differences between planned and realised expenditure. The history and tradition of rural development expenditure in a particular region may also play a role (path-dependency), and data inconsistencies in the CMEF dataset as potential cause can also not be ruled out. Interpretations should therefore be made with caution; however, the identified regions are prime candidates for further in-depth analyses of their rural development targeting strategy.

4 Conclusions

The article has used CMEF and public expenditure data to analyse regional expenditure patterns and their relation to CMEF objective and context-related baseline indicators. The study underlines the complexity that arises from the different objectives and types of interventions that are included under the rural development pillar of the CAP. Budget allocation prioritizing environment objectives is most common at the NUTS2 level, followed by a smaller group of regions with a focus on axis 1 (Competitiveness), and thus oriented on the economic development of the primary sector, and one with a relatively equal budget allocation among the thematic RD axes (Equal Spending), while a strong budget priority for rural viability (axes 3 and 4) is the exception.

There is some indication for positive development in regions prioritizing axis 1 (e.g. higher increase in agricultural labour productivity) without reversing cross-sectoral trends (e.g. high unemployment), however, it remains unclear whether this can be attributed to the presence of axis 1 funding as it is not possible to separate rural policy effects from other developments with the available data.

Due to lack of suitable indicators (Environment Group) and a too small sample size (Rural Viability Group), developments trends for these two groups could not be identified, and for the Equal Spending Group, developments were inconsistent, as expected. Greatest differences in the CMEF baseline indicators existed between regions prioritizing competitiveness interventions and those prioritizing environment interventions, while regions with an equal expenditure pattern are in between those two. Statistical results and discriminant analysis confirmed that budget expenditure for the RD axes and rural development needs were generally coherent and the budget pattern thus relatively predictable, however, there were also regions that seemed to have a deviating budget pattern (17% of the DA sample) and should be further investigated.

The analysis in this article also demonstrates the importance of collecting and managing proper indicators at EU level. The structure of the 2007-2013 CMEF proved useful for the analysis in this article, though several limitations regarding data availability and quality are still major constraints to a meaningful and reliable analysis for all three RD axes, particularly with regard to environment-related indicators below national scales. A further and consistent continuation of the core CMEF indicators in combination with greater data completeness would be desirable to facilitate time series analysis to support effective monitoring of achievement of CAP objectives in the future.

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Tables

Table 1: *Overview of the rural development interventions in the EU (period 2007-2013)*

Axis 1 Competitiveness	Axis 2 Environment	Axis 3 Rural viability	Axis 4 LEADER
(111) Vocational training and information actions (112) Setting up of young farmers (113) Early retirement (114) Use of advisory services (115) Setting up of management, relief and advisory services (121) Modernisation of agricultural holdings (122) Improvement of the economic value of forests (123) Adding value to agricultural and forestry products (124) Cooperation for development of new products (125) Infrastructure related to the development and adaptation (126) Restoring agricultural production potential (131) Meeting standards based on Community legislation (132) Participation of farmers in food quality schemes (133) Information and promotion activities (141) Semi-subsistence farming (142) Producer groups	(211) Natural handicap payments to farmers in mountain areas (212) Payments to farmers in areas with handicaps, other than mountain areas (213) Natura 2000 payments and payments. linked to Directive 2000/60/EC (214) Agri-environment payments (215) Animal welfare payments (216) Non-productive investments (221) First afforestation of agricultural land (222) First establishment of agroforestry systems (223) First afforestation of non-agricultural land (224) Natura 2000 payments (225) Forest-environment payments (226) Restoring forestry potential and introducing prevention (227) Non-productive investments	(311) Diversification into non-agricultural activities (312) Support for business creation and development (313) Encouragement of tourism activities (321) Basic services for the economy and rural population (322) Village renewal and development (323) Conservation and upgrading of the rural heritage (331) Training and information (341) Skills acquisition, animation.	(411) Implementing local development strategies. Competitiveness (412) Implementing local development strategies. Environment/land (413) Implementing local development strategies. Quality of life (421) Implementing cooperation projects (431) Running the local action group, acquiring skills and ...

Table 2: *CMEF data sources (Source: CMEF – baseline indicator tables published in 2013)*

Data sources	**Number of indicators**
Eurostat	119
- National and Regional Economic Accounts	49
- Farm Structure Survey	26
- Labour Force Survey	18
- Population statistics	15
- Energy Statistics	4
- Tourism statistics	2
- Agri-environmental indicators	2
- Statistics on agricultural production methods	2
- GISCO database	1
FOREST EUROPE/UNECE/FAO	33
European Environment Agency	19
DG Environment	12
- Corine Land Cover 2006	7
- Natura 2000 Barometer	3
- directly reported by Member States	2
Joint Research Centre (JRC) (RUSLE model)	8
DG Agriculture and Rural Development	7
DG Communication Networks, Content and Technology	7
National data as reported to ICP Forests	6
EurObservER, EBB, ePURE	4
Eurostat/OECD - PECBM and national programmes	3
Total number of CMEF sub-indicators 2013	**218**

Source: http://ec.europa.eu/agriculture/statistics/rural-development/2013/regional_tables_en.xlsx

GISCO: Geographical information system of the Commission
FOREST EUROPE: the Ministerial Conference on the Protection of Forests in Europe
UNECE: United Nations Economic Commission for Europe
DG: Directorate General
RUSLE: Revised Universal Soil Loss Equation
ICP Forests: International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests
EurObserv'ER: barometer that measures the progress made by renewable energies in each sector and in each Member State of the EU
EBB European Biodiesel Board
ePURE EU representation of European renewable ethanol industry
PECBM: Pan-European Common Bird Monitoring

Table 3: *Availability of CMEF baseline indicators for the NUTS subdivisions (2013 dataset)*

NUTS level	Baseline indicator type	Lead indicators	Total	Sub-indicators		Total
				State	Change	
NUTS0	Objective-related	36		78	24	
(country)	Context-related	22	57	88	27	217*
NUTS1	Objective-related	21		37	13	
	Context-related	13	34	56	13	119
NUTS2	Objective-related	22		38	14	
	Context-related	15	37	61	14	127
NUTS3	Objective-related	16		28	9	
(district)	Context-related	11	27	39	10	86

*The context-related indicator ‘Designation of rural areas’ (C1) is not reported at the national level, therefore the total number of sub-indicators is 217, and not 218

Table 4: *Co-financing rates and EU member states contribution rates*

Axis	**Type of region**	**EU Co-financing rate**	**EU Member States Contribution rate**
1	Convergence region*	0.75	0.25
	Non-convergence regions	0.5	0.5
2	Convergence region	0.8	0.2
	Non-convergence regions	0.55	0.45
3	Convergence region	0.75	0.25
	Non-convergence regions	0.5	0.5
4	Convergence region	0.8	0.2
	Non-convergence regions	0.55	0.45

* Regions with a Gross Domestic Product (GDP) per capita below 75% of the EU-27 average

Table 5: *General statistics of the four RD expenditure groups*

		Competitiveness n=60	Environment n=174	Rural viability n=4	Equal Spending n=25	Whole Sample n=263
Convergence regions (n)		28	42	1	10	81
Non-convergence regions (n)		32	132	3	15	182
EU-15 regions (n)		34	155	3	16	208
EU-12* regions (n)		26	19	1	9	55
RD expenditure allocation						
mean	Axis1%	0.62	0.18	0.13	0.35	0.30
	Axis2%	0.31	0.75	0.25	0.37	0.60
	Axes3,4%	0.07	0.07	0.62	0.28	0.10
standard deviation	Axis1%	0.10	0.11	0.02	0.10	0.22
	Axis2%	0.13	0.12	0.10	0.08	0.24
	Axes3,4%	0.08	0.07	0.11	0.09	0.11

* EU accession after 2004, so-called New Member States

***Table 6:** Expenditure group means of CMEF context-specific baseline indicators (2013 published data, NUTS2 level)*

					Expenditure group				
Axis		**Indicator description**	**Measurement/Unit**		**Competitiveness**	**Environment**	**Rural Viability**	**Equal Spending**	**sig.[a]**
horizontal	C1	Designation of Rural Areas	OECD regional typology	n PR/ n IR/ n PU	10/ 30/ 20	46/ 81/ 47	0/ 2/ 2	2/ 15/ 8	
	C2	Importance of Rural Areas	% Territory in Rural Areas	% PR/ % IR/ %PU	39.1/ 36.1/ 26.0	40.5/ 39.4/ 21.5	24.2/ 24.3/ 51.6	31.5/ 41.0/ 30.7	
			% Population in Rural Areas		30.8/ 36.3/ 34.4	31.4/ 39.3/ 29.5	13.9/ 21.3/ 64.8	20.9/ 43.1/ 38.7	
			% GVA in Rural Areas		28.3/ 36.3/ 36.9	30.3/ 39.3/ 31.5	11.6/ 17.6/ 70.9	18.6/ 43.7/ 40.4	*
			% Employment in Rural Areas		29.6/ 36.0/ 35.9	30.4/ 39.4/ 31.2	12.1/ 19.7/ 68.2	19.6/ 43.5/ 39.7	
Axis 1	C3	Agricultural Land Use	% UAA arable/ permanent grass/ permanent crops		66.1/ 25.7/ 7.8	54.3/ 38.9/ 6.5	67.9/ 29.6/ 2.5	69.0/ 26.8/ 3.6	*
	C4	Farm Structure	Number of Farms	n	4,084,130	5,871,940	70,780	2,203,780	*
			UAA	ha	49,856,820	100,327,350	690,420	18,521,670	
			Average Physical Farm Size	ha	22.6	46.5	29.4	67.4	*
			Physical Farm Size	% of holdings < 5 ha UAA/ 5-50 ha/>50ha	56.6/ 31.1/ 11.5	33.3/ 44.5/ 21.8	41.6/ 38.4/ 20.2	44.7/ 34.0/ 21.4	*
			Average Economic Farm Size	SO	48160.3	65752.0	129549.6	63598.6	
			Economic Farm Size	% of holdings < 4000 SO/4000-50000 SO />50000 SO	44.0/ 38.1/ 17.9	25.6/ 50.2/ 23.7	24.0/ 32.6/ 43.4	32.6/ 42.0/ 25.3	*
			Labour Force	AWU	3,766,360	4,928,950	75,920	1,265,700	*
Axis 2	C7	Land Cover	% agricultural/ forest/ natural/ artificial area		57.4/ 21.1/ 5.2/ 10.1	50.7/ 23.0/ 8.0/ 9.4	44.8/ 18.9/ 1.8/ 23.5	57.0/ 21.4/ 3.7/ 12.8	*
	C8	Less Favoured Areas		% UAA non-LFA/LFA	62.0/ 38.0	48.5/ 51.5	66.7/ 33.3	68.1/ 31.9	*
	C9	Areas of Extensive Agriculture	% UAA for extensive arable crops	% UAA where cereals yield < 60% of EU27-average	19.0	3.6	6.0	13.9	*
			% UAA for extensive arable grazing	% UAA where Livestock density (LU) < 1 LU/ha of forage area	14.0	29.5	28.8	19.1	*
	C10	Natura 2000 area	% UAA under NATURA 2000	%Agricultural/ Forest area	9.1/ 35.4	7.4/ 22.0	8.2/ 28.7	10.6/ 35.6	*
	C15	Water Use		% irrigated UAA	7.1	6.6	7.2	6.7	
Axis 3/4	C17	Population Density			366.1	329.1	1129.9	491.1	
	C18	Age Structure	% people aged 0-14/15-64/>65 years		15.2/ 67.6/ 17.2	15.6/ 66.0/ 18.4	15.7/ 67.6/ 16.6	14.4/ 66.9/ 18.7	*
	C19	Structure of the Economy	% GVA in Primary/ Secondary/ Tertiary sector		3.6/ 29.8/ 66.6	2.5/ 27.2/ 70.3	2.5/ 24.1/ 73.3	3.1/ 29.9/ 67.0	*
	C20	Structure of Employment	% Employment in Primary/ Secondary/ Tertiary sector		8.6/ 26.0/ 65.4	5.1/ 23.8/ 71.1	4.1/ 19.5/ 76.3	8.9/ 23.9/ 67.1	*
	C21	Long-Term Unemployment	% active population		5.5	3.7	3.2	4.0	*
	C22	Educational Attainment	% adults (25-64 years) with Medium or High educational attainment		73.7	73.7	79.3	79.6	

[a] at least one of the sub-indicators is significant in both Kruskal-Wallis and post hoc test ($p<0.05$), Rural Viability Group not included in the tests

OECD regional typology: Predominantly Urban (PU), if the share of population living in rural local units is below 15%;
Intermediate Rural (IR), if the share of population living in rural local units is between 15% and 50%; Predominantly Rural(PR), if the share of population living in rural local units is higher than 50%
GVA – Gross Value Added (GVA = GDP + subsidies - (direct, sales) taxes), http://www.oecd.org/gov/regional-policy/42392595.pdf
UAA – Utilised Agricultural Area
ESU - European Size Unit (1 ESU = 1200 EURO Farm Standard Gross Margin), see http://ec.europa.eu/agriculture/rica/methodology1_en.cfm
SO - The standard output of an agricultural product (crop or livestock), abbreviated as SO, is the average monetary value of the agricultural output at farm-gate price, see http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:SO
AWU - One annual work unit, abbreviated as AWU, corresponds to the work performed by one person who is occupied on an agricultural holding on a full-time basis. Full-time means the minimum hours required by the relevant national provisions governing contracts of employment. If the national provisions do not indicate the number of hours, then 1 800 hours are taken to be the minimum annual working hours: equivalent to 225 working days of eight hours each, see http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Annual_work_unit_%28AWU%29
LFA – Less Favoured Areas, areas designated as "less-favoured", agricultural production or activity is more difficult because of natural handicaps, e.g. difficult climatic conditions, steep slopes in mountain areas, or low soil productivity

Table 7: Expenditure group means of CMEF objective-related baseline indicators (2013 published data, NUTS2 level)

Axis	Indic.	Indicator description	Unit	Year of data	Whole Sample	Competitive-ness	Environ-ment	Rural Viability	Equal Spending	KW-sig.	GH-sig.
horizontal	O1a	Economic Development; GDP(in pps[a])/capita (EU-27=100)	index of pps	avg 2008-2010	96.2	86.2	100.1	100.5	90.4	0.05	
	O1b	- Change in Economic Development; GDP(in pps)/capita (EU-27=100)	index of pps	avg 2008-2010 - avg 2005-2007	-1.1	1.9	-2.7	6.7	1.1	0.00	1:2,2:4
	O2a	Employment Rate; Employed persons/total population (15-64 y.o,)	%	2012	65.3	60.4	66.4	70.9	67.2	0.00	1:2,1:4
	O2b	- Change in Employment Rate; Employed persons/total population (15-64 y.o.)	%	2007-2012	-0.3	-1.2	-0.2	0.7	1.0	0.10	
	O3a	Unemployment; Unemployment rate	%	2012	9.5	12.6	8.7	7.1	8.9	0.00	1:2
	O3b	- Change in Unemployment; Unemployment rate	%	2007-2012	2.1	4.1	1.6	0.5	1.0	0.01	1:2
Axis 1	O4	Training and Education in Agriculture; % managers with basic or full agricultural training	%	2010	40.5	32.7	40.9	64.6	49.9	0.02	
	O5	Age Structure in Agriculture; Ratio: farmers >=55 y.o.	%	2010	0.2	0.2	0.2	0.1	0.2	0.29	
	O6a	Labour Productivity in Agriculture; GVA[b] / AWU[b]	1000 Euro / AWU	avg 2010-2012	20.1	18.3	19.9	44.3	21.9	0.15	
	O6b	- Change in Labour Productivity in Agriculture; Average annual growth rate in nominal terms	%	2007-2012	0.2	5.4	-1.0	2.9	1.4	0.02	1:2
	O7b	GFCF in Agriculture ; Gross Fixed Capital Formation in agriculture as a share of Gross Value Added in agriculture	%	2010	43.1	31.3	44.8	62.2	42.7	0.11	
	O7c	- Change in GFCF in Agriculture ; Average annual growth rate in nominal terms	%	2005-2010	3.4	1.4	3.6	5.6	3.0	0.27	
	O8b	Employment Development of Primary Sector; Share of primary sector in total employment	%	2010	6.3	8.5	5.2	4.1	8.9	0.02	1:2
	O8c	- Change in Employment Development of Primary Sector; Average annual growth rate	%	2010	-1.8	-2.6	-1.6	-5.7	-1.0	0.01	
	O9b	Economic Development of Primary Sector; Share of primary sector in total GVA	%	2010	2.8	3.7	2.4	2.5	3.1	0.00	1:2
	O9c	- Change in Economic Development of Primary Sector; Average annual growth rate	%	2007-2010	-1.0	0.1	-1.1	-11.6	-1.1	0.21	
	O12b	Employment Development in Food Industry; Share of employment in food industry in total employment	%	2012	2.4	3.2	2.1	2.3	2.2	0.00	1:2,1:4
	O12c	- Change in Employment Development in Food Industry; Average annual growth rate of Employment in food industry	%	2007-2012	-1.2	-1.6	-1.1	2.0	-2.0	0.32	
	O16	Importance of semi-subsistence farming in New Member States	% of farms < 1 ESU	2010	40.5	43.5	24.5	23.4	36.2	0.00	1:2
Axis 2	O18b	HNV[d] farmland; Agricultural land of high nature value	% UAA	2013	29.3	25.8	31.6	21.9	24.1	0.39	
	O22f	Area at risk of soil erosion; Share of estimated agricultural area affected by moderate to severe water erosion (>11 t/ha/year)/Total agricultural area	% UAA	2006-2007	5.4	3.9	6.6	0.5	1.9	0.01	2:4
	O23b	Soil: Organic Farming	% UAA	2011	4.3	1.8	5.4	1.2	3.8	0.00	1:2
Axis 3	O27	Farmers with Other Gainful Activity	%	2010	38.9	35.2	39.5	50.7	40.5	0.12	
	O28b	Employment Development of Non-Agricultural Sector; Share of secondary and tertiary sectors in total employment	%	2010	93.8	91.6	94.9	95.9	91.1	0.03	1:2
	O28c	- Change in Employment Development of Non-Agricultural Sector; Average annual growth rate of employment in secondary and tertiary sectors	%	2007-2010	0.05	-0.2	0.2	0.6	-0.5	0.20	
	O29b	Economic Development of Non-Agricultural Sector; Share of secondary and tertiary sectors in total GVA	%	2010	97.3	96.5	97.6	97.5	96.9	0.02	1:2
	O30b	Self-Employment Development; Share of self-employment in total employment	%	2012	15.7	15.4	16.1	13.6	13.9	0.30	
	O30c	- Change in Self-Employment Development; Share of self-employment in total employment	%	2007-2012	2.1	-1.1	3.4	9.0	1.0	0.01	
	O31b	- Change in Tourism Infrastructure in Rural Areas; % change number of bed places	%	2012	2.9	1.5	3.3	3.9	3.4	0.46	
	O33a	Development of Services Sector; Share of GVA in services	%	2010	8.8	4.2	10.9	0.7	6.6	0.00	
	O33b	- Change in Development of Services Sector; Share of GVA in services	%	2007-2010	0.2	0.4	0.2	1.6	-0.4	0.36	
	O34a	Net Migration; Net migration crude rate	rate per 1000	2011	2.2	0.9	2.7	3.6	1.1	0.00	1:2
	O34b	- Change in Net Migration; Net migration crude rate	rate per 1000	2007-2011	-1.4	-3.0	-0.9	1.5	-1.7	0.36	
	O35a	Life-Long Learning in Rural Areas; % of 25-64 y.o. participating in education and training	%	2012	9.7	6.0	11.1	10.9	8.9	0.00	1:2
	O35b	- Change in Life-Long Learning in Rural Areas; % of 25-64 y.o. participating in education and training	%	2007-2012	0.1	-0.1	0.1	-0.1	0.8	0.14	

[a] pps purchasing power standards [b] GVA Gross Value Added [c] AWU Annual Work Units [d] HNV High Nature Value farmland

Grey-shaded cells: group mean values > mean of the whole sample

KW-sig: Kruskal-Wallis test result, level of significance; orange shaded = significant at p<0.05; Rural Viability Group not included in both tests

GH-sig: Games-Howell test result, pairs with significant (p<0.05) differences, e.g. 1:2 means that there are statistically significant differences in the group means of Competitiveness (1) and Environment (2) Group

Table 8: *Euclidean distance matrix, calculated from the z-standardized CMEF objective-related baseline indicators (all available sub-indicators)*

		Expenditure groups			
		Competitiveness	Environment	Rural Viability	Equal Spending
All indicators	Competitiveness	0			
	Environment	0.59	0		
	Rural Viability	1	0.80	0	
	Equal Spending	0.49	0.37	0.78	0
Indicators assigned to Axis 1	Competitiveness	0			
	Environment	0.55	0		
	Rural Viability	1	0.79	0	
	Equal Spending	0.49	0.29	0.73	0
Indicators assigned to Axis 2	Competitiveness	0			
	Environment	0.72	0		
	Rural Viability	0.35	1	0	
	Equal Spending	0.40	0.57	0.50	0
Indicators assigned to Axes 3,4	Competitiveness	0			
	Environment	0.63	0		
	Rural Viability	1	0.65	0	
	Equal Spending	0.43	0.50	0.91	0

Table 9: *Comparison of correctly and falsely classified expenditure groups (discriminant analysis)*

Original group	Competitiveness (n=56)			Environment (n=151)		
Classified as	Environment n=13	Competitiveness n=43	p	Competitiveness n=22	Environment n=129	p
CMEF sub-indicators						
O1b	-4.18	3.91	*	2.01	-3.86	*
O12b	1.84	3.59	*	3.12	1.92	*
O16	22.87	51.67	*	47.86	20.53	*
O23b	2.10	1.78		3.09	5.90	*
C3a	53.79	70.70		57.56	51.83	
C9b	21.96	12.47		28.25	33.68	

* indicates significant differences (p<0.05)

Table 10: *NUTS2 regions with an expenditure patterns deviating from the discriminant analysis (DA) result (= candidates for in-depth targeting analysis)*

Country	**NUTS2 code**	**Region**	**Observed expenditure group**	**DA group**
Belgium	BE10	Région de Bruxelles-Capitale/ Brussels Hoofdstedelijk Gewest	1	2
	BE21	Prov. Antwerpen	1	2
	BE24	Prov. Vlaams-Brabant	1	2
Germany	DE50	Bremen	1	2
Spain	ES12	Principado de Asturias	1	2
	ES51	Cataluña	1	2
	ES53	Illes Balears	1	2
	ES70	Canarias	1	2
France	FR10	Île de France	1	2
Italy	ITC3	Liguria	1	2
	ITD3	Veneto	1	2
	ITD4	Friuli-Venezia Giulia	1	2
Netherlands	NL41	Noord-Brabant	1	2
Denmark	DK05	Nordjylland	2	1
Spain	ES43	Extremadura	2	1
France	FR24	Centre	2	1
	FR53	Poitou-Charentes	2	1
Greece	GR21	Ipeiros	2	1
Italy	ITF2	Molise	2	1
	ITF3	Campania	2	1
Latvia	LV00	Latvija	2	1
Poland	PL42	Zachodniopomorskie	2	1
	PL43	Lubuskie	2	1
	PL62	Warminsko-Mazurskie	2	1
	PL63	Pomorskie	2	1
Portugal	PT11	Norte	2	1
	PT16	Centro (P)	2	1
	PT18	Alentejo	2	1
	PT20	Região Autónoma dos Açores	2	1
Romania	RO11	Nord-Vest	2	1
	RO12	Centru	2	1
	RO42	Vest	2	1
Slovakia	SK01	Bratislavsky kraj	2	1
United Kingdom	UKD2	Cheshire	2	1
	UKF3	Lincolnshire	2	1

Figures

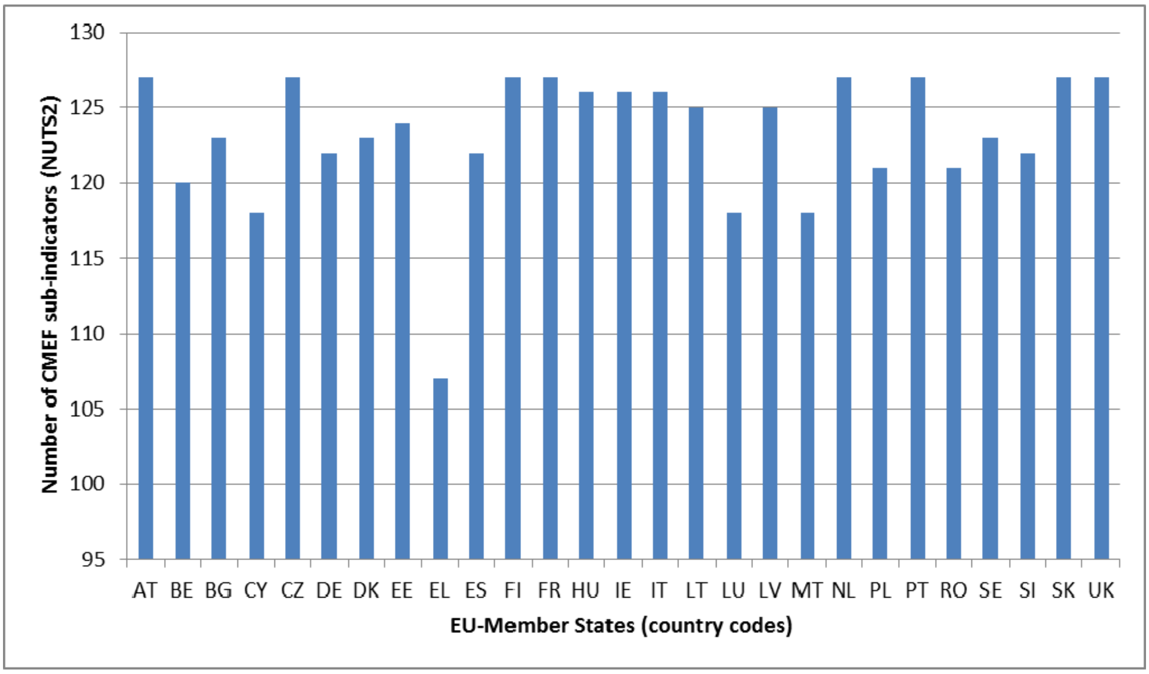

Figure 1: *Availability of CMEF baseline objective- and context-related indicators (sub-indicators) at NUTS2 level, by EU-Member State (total number of sub-indicators published in 2013: n=218)*

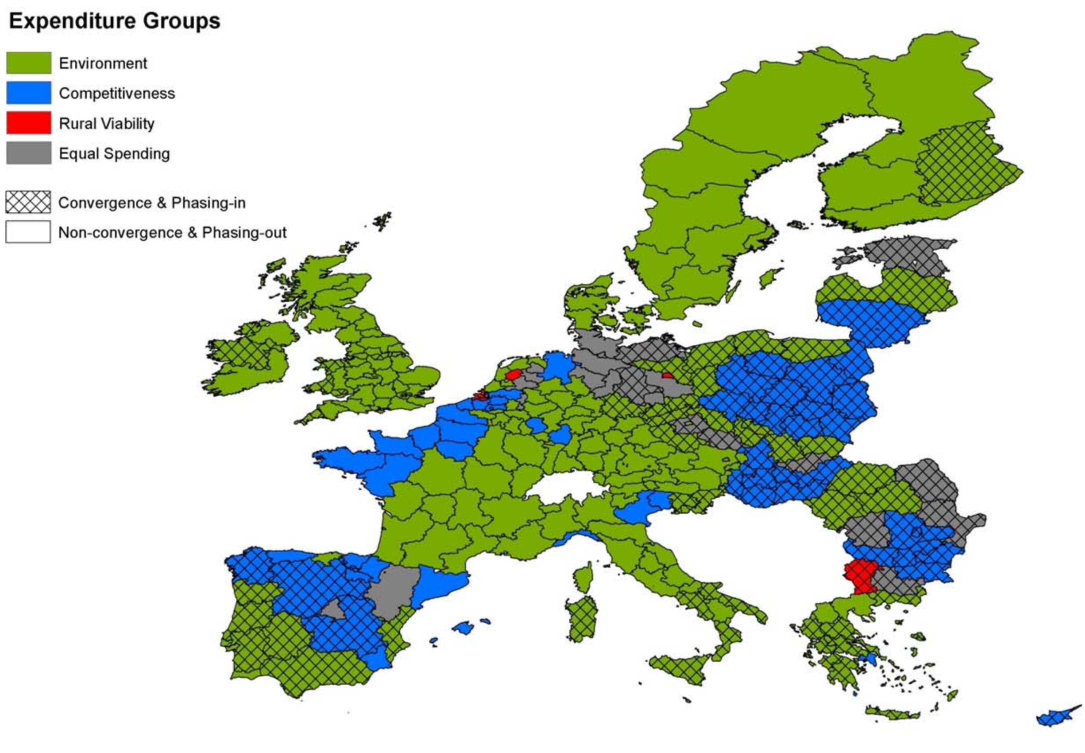

Figure 2: *NUTS2 regions with a similar expenditure pattern for rural development (colours); hatched areas indicate the status of the regions under the EU cohesion policy (2007-2013) which determines the level of co-financing from the EU*