How much rural is the CAP?

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Abstract

In this task, research is mostly finalised to analyse how EU policies have been distributed across space. Here, the main focus is on Common Agricultural Policy (CAP) expenditure. The same territorial detail adopted in previous tasks is used (i.e., NUTS 3 level). By analysing CAP expenditure at such a territorial disaggregation level, this work has specifically concentrated on rural, agricultural and environmental policies. Actually, specific CAP measures are directly aimed at tackling those issues. CAP also accounts for a large share of overall EU funds, and it represents one of major drivers of EU spatial development. The methodology of analysis is based on the reconstruction of allocation of EU funds across EU-27 NUTS 3 regions. First, an exploratory analysis of the spatial allocation of CAP expenditure across Europe is assessed. Spatial allocation of CAP expenditure is considered by disentangling specific measures as well (e.g., Pillar One and Pillar Two expenditure, Direct Payment and Market Intervention Measures, Pillar Two's Axes…). Both absolute expenditure levels and expenditure intensity are computed here. Then, through a simple statistical analysis, the correlation between CAP expenditure at NUTS 3 level and regional features, in terms of both rurality and agricultural activity, is assessed.

Contribution to the Project

Assessing distribution and role of EU policies, by focusing on spatial allocation of CAP expenditure at NUTS 3 level.

Keywords: Economic growth path, European economic policy

Jel codes: O18, Q01, R12, R58

Content

1. Introduction and main objectives

The analysis of the allocation of European policies throughout the EU-27 is one of the main objectives of this MS (#105). In particular, a detailed analysis of the territorial allocation of EU expenditure is firstly provided in the report. A spatial approach is mainly adopted here: data about actual expenditures have been collected at a very disaggregated territorial level (NUTS 3 level) covering all EU Member States (EU-27).

Nevertheless, within the wide EU policy framework, Common Agricultural Policy (CAP) expenditure is mostly considered here. This choice is due to some major considerations. Firstly, CAP effects on single beneficiaries are easily identifiable from a territorial (i.e., geographical) point of view: although the *ex-ante* spatial allocation of such a policy is usually defined at either national or regional territorial level, *ex-post* expenditure may be analysed even at local level (i.e., EU-27 NUTS 3 level). Secondly, the CAP still represents the most important EU policy, in terms of both total expenditure and share within the EU budget. Lastly, the CAP includes a wide range of measures, from agricultural policies to rural interventions and environmental measures. In fact, Pillar One of the CAP is mainly aimed at supporting agricultural activities and farmers' income. Conversely, the Second Pillar of the CAP refers to Rural Development Policy (RDP): several measures are implemented to support competitiveness of agricultural holdings in rural regions, diversification of the economy in rural areas, improvement in the quality of life within rural areas. Furthermore, some specific measures of the RDP more directly tackle environmental issues as well. Therefore, by disentangling CAP expenditure into specific measures, it is possible to shed light on the territorial allocation of all these different EU policies. According to the above-mentioned definitions, in the first part of the MS, evidence is provided about how CAP expenditure allocates across the EU-27 space. Since CAP expenditures are directly paid to specific beneficiaries whose territorial location can be clearly and univocally defined, actual CAP expenditures from years 2007-2011have been collected for each NUTS 3 regions composing the EU-27 (1288 observations). In particular, same territorial scale as in MS 104 (Camaioni *et al.*, 2013a) is adopted here. In describing the spatial allocation of CAP expenditures, both raw values and weighted data are taken into account. Some specific expenditure intensity indices are thus computed, by means of different dimensions. As the CAP largely deals with agricultural and rural issues, expenditures have been weighted by agricultural area (hectares of UAA), agricultural labour force (AWU employed in agriculture) and gross value added from agricultural activities. Denominators of these intensity ratios all have their peculiarities: thus, rather different pictures at EU scale are expected to be found when focusing on each of them.

Nevertheless, shedding light on the spatial allocation of EU expenditure does not represent a brand new research question in literature. Previous studies have already investigated the territorial allocation of EU funds: for example, Shucksmith *et al.* (2005) and Crescenzi *et al.* (2011) have already focused on CAP expenditure. However, those works have, at the most, considered NUTS 2 level, by just focusing on either the *ex ante* allocation of funds or a reconstruction of real expenditure (according to some sample observations). Moreover, in most cases, investigations limited their attention to the EU-15, thus ignoring the new Member States in Eastern Europe. Accordingly, what is rather new in this analysis is just the higher level of territorial disaggregation (NUTS 3 level) and coverage (EU-27) as well as the nature of the expenditure data under

study (i.e., total real payments as registered *ex post* by the EU bureaus aggregating individual beneficiaries at NUTS 3 level). All these innovations will be stressed even in the descriptive section of the report.

Then, moving from this somewhat exploratory analysis, the second part of the report tries to assess to what extent the CAP is both a “rural” and an “agricultural” policy, within the EU space. As a matter of fact, it is straightforward that the CAP is the most important agricultural (and rural) policy within the EU institutional and political framework. Nevertheless, a geographical and territorial approach is again stressed here. Actually, the second part of the MS is devoted at linking the spatial allocation of CAP expenditure to some specific regional features. The main research question here is assessing whether or not CAP is really geographically targeted to the most rural and agricultural regions throughout the EU. In other words, the presence of both a ‘rural’ effect and an ‘agricultural’ effect in the allocation of CAP expenditure is tested here. This is a very central question in order to verify the territorial coherence of the CAP as well as its effectiveness. From a methodological perspective, these hypotheses are tested by means of statistical analyses (Pearson correlation). Firstly, the report assesses to what extent CAP really supports rural EU regions more than non-rural (or urban) ones. Further methodological innovations of this work deal with the way rural region are defined. Actually, traditional and largely accepted indicators of rurality are coupled with more innovative ones in order to properly define those regions. In particular, population density and urban-rural typologies provided by Eurostat (2010) are adopted in the report as well as some alternative definitions of rurality, such as the PeripheRurality Indicator (PRI), directly derived from MS #104 (Camaioni *et al.*, 2013a; 2013b). Secondly, links between CAP expenditure and agricultural activity at regional level are assessed. Some indicators can measure the presence of agricultural activity at regional (i.e., NUTS 3) level. Here, the share of agricultural employment out of the total, the share of agriculture gross value added out of the total and the agricultural gross value added per unit of land are alternatively used to assess whether CAP support is selectively directed towards EU “agricultural” regions or not. Once again, this statistical analysis is aimed at assessing the coherence of CAP fund allocation with some sector-based characteristics of the EU rural space.

Given the above-mentioned research questions and main objectives, the MS is organised as follows. Section 2 provides some detailed information on EU agricultural, rural and environmental policies under study (the CAP and its most important measures). The section provides information about data collection at NUTS3 level on EU real expenditure as well. Section 3 provides an exploratory analysis of the spatial allocation of CAP funds. After having defined the territorial scale of the analysis, spatial allocation of CAP expenditure is shown also distinguishing among specific policy measures. Section 4 assesses the statistical correlation between CAP expenditure at NUTS 3 level and regional features in terms of both rurality and agricultural activity. Section 5 concludes the report, by suggesting some policy implications of the analysis as well.

2. Policy Data: a General Description

2.1 A Review of the relevant EU policy under study

The main aim of the current analysis is providing evidences about the spatial allocation of major EU policies as well as their relationships with specific features of EU rural areas. In particular, this analysis focuses on a very local level (i.e. NUTS 3 level), covering the whole set of EU-27 Member States. EU policy expenditure whose direct beneficiaries can be somehow spatially identified and whose effects are strongly related to a specific area are considered here. In particular, the work tries to shed new light on the most important EU "territorial" policies: among them, agricultural, rural and environmental policies play a key role in addition to more specific regional policies.

2.1.1 Agricultural Policies

The Common Agricultural Policy (CAP) is the most important EU Policy in terms of total expenditure: in 2011, it still represented 44% of total EU budget (Henke *et al.*, 2010). Since its origin in 1962, the CAP has supported the agricultural sector as well as farm incomes: originally, those objectives were mainly pursued through the implementation of economic incentives (e.g., market support measures) focusing on individual commodities. Then, over time, the CAP has undergone major changes and reforms: actually, most of the original market support measures have been gradually transformed into direct income support measures. As a consequence, the support originating from CAP is no more related to the explicit aim of devoting a given area of land to agriculture. Furthermore, farmers can now choose to keep livestock numbers at any desired level as well as adopt different technologies in the production process (Shucksmith *et al.*, 2005).

Following this path of successive reforms, the CAP is currently centred on distinct policy issues, devoted to support both producer income and structural adjustments. Major reforms have been readdressing the main objectives of the policy over time, but they have also been induced by EU budget constraints (Shucksmith *et al.*, 2005). Nevertheless, although the CAP review process has gradually led to a general reduction in its overall expenditure as share of the EU budged, the CAP still represents a large part of EU policy budget, thus confirming the importance of the agricultural policy over the construction of the EU (Shucksmith *et al.*, 2005).

Agenda 2000 was an action programme of the EU that reformed both the CAP and the regional policies before Eastern enlargements of the Union. In establishing a new financial framework for the years 2000–2006, it firstly defined the two "pillars" of the CAP. Then, following reforms (in particular Council Regulation 1290/2005) defined two distinct funds for financing each of them. According to their budget importance, they are: the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD).

EAGF, namely the First Pillar, finances both direct payments to farmers and measures to respond to market disturbances, such as private or public storage and export refunds. EAFRD (namely the Second Pillar) is aimed at financing the rural development

programmes within single EU Member States. Both the EAGF and EAFRD replaced the European Agricultural Guidance and Guarantee Fund (EAGGF), which had been set up by Regulation 25/1962 on the financing of the CAP.

For the 2007-2013 programming period, the overall CAP appropriation for commitment is equal to 408,867 million €, after transfers from EAGF to EAFRD (Table 2.1). These figures confirm that Pillar One remains the dominant part of the CAP, in spite of its recent reforms. Actually, even in the current programming period, EAGF represents 76.4% out of overall CAP funds.

Table 2.1 – The Common Agricultural Policy in the 2007/2013 financial framework

(million Euro at current prices): appropriations for commitment

		2007-2013
Before transfers from EAGF to EAFRD		
EAGF	Agriculture - Markets and direct aid	330,085
	Of which: single payments EU-27	290,025
EAFRD	Agriculture - Rural Development	78,264
After transfers from EAGF to EAFRD		
EAGF	Agriculture - Markets and direct aid	312,623
EAFRD	Agriculture - Rural Development	96,244

Source: Henke *et al.*, 2010. Prepared on the basis of the following documents: Budget of the European Union for the financial year 2010 - The figures, January 2010; Commission Regulation (EC) No 360/2010, Decision 2010/236/EC and Decision 2010/237/EC (OJ L 106, 28.4.2010); Decision 2009/379/EC (OJ L 117, 12.5.2009).

As previously pointed out, the first Pillar of CAP mainly refers to agricultural policies. Within the Pillar One funding scheme (i.e., EAGF), Direct Payments (DPs) absorb the largest part of the overall CAP budget. Since the 2003 reform of CAP, a new system of direct payment has been implemented: under the Single Payment Scheme (SPS) / Single Area Payment Scheme (SAPS, in Eastern Member States), direct aids support farmers' incomes: moreover, as most of the support is now decoupled from production, further distortions in market prices are avoided. According to this scheme, DPs are directly addressed to farmers and other land managers: DP main aim is supporting farmers' incomes in return for them respecting standards of food safety, environmental protection and animal welfare and keeping the land in good condition. Conversely, the aim of market intervention measures (MI) is to respond to specific market disturbances by using measures such as intervention buying or private storage aid or export refunds. Similar market intervention measures have been introduced or maintained for a number of products. Supports under certain conditions are also addressed to traders and processors.

Both DP and MI are directly managed by the EU Commission: nevertheless, either regional or national paying agencies are in charge of DP and MI payments to the direct beneficiaries. Whereas direct payments account for a large share of the support currently given to agriculture, market policies have steadily decreased over time.

Market liberalization demanded for by international constraints (e.g., WTO) has largely contributed to this trend (Henke *et al.*, 2010). In the current programming period (2007-2013), the share of DP committed funds is 87.87% out of total Pillar One funds (Table 2.2).

Table 2.2 – Pillar One: committed funds (share on total Pillar One)

	Committed funds (2007-2013)
Direct Payment	87.87%
Market Intervention measures	12.13%

Source: Henke *et al.*, 2010

2.1.2 Rural Policies

The CAP has largely evolved over time. Its Second Pillar (Rural Development Policy) has been designed to complement CAP Pillar One. It includes an additional set of measures, aimed at serving broader environmental and rural development objectives that are just partially related to agriculture. Following Agenda 2000 reform, CAP was organised in "Pillars": while Pillar One was dedicated to market support and direct payments, Pillar Two was aimed at other structural policies as well as rural development. In particular, the Second Pillar finances rural development programmes, encompassing a wide range of measures. In the current 2007-2013 programming period, the Rural Development Regulation provides a menu of 44 measures (Regulation 1698/2006) from which either Member States or their regions may choose, when designing specific Rural Development Plans. These measures can be broadly grouped into three categories, respectively regarding: i) structural investment to improve competitiveness for farming and forestry; ii) agri-environmental protection, countryside management and territorial development; iii) improvement of the quality of life and diversification of the rural economy.

Rural Development Policy (2007-2013) is implemented by specific programmes at either national or regional level. Unlike Pillar One, Pillar Two measures are selectively applied to specific areas or categories of beneficiary: actually, Pillar Two expenditure is the result of various policies implemented by the EU during different stages of its history (from structural policies to market accompanying measures, to diversification) (Henke *et al*. 2010). As a consequence, both Rural Development Policy and other structural funds should contribute to the cohesion objectives promoted by the EU.

Pillar Two differs from Pillar One in its implementation as well. Pillar Two expenditure is not directly managed by the EU Commission: conversely, Rural Development Programmes are mainly implemented at National level, throughout the EU-27. Just a few Countries (Spain, Germany and Italy) have opted for the implementation at regional level. Other exceptions are represented by:

- Belgium (2 RDPs: Flanders and Wallonia);
- Finland (2 RDPs: Mainland and Region of Åland);

- France (6 RDPs: Exagone, Corse, Guadeloupe, Guyane, Martinique, Réunion);
- Portugal (3 RDPs: Mainland, Azores, Madeira);
- The UK (4 RDPs: England, Wales, Scotland and Northern Ireland).

Programmes are then designed to implement a strategy on the basis of the common strategic objectives. Rural development policy 2007-2013 is particularly focused on three themes (also known as "thematic axes"). Therefore, with regard to the contents of the Rural Development Programmes, the EAFRD financial resources can be disentangled according to the following axes:

- Axis 1: improving the competitiveness of the agricultural and forestry sector;
- Axis 2: improving the environment and the countryside;
- Axis 3 improving the quality of life in rural areas and encouraging diversification of the rural economy.

Furthermore a fourth axis has been added and it constitutes the so called "Leader initiative". Local action groups, established at local level, define their own strategy under local development programmes based on the three axes of the RDP, mostly following a bottom-up approach.

In order to provide a balanced approach to RDP, both Member States and Regions are requested to spread rural development funding among all of these thematic axes. Nevertheless, the allocation of funds among axes is not even. In the current programming period, about 33% of EAFRD financial resources is committed to Axis 1 (i.e., measures for the competitiveness of the agro-food system); about 46% of resources goes to Axis 2 (improvement of the environmental sustainability); while just 13% of the total EAFRD resources is dedicated to income diversification and enhancement of quality of life within rural areas (Axis 3). In spite of a considerable increase compared to previous programming periods, less than 6% of resources have been allocated to the Leader approach (Axis 4) (Table 2.3). Furthermore, Copus (2010) already analysed RDP expenditure on both sectoral and territorial measures in EU Member States: actually, the former was found to be rather dominant. Nevertheless, the allocation among thematic axes is even more imbalanced when considering each EU-27 Member State: major differences are affected by both the choice of allocating resources to priority Axes and the distinction between convergence and non-convergence regions. Both elements may deeply affect the financial leverage that is generated by national and private co-financing (Camaioni and Sotte, 2010).

Table 2.3 – Pillar Two: committed funds by thematic Axis (share on total Pillar Two)

	Committed funds (2007-2013)
Axis 1 – Improving the competitiveness of the agricultural and forestry sector	33.3%
Axis 2 – Improving the environment and the countryside	46.1%
Axis 3 – Improving the quality of life in rural areas and encouraging diversification of the rural economy	12.2%
Axis 4 – Leader initiative	6.0%
Technical Assistance	1.9%
Axis 6 (special aids granted to new Member States (Bulgaria and Romania)	0.5%
Total (EU-27)	100.0%

Source: own elaboration on Camaioni and Sotte (2010)

2.1.3 Environmental and Regional Policies

Environmental objectives are largely pursued in the EU territory through not specifically-designed funds. Actually, those objectives are mainly implemented by EU policies such as Regional Policies as well as the above-mentioned Agricultural Policies.

Due to its great heterogeneity at EU level, regional policy is mainly financed by three different funds:

- the Cohesion Fund (CF);
- the European Regional Development Fund (ERDF);
- the European Social Fund (ESF).

The CF is reserved to those EU Member States whose gross national income (GNI) per inhabitant is less than 90% of the Community average[1]. It helps in reducing their economic and social shortfalls, as well as in stabilising their economy: actually, it is aimed at supporting actions in the framework of the Convergence objective. For example, the CF finances trans-European transport networks; public and private investments mostly related to the energy sector and to the transportation system, as long as they clearly present a benefit to the environment (e.g., energy efficiency, use of renewable energy, developing of rail transports, support to intermodality, strengthen of the public transport…).

The ERDF aims to strengthen economic and social cohesion over EU-27 Member States by the implementation of Operational Programmes. The ERDF mainly finances

1. In the current programming period (2007-2013), the Cohesion Fund concerns the following EU-27 Member States: Bulgaria, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia. Spain is eligible to a phase-out fund only as its GNI per inhabitant is less than the average of the EU-15.

the following programmes: investments in the business sector (e.g., SMEs) in order to create sustainable jobs; development of major infrastructures linked to research and innovation, telecommunications, environment, energy and transport; financial instruments (capital risk funds, local development funds, etc.) in order to support regional and local development and to foster cooperation between towns and regions.

The ESF finances specific Operational Programmes across the EU which are mainly addressed to: adapting workers and enterprises, throughout the implementation of lifelong learning schemes, designing and spreading innovative working organisations; facilitating the access to employment for job seekers, the unemployed, women and migrants; promoting social integration of disadvantaged people; combating discrimination in the job market; strengthening human capital by reforming education systems and setting up a network of teaching establishments.

With regards to Environmental Policy, it is partially pursued through the implementation of the CAP as well. Firstly, Direct Payments largely contribute to providing environmental public goods, by fostering more sustainable farming systems. Among the good agricultural and environmental conditions to be followed, the EC strongly recommends: i) prevention of soil erosion; ii) maintaining of soil organic matter and soil structure; iii) avoiding the deterioration of habitats; iv) protecting and managing water. In particular, the above-mentioned environmental targets are pursued in combination with cross-compliance: actually, cross-compliance penalises farmers who infringe EU law on environmental, public and animal health, animal welfare or land management by directly reducing the total amount of EU support they receive. Moreover, also Pillar Two (Rural Development Policy) largely supports environmental targets. In particular Axis 2 is directly aimed at improving environmental objectives. Within the Second Pillar of the CAP, Axis 2 plays a key role, as it represents almost 50% of overall committed expenditures from RDP.

Moreover, the Directorate General for the Environment also manages specific actions mostly referring to environmental issues: the LIFE fund and the Eco-Innovation and Competitiveness and Innovation Framework Programme (CIP-EIP), and operating grants to environmental non-governmental organisations. The former aims to support environmental and nature conservation projects, the latter supports projects in eco-innovation. Both of them are directly managed by DG Environment through grants and call for proposal.

2.2 Disaggregating CAP Expenditures

Referring to the above-mentioned set of policies covering most of EU agricultural, rural and environmental topics, this section provides further information about data sources and coverage. Actually, the availability of detailed territorial data on EU policies is rather poor, as pointed out by Shucksmith *et al.* (2005). Usually, no information on CAP real expenditure at regional level is available: just data at national level are usually provided by DG Agriculture[2]. Conversely, just data referring either to the *ex-ante*

2. The implementation of Pillar One expenditure is annually reported by DG Agriculture in “Agriculture in the European Union. Statistical and Economic Information Report”. However, this Report just shows expenditure implementation at

allocation of funds or to the reconstruction of the real expenditure based on some sample observations (e.g., FADN data[3]) are available at regional level.

Data on real *ex-post* expenditure are public, as well: nevertheless, they are not collected in any comprehensive dataset, covering all EU-27 Members States. The source of the data that have been adopted in the current analysis is the European Commission (DG Agriculture). According to the main aims of the work, CAP actual expenditures have been taken into account. Data refer to current programming period (i.e., years 2007 to 2013): accordingly, actual expenditures from two different funds (EAGF and EAFRD) are taken into account here[4]. The final dataset gathers EU-27 payments from years 2007 to 2011.

Expenditure data refer to single payments received by beneficiaries throughout the EU-27, on the basis of the declaration of the paying agencies. In order to keep the anonymity, data are provided at NUTS 3 level. Nevertheless, the aggregation at NUTS 3 level itself poses some critical issues. In years 2003 to 2007, the NUTS 2003 classification was in force; in 2008, the NUTS 2006 classification was then adopted (see Section 3.1 for further details about NUTS classifications). Although we just focus on the current programming period, expenditure from years 2007 and 2008 could also refer to expenditures from previous programming period. As a consequence, in the original dataset, both classifications (NUTS 2003 and NUTS 2006 ones) occurred to be used in order to identify same NUTS 3 regions, also in the same year. Thus, a major issue to be solved dealt with the univocal allocation of different payments among EU regions. In some cases NUTS codes simply changed when shifting from NUTS 2003 to NUTS 2006 classification, thus not really affecting the allocation of expenditures. Furthermore, major changes affected territorial divisions at sub-national level: some NUTS 3 regions terminated, being split into two or more new NUTS 3 regions; some other NUTS 3 regions were merged; in other cases, boundary shifts occurred as well. In the latter cases, CAP expenditures that were spatially identified according to the NUTS 2003 classification had to be reallocated according to the new NUTS 2006 layer. In particular, when either splits or boundary shifts occurred, the following methodology has been adopted: expenditures of old NUTS 3 regions were apportioned according to the share of total surface of the new NUTS 3 regions. This methodology follows the idea that expenditure allocation within each NUTS 3 region is spatially homogeneous.

Moving from overall CAP expenditure at NUTS 3 level, it is then possible to further disaggregate expenditure among Pillars and measures. According to Agenda 2000 that first defined two “pillars”, now the CAP comprises a wide variety of measures, encompassing agricultural, rural and environmental policies as well. It is straightforward that each measure has both distinct aims and objectives and distinct territorial impacts throughout the EU-27. Thus, the importance of disaggregating them appears to be crucial.

national level. The latest report currently refers to year 2012 and it is available at the following link: http://ec.europa.eu/agriculture/statistics/agricultural/2012/pdf/full-report_en.pdf (link accessed on November 19, 2013). In a similar way, Rural Development implementations are shown by EU member States and by single measures in “Rural Development in the EU. Statistical and Economic Information Report”. Latest available figures refer to year 2012: http://ec.europa.eu/agriculture/statistics/rural-development/2012/full-text_en.pdf (link accessed on November 19, 2013).

3. FADN (Farm Accountancy Data Network) database collects data on average CAP expenditure at both national and regional (NUTS 2) level. For example, referring to Pillar Two, data disentangled by main measures are available as well: agro-environmental payments, less favoured areas (LFA) payments… Nevertheless, data are never available for current programming period, always referring to the previous one.

4. National co-funding for RDP expenditure is not considered for the purpose of the current analysis.

2.2.1 Pillar I Expenditures

For the purpose of this work, the allocation at NUTS 3 level of overall Pillar One expenditure is first taken into account. Data refer to EAGF expenditure (years 2007 to 2011). Furthermore, according to the main aims of this work, it is convenient to distinguish Pillar One expenditure between the overall Direct Payment (DP) and Market Interventions measures. Actually, such a breakdown may shed new light on potentially different territorial impacts characterising each measure. In particular, the database constitutes a simple aggregation at NUTS 3 level of both payments under the SPS-SAPS and MI measures: both direct aids and market measures are directly paid to beneficiaries by EU bureaus, throughout the EU-27. Thus, collected data constitute the declaration of paying agencies at NUTS 3 level for these two types of expenditures.

In spite of the above-mentioned breakdown (DP and MI measures), both types of intervention largely refer to agricultural policies, although cross-compliance actually links DP to environmental issues as well. In latest programming periods, the "traditional" market support for most farm commodities has partially lost its key role within the CAP, being replaced by direct income payments to farmers. Nevertheless agricultural policies still play a predominant role within the CAP budget. This is still true in current programming period, notwithstanding "modulation" (i.e., the reduction of DP for individual farmers, in order to finance Pillar Two measures).

2.2.2 Pillar II (Rural Development) Expenditures

Pillar Two covers many types of measures that are mostly aimed at promoting rural development. As for CAP Pillar One, the database referring to Pillar Two is constituted by the aggregation at NUTS 3 level of overall expenditures from the EAFRD (years 2007-2011) at measure level. Due to the greater variety of measures characterising Pillar Two activities, the analysis of expenditure breakdown is significant. In the database, RDP expenditure are organised by EAFRD budget codes that have been analysed in order to identify the measure name on the basis of the budget codes. Then, data on specific measures have been aggregated into distinct axes, following Council Regulation 1698/2006. In particular, such a breakdown has major effects on the analysis of EU policies as well. Actually, territorial impacts of Axes may largely differ according to their respective objectives. In particular, Axis 1 is devoted to improve the competitiveness of the agricultural and forestry sector, while Axis 3 focuses on improving the quality of life in rural areas and encouraging diversification of the rural economy. The former has a stronger sector-based dimension; the latter is characterised by more territorial dimension. The Fourth Axis (LEADER) is addressed to implement horizontally all the other axes and it is based on the concept to strengthen the endogenous factors of development. Nevertheless, due to the small amount of total expenditures devoted to it, Axis 4 is not directly taken into account into the current analysis.

Conversely, Axis 2, which still represents almost 50% of overall committed expenditures from RDP, focuses on various environmental issues: countryside management, climate change adaptation and mitigation, biodiversity, efficient use of natural resources and other green issues. While Axis 1 and Axis 3 are likely to have direct effects on the territories where they occur; environmental effects from Axis 2

measures could not be spatially bounded within NUTS 3 regions. Nevertheless, to the purposes of this work, the expenditure of Axis 2 has been considered for the spatial analysis of environmental policies, due to its budgetary importance compared to the whole set of other EU environmental actions (environmental objectives within Structural Funds, LIFE and the Eco-Innovation and Competitiveness and Innovation Framework Programme).

3. An Exploratory Analysis of the Spatial Allocation of EU Funds

3.1 The Selected Geographical Scale for the Analysis: NUTS 3 level

This work is firstly aimed at considering the way in which major EU policies focusing on agricultural, rural and environmental issues have been distributed across the European territory. In fact, according to the considerable socio-economic and environmental differences throughout the EU, analysis of spatial allocation of funds was expected to provide evidences about territorial imbalances in the incidence of those policies. Nevertheless, the main focus of the analysis is on CAP expenditure. In fact, according to a geographical perspective, it is easier to identify CAP beneficiaries than beneficiaries for other EU policies. Actually, those beneficiaries refer to well-defined production areas in most cases. In particular, after having described such a territorial allocation, it is then possible to show to what extent CAP is “rural” and “agricultural”, i.e. to what extent CAP funds actually go and are spent in rural and agricultural EU regions more than in urban ones.

A similar research question is not definitely new: previous studies have already investigated the territorial allocation of some EU policies funds. For example, Shucksmith *et al.* (2005) and Crescenzi *et al.* (2011) focused on CAP expenditure allocation, throughout the EU space. However, those works have, at the most, considered NUTS 2 level and they usually limited their attention to the EU-15. Therefore, current analysis shows some innovative elements. In particular, both a higher level of territorial disaggregation and a broader coverage of the analysis are provided: respectively the analysis is performed at NUTS 3 level, throughout the EU-27.

The territorial disaggregation adopted here (i.e. NUTS 3 level) refers to the *Nomenclature of territorial units for statistics* (NUTS) classification: it is a hierarchical system for dividing up the territory of the EU at sub-national level. Even though the NUTS 2010 classification is currently adopted (Commission Regulation (EC) No 105/2007), the NUTS 2006 classification (Commission Regulation (EC) No 1059/2003) is adopted here. Actually, NUTS 2006 classification was operating from 2008 to 2011,

and most of information at sub-regional level included into the Eurostat dataset is still provided according to this specific classification[5].

At sub-national level, NUTS classification is based on the administrative divisions which are applied within each Member State[6]. Therefore, three levels are hierarchically ordered within NUTS classification: they mainly follow a demographic criterion[7]. Nevertheless, demographic criteria (maximum and minimum thresholds) are applied in addition to the administrative divisions within EU Member States (MSs). As a consequence, a large heterogeneity in NUTS size is observed throughout the EU. Accordingly, the number of NUTS 2 and NUTS 3 regions varies considerably between Member States: more than 400 NUTS 3 areas (out of 1303 within the EU) are in Germany (Table 3.1).

According to the provided classification, NUTS 3 regions throughout EU-27 Member States are 1303. Nevertheless, for the purpose of the current work, some regions have been excluded from the analysis. In particular, due to the lack of territorial contiguity with the European continent, the following regions have not been included into the analysis:

- French DOM (*Departements d'outre-Mer*): Guadeloupe (FR910), Martinique (FR920), Guyane (FR930), Réunion (FR940);
- Archipelago of the Azores (Região Autónoma dos Açores – PT200) and Archipelago of Madeira (Região Autónoma da Madeira – PT300), both belonging to Portugal, but located in the Atlantic Ocean;
- NUTS 3 regions belonging to Canary Islands (Spain): El Hierro (ES703), Fuerteventura (ES704) , Gran Canaria (ES705), La Gomera (ES706), La Palma (ES707), Lanzarote (ES708), Tenerife (ES709);
- The Spanish cities of Ceuta (ES630) and Melilla (ES640) for they are exclaves in Morocco (on the Northern coast of Africa).

Thus, the final set of observation is composed by 1288 NUTS 3 regions.

5. The NUTS classification was originally based on Regulation 1059/2003 on the establishment of a common classification of territorial units for statistics. This regulation was first approved in 2003 and then it was amended in 2006, by Regulation 105/2007. Two further amending Regulations 1888/2005 and 176/2008 extended the NUTS classification both to the 10 MS that joined the EU in 2004 and to Bulgaria and Romania.

6. Usually, two main regional levels are comprised within the administrative framework at national level. As the NUTS classification adopts three different levels, the third one is generally created by aggregating administrative units, belonging to the lower level in the hierarchy.

7. NUTS regulation defines minimum and maximum population thresholds for NUTS 1, NUTS 2 and NUTS 3 regions size.

Table 3.1 – NUTS classification national structures

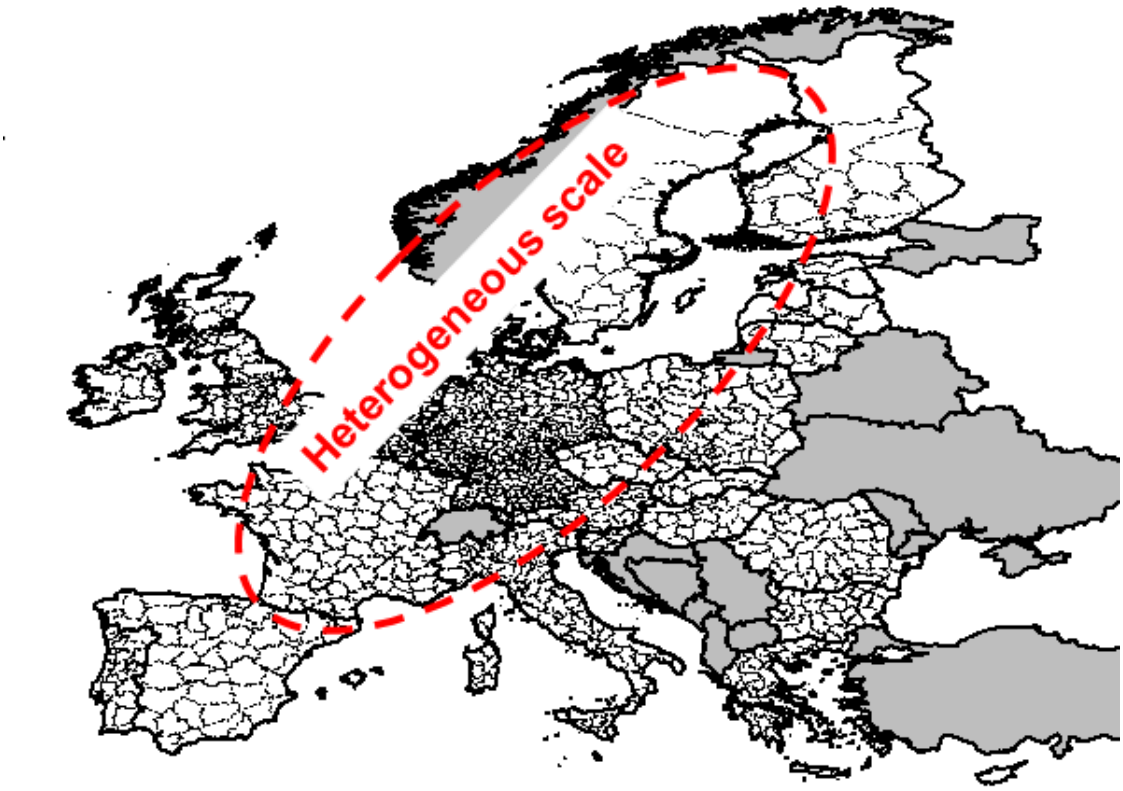
NUTS 0	NUTS 1		NUTS 2		NUTS 3	
Belgium (BE)	Gewesten/ Régions	3	Provincies/ Provinces	11	Arrondissementen/ Arrondissements	44
Bulgaria (BG)	Rajoni	2	Rajoni za planirane	6	Oblasti	28
Czech Republic (CZ)	—	1	Oblasti	8	Kraje	14
Denmark (DK)	—	1	Regioner	5	Landsdeler	11
Germany (DE)	Länder	16	Regierungsbezirke	39	Kreise	429
Estonia (EE)	—	1	—	1	Groups of Maakond	5
Ireland (IE)	—	1	Regions	2	Regional Authority Regions	8
Greece (GR)	Groups of development regions	4	Periferies	13	Nomoi	51
Spain (ES)	Agrupacion de comunidades Autonomas	7	Comunidades y ciudades Autonomas	19	Provincias + islas + Ceuta, Melilla	59
France (FR)	Z.E.A.T.+DOM	9	Régions+DOM	26	Départements+DOM	100
Italy (IT)	Gruppi di regioni	5	Regioni	21	Province	107
Cyprus (CY)	—	1	—	1	—	1
Latvia (LV)	—	1	—	1	Reģioni	6
Lithuania (LT)	—	1	—	1	Apskritys	10
Luxembourg (LU)	—	1	—	1	—	1
Hungary (HU)	Statisztikai nagyregiok	3	Tervezesi-statisztikai regiok	7	Megyek + Budapest	20
Malta (MT)	—	1	—	1	Gzejjer	2
Netherlands (NL)	Landsdelen	4	Provincies	12	COROP regio's	40
Austria (AT)	Gruppen von Bundeslandern	3	Bundesländer	9	Gruppen von politischen Bezirken	35
Poland (PL)	Regiony	6	Wojewodztwa	16	Podregiony	66
Portugal (PT)	Continente + Regioes autonomas	3	Comissaoes de Coordenacao regional + Regioes autonomas	7	Grupos de Concelhos	30
Romania (RO)	Macroregiuni	4	Regiuni	8	Judet + Bucuresti	42
Slovenia (SI)	—	1	Kohezijske regije	2	Statistične regije	12
Slovakia (SK)	—	1	Oblasti	4	Kraje	8
Finland (FI)	Manner-Suomi, Ahvenananmaa / Fasta Finland, Aland	2	Suuralueet / Storomraden	5	Maakunnat / Landskap	20
Sweden (SE)	Grupper av riksomraden	3	Riksomraden	8	Län	21
United Kingdom (UK)	Government Office Regions; Country	12	Counties (some grouped); Inner/ Outer London; Groups of unitary authorities	37	Upper tier authorities / groups of lower tier authorities	133
UE-27		97		271		1303

Source: Eurostat (2013), http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/correspondence_tables/national_structures_eu

Suggested territorial level (i.e., NUTS 3 level) allows a detailed representation of the EU rural space as well as of the allocation of CAP expenditure. Actually, NUTS 2 level is a too wide scale to be representative in terms or rural features, for NUTS 2 regions usually include both the urban and the rural space. An even smaller scale (e.g., local administrative unit level) could really improve the analysis but it is unfeasible given the current data availability across all EU Member States.

Nonetheless, working at NUTS 3 level may still incur some practical problems. First, gathering local data for both rural features and policy expenditures is not an easy task. For example, many missing values are observed at NUTS 3 level when considering rural features (e.g., overall utilised agricultural area and gross value added from the agricultural sector). A second issue in performing an analysis at NUTS 3 level throughout the EU-27 deals with the above-mentioned large variation which is observed in land surface of those regions. Actually, NUTS 3 regions that are located in more peripheral and sparsely-populated countries tend to be larger than NUTS 3 regions in more central Countries (e.g., Germany). Figure 3.1 highlights the wide heterogeneity of the space under study, according to the selected territorial level of disaggregation.

Figure 3.1 – The wide heterogeneity throughout the EU space under study



Source: own elaboration

Nevertheless, an even more important issue has to do with the appropriateness of such territorial scale (i.e. NUTS 3 level) for policy analysis. Actually, it can be argued that the NUTS 3 territorial scale might not be appropriate for this kind of policy analysis, that is to say, for investigating the distribution of policies whose *ex-ante* allocation decisions are taken at a higher territorial and institutional level (e.g., EU, NUTS 0 or NUTS 1 level). Conversely, this is the main reason why working at NUTS 3 level with real

expenditure data may offer greater insight than previous works. Actually, real expenditure is observable just *ex-post* at NUTS 3 level. Expenditure that is observed at this territorial scale does not only depend on further top-down (i.e. political) allocation decisions but also on the bottom-up capacity of single regions to attract and really use those funds. Therefore, this specific kind of policy evaluation does not only concern political decisions: it also has to do with the real implementation of policies across the EU space. With this implementation, the underlying higher-level political decision is only one of the factors involved. The other contribution is the capacity and the specific features of individual territories (NUTS 3 regions) which are likely to affect the expenditure they really receive. Thus, despite the above-mentioned practical problems dealing with NUTS 3 level, working at such a level of territorial disaggregation in analysing EU expenditure allocation may represent an important advancement in this field of study.

3.2 The Spatial Allocation of CAP Expenditures

3.2.1 Absolute levels of CAP Expenditures

In this section, some evidences about the spatial allocation of EU policy expenditure throughout the EU-27 are given. Referring to data gathered from European Commission (DG Agriculture) about CAP real expenditure for years 2007 to 2011, we first focus on overall CAP expenditure. As pointed out, expenditure is available at NUTS 3 level in order to keep anonymity [8]: thus, according to this territorial disaggregation, 1288 observations are currently available. For such a distribution, Table 3.2 shows overall CAP expenditure main *descriptive statistics*: actually, both the average value and the standard deviation are listed, as well as the quartiles from the cumulative distribution function. In years 2007 to 2011, each EU-27 NUTS 3 region on average received 193,864 million Euros as CAP expenditure. Dispersion from the average value is really high, though. Standard deviation equals to 244 million Euros, while interquartile range (IQR) is larger than 202 million Euros: these figures suggest the presence of a wide heterogeneity in CAP expenditure at local level. Furthermore, the sharp difference between mean and median also suggests the presence of a rather skewed distribution.

8. When considering CAP expenditures at NUTS 3 level, some issues were experienced for the provinces of Catalonia (Spain). For that region, expenditure data seem unreliable: actually, 99.98% of regional CAP expenditure is concentrated in the NUTS 3 region of Barcelona, which accounts for barely 16.89% of total UAA at NUTS 2 level. Therefore, in order to have more homogeneous figures, we assumed the following hypothesis: total expenditure at NUTS 2 level was equally divided into four NUTS 3 regions composing Catalonia (Barcelona, Girona, Lleida and Tarragona).

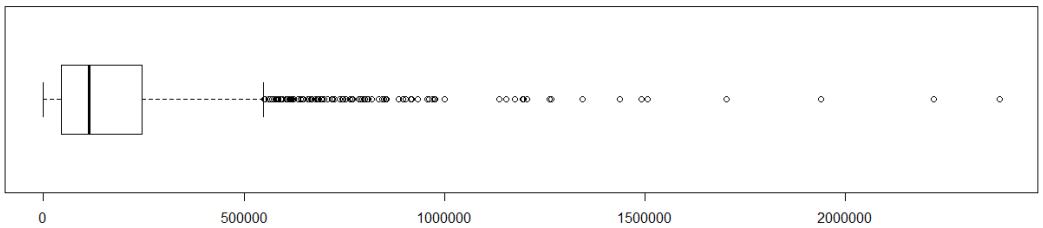
Table 3.2 – CAP expenditure descriptive statistics, 2007-2011 (in .000 €) (Total number of observations: 1288)

	Total CAP Expenditure
Mean	193,860.70
Standard Deviation	244,093.57
Minimum	123.05
1st Quartile	44,180.50
Median	113,381.15
3rd Quartile	246,386.23
Maximum	2,384,202.77

Source: own elaboration

Same statistical information can be graphically depicted through the use of a boxplot. In the plot, the edges of the box represent first and third quartile of the distribution respectively, while the band inside it shows the median value of the distribution. Lines that extend out from the boxes are the so-called "whiskers": they provide more information about the variability of observed data outside first and third quartiles. Here, whiskers extend to the most extreme data point which is 1.5 times the IQR from the box. Any data not included between the whiskers somehow depict possible 'outliers' in the distribution: here, possible 'outliers' are plotted as small circles. The analysis of Figure 3.2 largely confirms the above-mentioned hypothesis that the distribution of CAP expenditure at NUTS 3 level is rather skewed. In particular, whereas 50% of regions under study received 113 million Euros each (considering years 2007 to 2011), a few of them received more than 1 billion Euros each in same period.

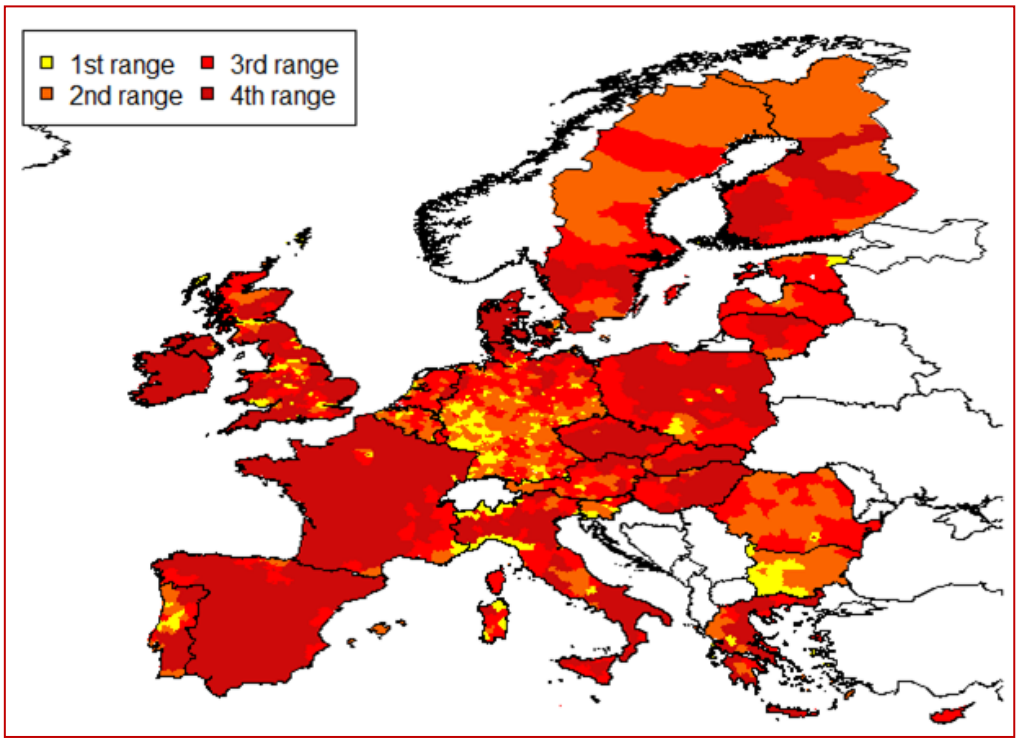
Figure 3.2 – Distribution of CAP expenditure by NUTS 3 region, 2007-2011 (in .000 €) (Total number of observations: 1288)



Source: own elaboration

Nevertheless information coming from the analysis of the boxplot is just part of the story. Boxplot as well as other descriptive statistics just suggest how overall CAP expenditure is distributed throughout the sample under study (1288 EU-27 NUTS 3 regions). Unfortunately, they can say nothing about actual spatial allocation of those data, although the latter is a key point, due to the large heterogeneity that is observed at EU level (central vs. peripheral regions, urban vs. rural areas, New Member States vs EU-15). As a consequence, in order to gather more information about the territorial distribution of CAP expenditure within the EU space as well, in Figure 3.3 overall CAP expenditure at NUTS 3 level is mapped, by applying a spatial quartile distribution to the whole set of EU regions. Accordingly, each range includes 322 observations (NUTS 3 regions). In particular, the lowest 25% of the data is found below the 1st quartile, thus belonging to the 1st range (lower quartile); conversely, the 4th range corresponds to the upper quartile of the distribution. According to this spatial distribution, the map sheds new light on specific territorial patterns originating from the allocation of CAP expenditure at EU level.

Figure 3.3 – Spatial quartile distribution for CAP expenditure at NUTS 3 level (2007-2011 values)



Source: own elaboration

According to Figure 3.3., from a geographical perspective, a sort of core-periphery pattern seems emerging when analysing the distribution of absolute values of overall CAP expenditure at NUTS 3 level. Small regions in central EU tend to belong to the 1st range of the distribution for they share the lowest amount of CAP expenditure per single NUTS 3 region throughout the EU. On the opposite side, regions in more

peripheral Countries (and in France as well) show the greatest amount of CAP expenditure per NUTS 3 region. Actually, central EU regions are rather urban, especially when compared to more peripheral and remote ones. Therefore, the picture emerging form Figure 3.3 seems to be consistent with the idea that CAP is primarily targeted to more rural and agricultural areas. Nevertheless, findings just presented may be affected by some major statistical biases. Actually, the spatial quartile distribution of absolute levels of CAP expenditure may be affected by the large variation that is observed in terms of total surface area at NUTS 3 level throughout the EU. This issue has already been raised (see section 3.1): more peripheral NUTS 3 regions usually show a wider total surface than urban and more central ones. Therefore, raw expenditure data could not allow a proper representation of CAP support at local level for they do not take into account such differences in terms of surface. As a consequence, in order to get rid of those major distortions, specific indices, directly expressing CAP expenditure intensity, will be computed and shown in next section.

3.2.2 Three Indices of Expenditure Intensity

In order to provide more comparable results at EU level, the analysis of data about CAP expenditure absolute levels has been coupled with the analysis of some specific indices expressing the intensity of CAP expenditure at NUTS 3 level. In particular, support intensity can be expressed by means of different dimensions. As the policies under study here largely deal with agricultural and rural issues, the following dimensions have been selected: agricultural area, agricultural labour force, gross value added from agricultural activities. This selection partially follows the methodology suggested by Copus (2010)[9]. More in detail, the following expenditure intensity indices were taken as the basic units of analysis:

- Expenditure per hectare of utilised agricultural area (€/UAA): utilised agricultural area (UAA) refers to those areas that are directly used for farming activities. It includes arable lands, permanent grasslands and permanent crops. On the contrary, unused agricultural land (such as woodland and land occupied by buildings, farmyards, tracks, ponds) are usually not included in such a definition.
- Expenditure per annual work unit employed in agriculture (€/AWU): one annual work unit corresponds to the total amount of work that is performed by one single person occupied on a full-time basis on an agricultural holding.
- Expenditure per thousand Euros of agricultural gross value added (€/.000 €): the major reference is the Statistical classification of economic activities in the European Union (NACE, Rev. 2). According to it, the gross value added from sector A (Agriculture, forestry and fishing) is just taken into account. Values about GVA are expressed in thousand Euros, here.

Main statistical source is *Farm Structure Survey* from Eurostat reporting data on utilised agricultural area (UAA) and agricultural annual work units (AWU) employed in agriculture at NUTS 3 level. This is a periodical survey, thus data are available for

9. Copus (2010) analysed the intensity of rural development expenditure per hectare of agricultural land (UAA), per agricultural holding, per annual work unit (AWU) and per European size unit (ESU). Nevertheless, patterns of intensity were analysed at the MS level only. At NUTS 3 level, data on agricultural holdings and European size units are not reliable, showing a great amount of missing values.

years 2000, 2003, 2005 and 2007: when available, latest figures are considered. Data on agricultural GVA come from Eurostat National and Regional Economic Accounts: due to the current economic crisis, heavily affecting the economic cycle, average Agricultural GVA value for years 2007 to 2010 is considered, here[10].

Nevertheless, some further *caveats* have to be pointed out. In fact, we already stressed that the availability of detailed NUTS 3 data on agriculture across Europe is rather poor (Shucksmith *et al.*, 2005). Missing values particularly affect *Farm Structure Survey* data on hectares of utilised agricultural area (UAA) and agricultural work units (AWU) employed in agriculture: among others, they mostly affected NUTS 3 observations throughout Germany, the UK and Austria. Firstly, missing values have been replaced by considering 2005, 2003 and 2000 data respectively, when available. In particular, some missing values for NUTS 3 regions in Spain, Italy and Austria have been replaced according to this methodology. Nevertheless, the same methodology could not be applied at NUTS 3 to most regions throughout Germany: therefore, following Shucksmith *et al.* (2005), missing values in those regions have been replaced by considering data available at higher territorial level. In particular, the method chosen for apportionment of higher-level (NUTS 1 or NUTS 2 level) data on hectares of UAA and AWU to NUTS 3 level was mainly based on the following two core variables: total surface (in square kilometers) and number of agricultural employment[11]. The former was used to apportion UAA from NUTS 2 to NUTS 3 level; the latter to apportion AWU employed in agriculture. Clearly, this methodology relies on the major assumption that farming activities in relation to utilised agricultural area and employed labour force do not vary significantly within each Country or NUTS 2 regions (Shucksmith *et al.*, 2005)[12].

Further remarks deals with the way CAP expenditure intensity is computed here. Actually, when expressing the intensity of CAP support by means of specific agriculture-related variables, particularly high values may be observed in a few cases. They largely refer to urban areas whose values for UAA, AWU and even agricultural gross value added are generally quite small. Nevertheless, the same regions may account for a not negligible share of CAP beneficiaries and of CAP expenditure as well. Some beneficiaries, indeed, may be located in urban regions, even though they manage their agricultural activities in more rural regions. This peculiar situation implies "artificially" high levels of expenditure intensity for very urban regions, throughout the EU.

In order to get rid of such distortive effects, some small and very urban regions have been excluded from the analysis. In particular, those regions fulfilling at least one the following criteria:

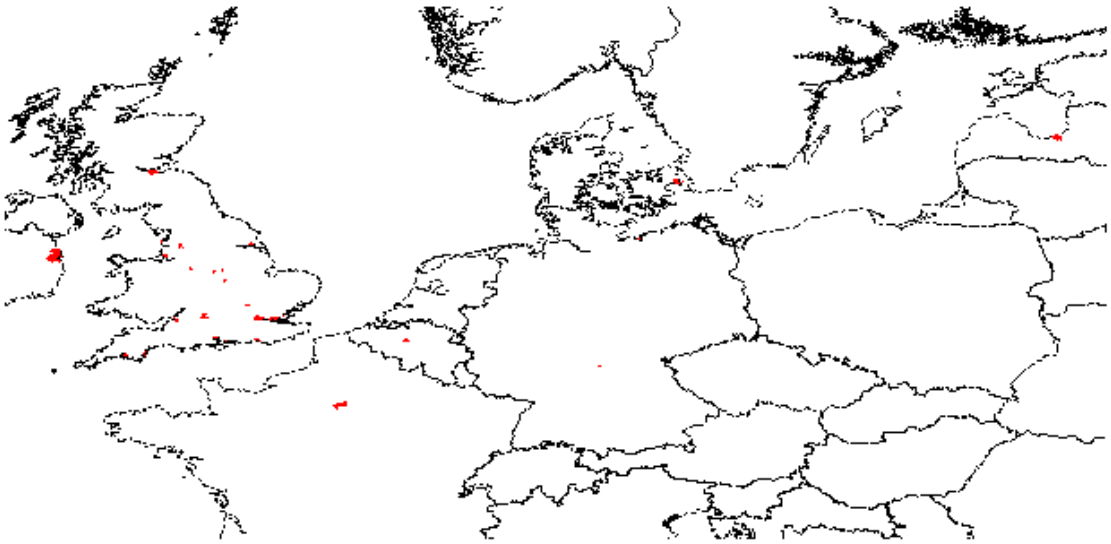
- UAA (utilised agricultural area) ≤ 1000 ha.;
- Agricultural AWU (annual work units) ≤ 10;
- Gross value added from agriculture ≤ 100,000.00 €;

10. Years 2007 to 2009 are used for Italy.
11. Those two core variables are always available at NUTS 3 level, throughout the EU-27 Member States.
12. Nevertheless, for a few regions within the sample, it was not possible to apportion data from higher territorial level according to the above-mentioned methodology. In particular, three NUTS 3 regions still miss the value for UAA, six regions miss the value for AWU; one region misses the value for the Agricultural Gross Value Added. Nevertheless, due to their very urban features, it seems plausible to consider them having no agricultural activities at all (i.e., UAA equals to zero, AWU equals to zero and agricultural GVA equals to zero respectively).

have been excluded from the analysis of the expenditure intensity indices. According to the above-mentioned criteria, 30 regions have been identified: they mostly are capital cities (e.g., Bruxelles, Copenhagen, Paris, Dublin, Riga, London) and other city regions, mainly located in the United Kingdom (21 British NUTS 3 regions are included out of 30). The whole list of excluded regions is shown in Table 3.3. Figure 3.4 maps it throughout the EU: it is easy to notice that those regions are mainly located in central Countries, with a few exceptions.

The above-mentioned exclusion does not really affect the overall dataset. Actually, the number of total observations that are still under investigation is larger than 1250 (1258 observations). Moreover, excluded regions account for a negligible share even in the overall CAP expenditure. Although accounting for 2.33% out of the total number of EU NUTS 3 regions, they account for less than 0.4% out of total CAP expenditure (Table 3.4).

Figure 3.4 – Excluded regions



Source: own elaboration

Table 3.3 – List of excluded regions

Code	Country	Name
BE100	Belgium	Arr. de Bruxelles-Capitale
DE262	Germany	Schweinfurt, Kreisfreie Stadt
DE806	Germany	Wismar, Kreisfreie Stadt
DK011	Danmark	Byen Kobenhavn
FR101	France	Paris
FR105	France	Hauts-de-Seine
FR106	France	Seine-Saint-Denis
IE021	Ireland	Dublin
LV006	Latvia	Riga
UKD41	United Kingdom	Blackburn with Darwen
UKD42	United Kingdom	Blackpool
UKD52	United Kingdom	Liverpool
UKE11	United Kingdom	Kingston upon Hull, City of
UKF11	United Kingdom	Derby
UKF14	United Kingdom	Nottingham
UKF21	United Kingdom	Leicester
UKG23	United Kingdom	Stoke-on-Trent
UKH21	United Kingdom	Luton
UKH31	United Kingdom	Southend-on-Sea
UKH32	United Kingdom	Thurrock
UKI11	United Kingdom	Inner London – West
UKI12	United Kingdom	Inner London – East
UKJ21	United Kingdom	Brighton and Hove
UKJ31	United Kingdom	Portsmouth
UKJ32	United Kingdom	Southampton
UKK11	United Kingdom	Bristol, City of
UKK14	United Kingdom	Swindon
UKK41	United Kingdom	Plymouth
UKK42	United Kingdom	Torbay
UKM25	United Kingdom	Edinburgh, City of

Source: own elaboration

Table 3.4 – Share of excluded regions out of EU-27

	% of excluded (30) regions on EU total
Total number of NUTS 3 regions	2.33
UAA	0.03
AWU	0.01
Agricultural GVA	0.22
CAP Expenditure	0.38

Source: own elaboration

Referring to the new sub-sample (1258 observations), Table 3.5 shows major descriptive statistics for CAP expenditure intensity in terms of land, labour and agricultural GVA, respectively. Mean and standard deviation as well as quartiles from the cumulative distribution function are shown. On average, the intensity of overall CAP support per single NUTS 3 region was about 1,800 € per hectare of utilised agricultural area and 47,600 € per unit of agricultural work (AWU) in the 5 years under study (data always refer to the overall sum of 2007-2011 expenditure). Moreover, CAP support amounted to 1,800€ per thousand Euros of agricultural gross value added, in each region.

Table 3.5 – CAP expenditure intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Mean	1,844.13	47,582.58	1,800.29
Standard Deviation	2,140.31	62,315.10	2,303.33
Minimum	128.09	546.28	28.77
1st Quartile	1,092.33	15,266.28	903.35
Median	1,598.41	36,075.91	1,453.07
3rd Quartile	2,135.53	61,463.14	2,079.99
Maximum	47,215.59	950,650.32	36,024.24

Source: own elaboration

According to the quartile distributions that are provided in the lower part of Table 3.5, the cumulative shares of raw CAP expenditure have been computed as well, that is the amount of total expenditure accounted for each specific range of the distribution (Table 3.6). The lower quartile in terms of CAP expenditure intensity generally accounts for less than 20% of total raw expenditure: in particular when considering the CAP expenditure intensity per thousand Euros of agricultural GVA, such a share is just 12.7%. Conversely, both the 3rd and the 4th ranges in terms of CAP expenditure intensity got a total support that is larger than expected. Actually, the 3rd range is the largest one, accounting by itself for more than 40% of total CAP expenditure, while the upper quartile account for about 25-35% of total CAP. A possible explanation of these results may be identified in the fact that those regions sharing the highest expenditure intensity are generally smaller than other NUTS 3 regions, thus accounting for a lower share on overall raw expenditure.

Table 3.6 – Cumulative shares of CAP expenditures (2007-2011) by quartiles of expenditure intensity (Total number of observations: 1258)

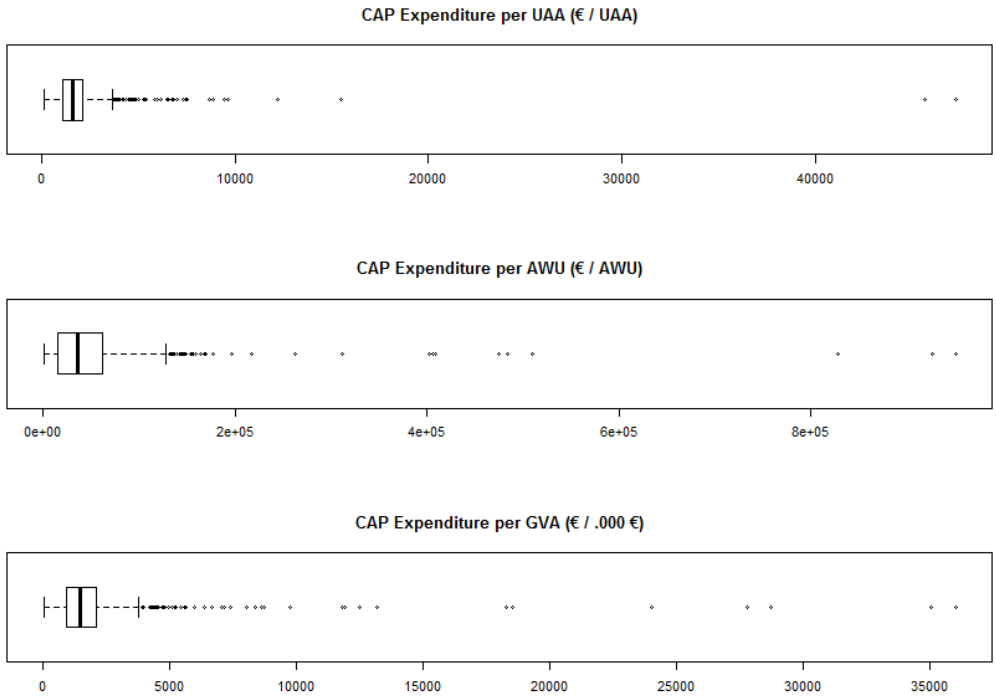
	Cumulative % of CAP expenditure		
	CAP Expenditure per UAA (€ / UAA)	CAP Expenditure per AWU (€ / AWU)	CAP Expenditure per GVA (€ / .000 €)
Minimum	0.00	0.00	0.00
1st Quartile	16.76	16.06	12.72
Median	27.60	20.97	24.41
3rd Quartile	73.73	67.16	64.88
Maximum	100.00	100.00	100.00

Source: own elaboration

In Figure 3.5, the distribution of the expenditure intensities is graphically depicted through the use of boxplots. Although some regions were previously excluded from the analysis due to their “artificially” high levels of intensity expenditure, a few extreme values are still observed. This is particularly true when analysing CAP expenditure intensity per hectare of utilised agricultural area and per AWU employed in agriculture.

Even in this case, the picture emerging from a boxplot is just part of the story. What is more interesting is the spatial allocation of the quartiles of the distributions throughout the EU-27. Then, the spatial quartile distributions of CAP expenditure intensities in the European space are respectively mapped in Figure 3.6 (CAP expenditure per ha. of UAA), Figure 3.7 (CAP expenditure per AWU employed in agriculture), and Figure 3.8 (CAP expenditure per thousand Euros of agricultural GVA). Values for just 1258 observations are reported in the following figures: other regions are labelled as “excluded regions” and they are mapped in grey colour.

Figure 3.5 – Distribution of CAP expenditure intensity by NUTS 3 region, 2007-2011 (Total number of observations: 1258)



Source: own elaboration

The remarkable heterogeneity that has been previously pointed out in general terms shows specific territorial patterns as well. Firstly, it has to be noticed that the overall picture significantly changes with the three indicators compared to total expenditures expressed in absolute values. Actually, the core-periphery pattern emerging from the analysis of the absolute levels of CAP expenditure should be reconsidered.

For example, when considering the intensity of total CAP expenditure per utilised agricultural area (UAA), regions in Eastern EU Member States (e.g., Romania and Bulgaria, the Baltic Countries and Poland) mostly belong to the lower quartile of the distribution, showing low expenditure intensity. CAP expenditure intensity is also well below the median (and the average EU value, too) in Scottish NUTS 3 regions as well as Northern Spain. Conversely, many urban regions and NUTS 3 regions in the Netherlands and in Belgium show the highest values of CAP expenditure per hectare of UAA throughout the EU[13]. Moreover, many regions located in Northern Italy and in Greece belong to the 4th range of the distribution as well.

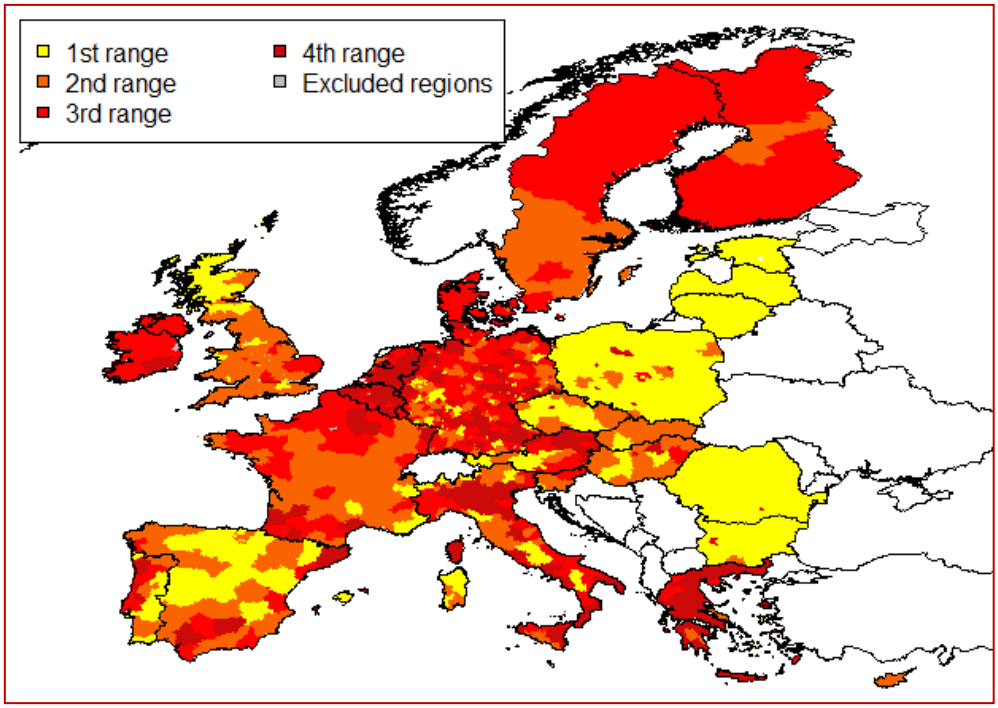
Main figures about the spatial allocation of CAP expenditure in terms of annual work unit (AWU) employed in agriculture follow a fairly similar territorial pattern. According to

13. This effect could be partially explained as some beneficiaries may be located in urban regions, some distance from the location of land (in more rural areas).

this specific index, regions in Northern and Western Member States tend to show large CAP expenditure intensity. The same is true for NUTS 3 regions which are located in Eastern Germany and throughout the Scandinavian Countries. Conversely, most regions belonging to both Eastern and Southern EU Member States (but Spain and Greece) usually belong to the 1st range of the distribution for they are characterised by larger shares of agricultural labour force than North-Western EU regions. Therefore, the intensity of CAP expenditure is lower in those regions.

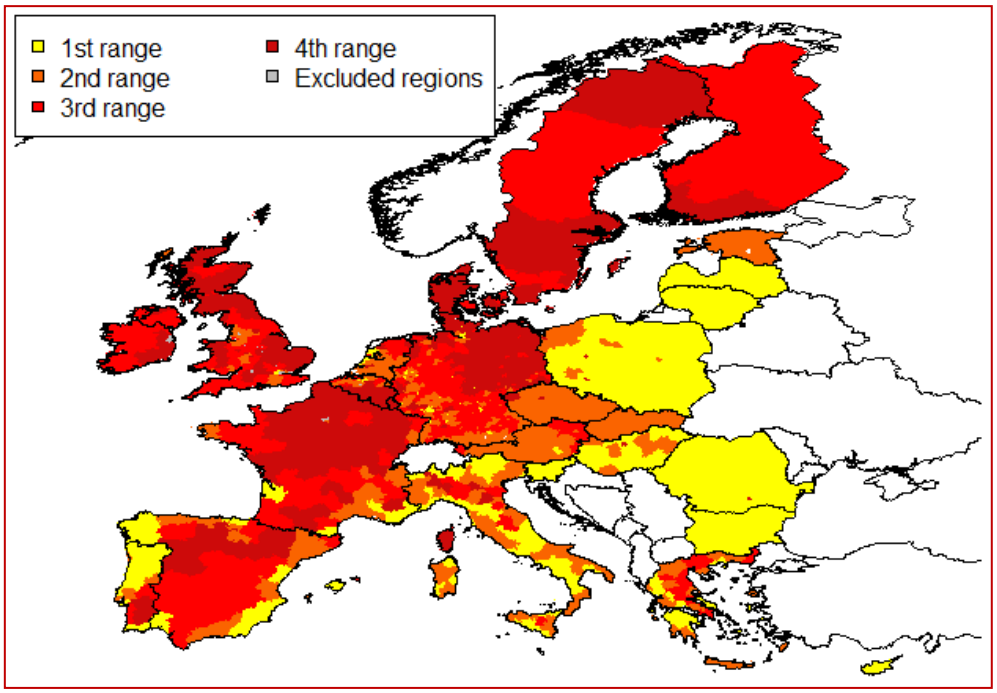
Lastly, when considering CAP support per thousand Euros of agricultural gross value added (000 €), the findings are somewhat different. Whilst previous indices suggested the existence of a major Eastern-Western divide in the allocation of overall CAP expenditure, such a divide is definitely less sharp according to this indicator. Here, CAP expenditure intensity is lower than the average in many Scandinavian regions. Also many Bulgarian and Romanian regions belong to the lower quartile of the distribution. Conversely, high intensity expenditure indices are observed in Western EU regions (e.g., Irish and French ones) as well as in Eastern Germany and in the Baltic Countries. Observed figures are largely due to the sharp differences within the absolute levels of GVA observed among Countries that largely affect agricultural GVA as well.

Figure 3.6 – Spatial quartile distribution for CAP expenditure intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



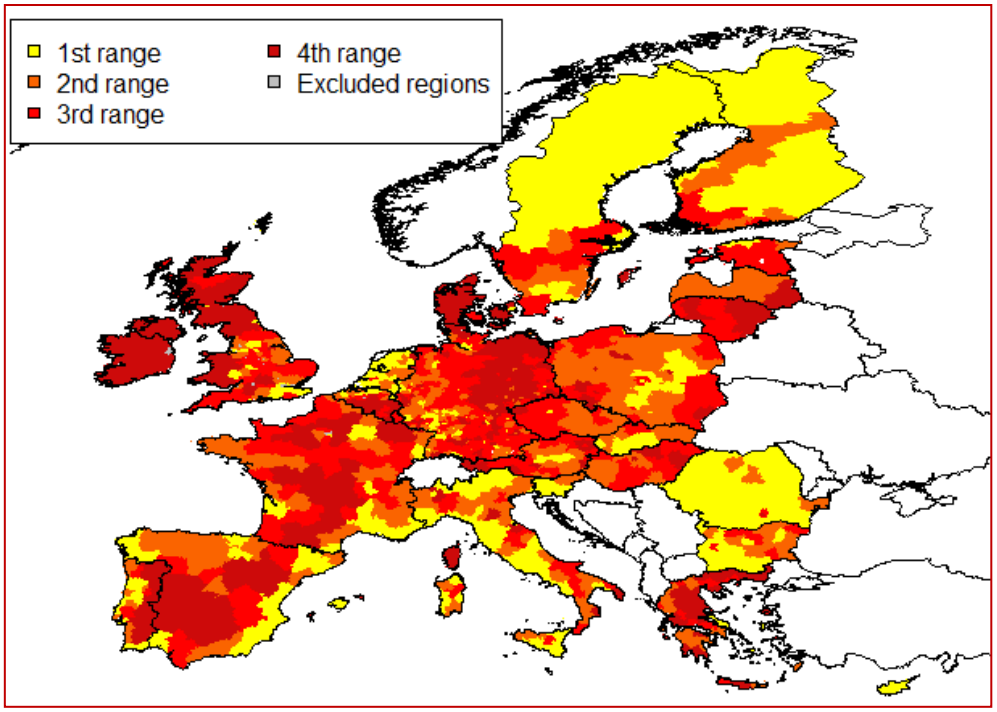
Source: own elaboration

Figure 3.7 – Spatial quartile distribution for CAP expenditure intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Figure 3.8 – Spatial quartile distribution for CAP expenditure intensity per thousand Euros of agricultural GVA(€ /.000 €)



Source: own elaboration

Spatial allocation of CAP expenditure (expressed in both absolute values and intensity indices) is heterogeneous at EU level. Heterogeneity has largely increased since the Eastern enlargements of the EU. When focusing on CAP expenditure absolute values, a large support goes to flatlands in North-Western EU Countries. Territorial patterns are rather different when considering the intensity of the support. Actually, when considering CAP expenditure per agricultural labour force, both Scandinavian and Western Europe regions are more supported than Eastern and Southern ones. Conversely, regions in Eastern EU Member States receive a more intense support than the EU average when considering agricultural gross value added: across Eastern Europe, the latter is definitely lower than Western EU one, in absolute levels.

Nevertheless, the focus on the overall CAP expenditure may be partially misleading as well: CAP comprises very different policies and measures, whose aims and purposes are rather different. Furthermore, different CAP measures are supported by different EU funds (EAGF and EAFRD). Therefore, according to this complex framework, a thorough analysis of disaggregated expenditure is quite important as well. Different measures are expected to be affected by very different territorial patterns.

3.3 The Allocation of Disaggregated Expenditure

Since the CAP comprises a wide variety of types of support, this section aims at considering the incidence of both Pillar One and Pillar Two support, separately. As pointed out, CAP distinct measures have different histories and aims: thus, each of them may have given origin to territorially distinct effects. Accordingly, by disentangling expenditure for distinct Pillars and measures, the overall analysis of the territorial allocation of CAP expenditure can be made more insightful. The territorial distribution of expenditures at NUTS 3 level is first described by considering CAP Pillar One and Two separately; then, within each Pillar, data are disentangled according to specific measures. In particular, the following broader structure is adopted here:

- Pillar One
  - Direct Payment (DP)
  - Market Interventions (MI) measures
- Pillar Two
  - Axis 1
  - Axis 2
  - Axis 3

For each dimension, raw expenditure (in thousand Euros) is analysed at first. Then, greater attention is focused on the analysis of above-mentioned expenditure intensity indices: expenditure per hectare of UAA, per annual work unit (AWU) employed in agriculture and per thousand Euros of agricultural GVA[14].

14. In Appendix 1, a hyperlinked file contains more information about CAP expenditure intensity indices at NUTS 3 level. Regions are ranked according to the level of the received support and the support is expressed as an index number, given the EU-27 global average equals to 100.

3.3.1 The First Pillar of the CAP: Total Expenditure

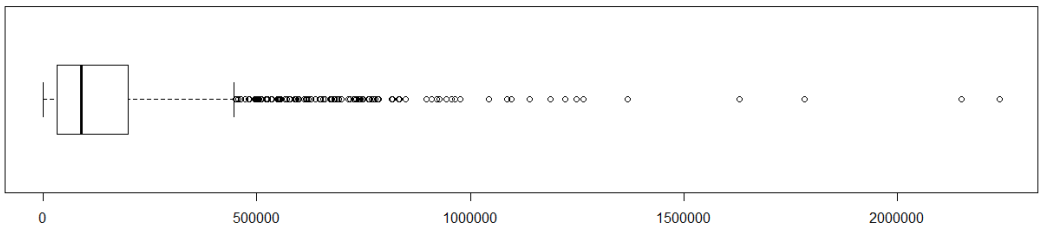
In spite of several major reforms, Pillar One still plays a predominant role within overall CAP. According to DG Agriculture data, referring to real CAP expenditures for years 2007 to 2011, Pillar One accounts for 84.25% out of total CAP. Notwithstanding "modulation", Pillar One still has an overwhelming relevance within the CAP. According to these figures, it is not surprising that distribution of Pillar One expenditure at NUTS 3 level is fairly similar to the overall CAP one (recall Section 3.2.1). In particular, each NUTS 3 region on average received about 163 million Euros in years 2007-2011. Dispersion from the average is wide as well: whilst standard deviation equals to 224 million Euros (Table 3.7), data dispersion is particularly significant in the 4th range of the distribution: actually, few observations got more than 1 billion Euros each in years 2007 to 2011 (Figure 3.9).

Table 3.7 – Pillar One expenditure descriptive statistics, 2007-2011 (.000 €) (Total number of observations: 1288)

	Total Pillar One Expenditure
Mean	163,326.80
Standard Deviation	223,701.32
Minimum	49.91
1st Quartile	31,976.18
Median	87,956.97
3rd Quartile	198,512.70
Maximum	2,240,148.85

Source: own elaboration

Figure 3.9 – Distribution of Pillar One expenditure by NUTS 3 region, 2007-2011 (in .000 €) (Total number of observations: 1288)

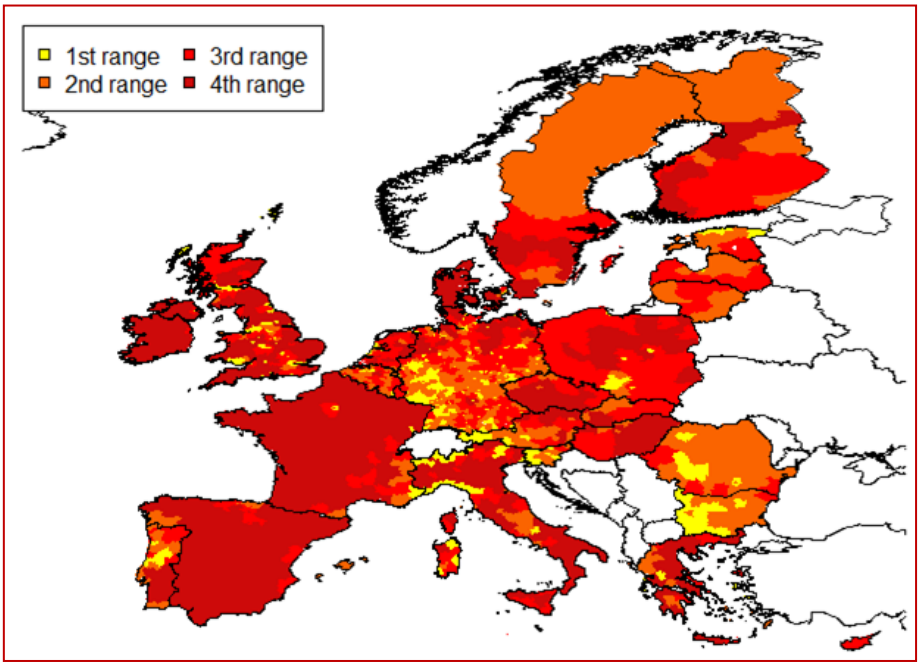


Source: own elaboration

Due to its overwhelming relevance out of total CAP, even the spatial allocation of Pillar One expenditure largely follows the spatial allocation characterising overall CAP expenditure. Again, urban NUTS 3 regions in very central Countries received a lower support than peripheral regions in the period under study. Moreover, when specifically focusing on Pillar One expenditure, regions in Western Countries tend to be largely highly supported. This is the case of Irish and British regions as well as most of French and Spanish ones. Conversely, just a few numbers of regions in the Eastern Countries (e.g., Poland, the Czech Republic and Hungary) shows a level of support which is above the EU average. In most cases, when just focusing on Pillar One expenditure, regions in those areas are less supported than the EU average (Figure 3.10). According to these figures and directly dealing with absolute levels of the support, the imbalance in agricultural support throughout the EU is straightforward, as Western EU Countries are more supported than Eastern EU ones.

Nevertheless, due to specific administrative divisions deeply varying throughout the EU-27, results may be affected by some major biases. Therefore, specific indices about the intensity of First Pillar expenditure are computed as well. Same 30 regions have been preliminarily excluded from the analysis, as specified above (see section 3.2.2). Accordingly, average Pillar One expenditure intensity equalled to 1,540.48€ per hectare of UAA throughout EU-27 NUTS 3 regions in years 2007 to 2011. In the same period, the average expenditure per AWU equalled to 40,355.90€, whereas expenditure per thousand of agricultural GVA equalled to 1,477.32€ (Table 3.8).

Figure 3.10 – Spatial quartile distribution for Pillar One expenditure at NUTS 3 level (overall 2007-2011 values)



Source: own elaboration

Table 3.8 – Pillar One expenditure intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Mean	1,540.48	40,355.90	1,477.32
Standard Deviation	1,967.47	56,769.06	2,041.24
Minimum	33.99	148.82	21.78
1st Quartile	799.64	11,578.08	683.25
Median	1,305.97	30,738.02	1,174.41
3rd Quartile	1,872.27	52,119.83	1,791.43
Maximum	45.472.59	917,648.29	35,914.44

Source: own elaboration

Moreover, according to the quartile distributions provided in the lower part of Table 3.8, the cumulative shares of total Pillar One expenditure have been computed for each range of the distribution (Table 3.9). Pillar One expenditure, by quartiles of intensity index, is even more concentrated than overall CAP expenditure. Indeed, when considering the intensity per hectare of UAA, the lower quartile accounts for just 12.3% out of total raw expenditure. Conversely, the upper quartile accounts for 32.2%. Nevertheless, 3rd range in terms of Pillar One expenditure intensity again accounts for the largest share of the absolute values. Figures are higher when considering the distribution of Pillar One expenditure intensity per thousand Euros of agricultural GVA: according to this distribution, the upper quartile accounts for more than 41% out of the total (Table 3.9).

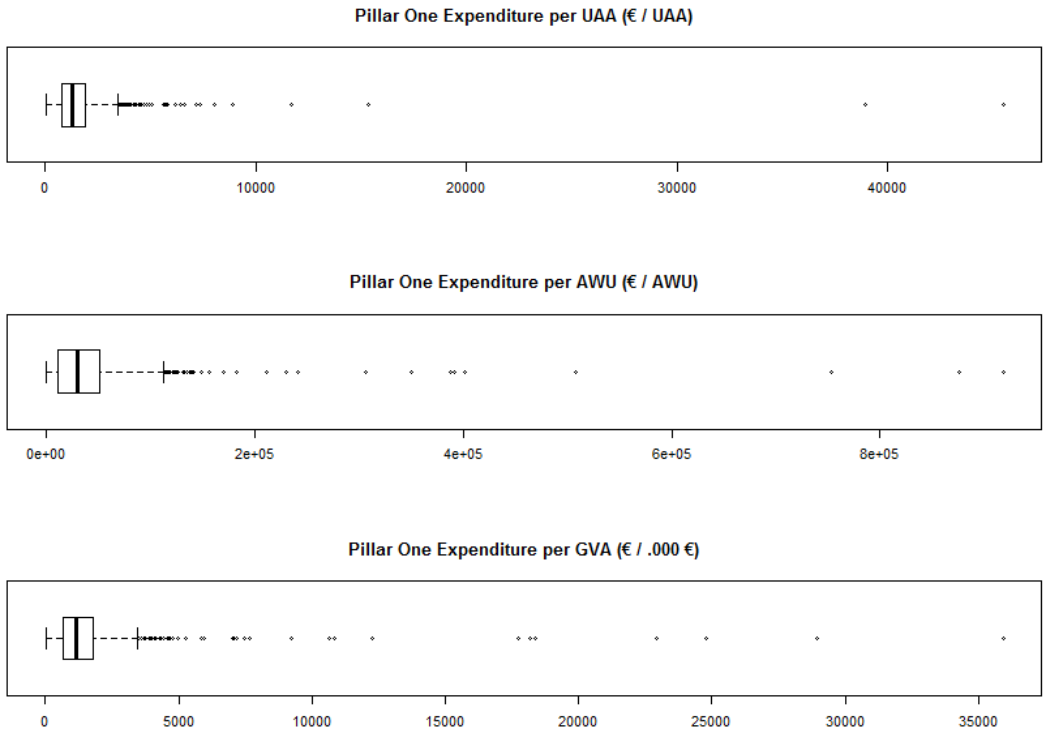
Table 3.9 – Cumulative shares of Pillar One expenditures (2007-2011) by quartiles of expenditure intensity (Total number of observations: 1258)

	Cumulative % of Pillar One expenditure		
	Pillar One Expenditure per UAA (€ / UAA)	Pillar One Expenditure per AWU (€ / AWU)	Pillar One Expenditure per GVA (€ / .000 €)
Minimum	0.00	0.00	0.00
1st Quartile	12.29	12.49	10.36
Median	22.95	19.81	20.52
3rd Quartile	67.76	62.40	58.99
Maximum	100.00	100.00	100.00

Source: own elaboration

According to these figures, it is easy to notice that the distributions for each intensity index are positively skewed: few observations share very large values, in particular when computing the intensity either per unit of agricultural area (UAA) or per AWU employed in agriculture. As observed in Figure 3.11, these distributions show an even greater skewness than overall CAP ones.

Figure 3.11 – Distribution of Pillar One expenditure intensity by NUTS 3 region, 2007-2011 (Total number of observations: 1258)



Source: own elaboration

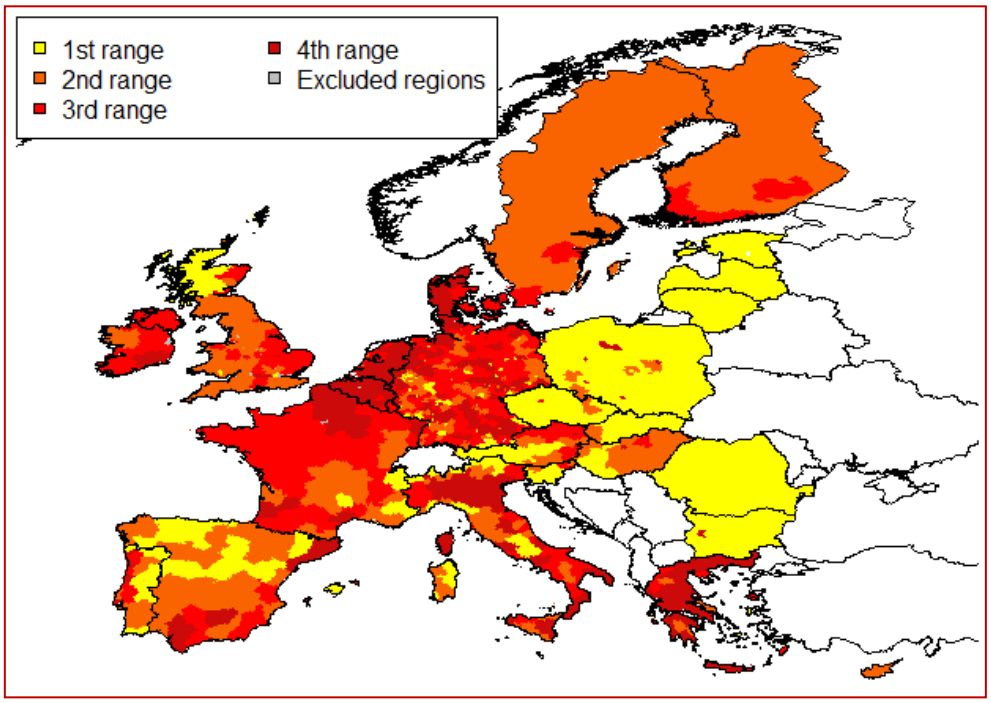
Such skewed distributions are coupled with rather heterogeneous territorial patterns. Again, patterns sharply differ when focusing on specific intensity indices (expenditure per hectare of UAA, per AWU employed in agriculture, per thousand Euros of agricultural GVA).

Intensity of Pillar One expenditure largely follows the spatial allocation of major agricultural activities throughout the EU-27, although some interesting findings can be pointed out. In particular, when focusing on the expenditure intensity per hectare of UAA (Figure 3.12) and per AWU (Figure 3.13) employed in agriculture, very low values generally affect all Eastern EU Member States regions with a few exceptions. Conversely, many regions belonging to Northern France, Belgium, the Netherlands and Germany (as well as most regions in Northern Italy) belong to the 4th range of the distribution: they are actually characterised by the highest Pillar One expenditure

intensity throughout the EU. Expenditure intensity is above the median value also in some Spanish and Greek regions. Those regions all share large agricultural sectors: surprisingly, in those regions the intensity of Pillar One support is rather high, in spite of large amounts of both agricultural areas and labour force.

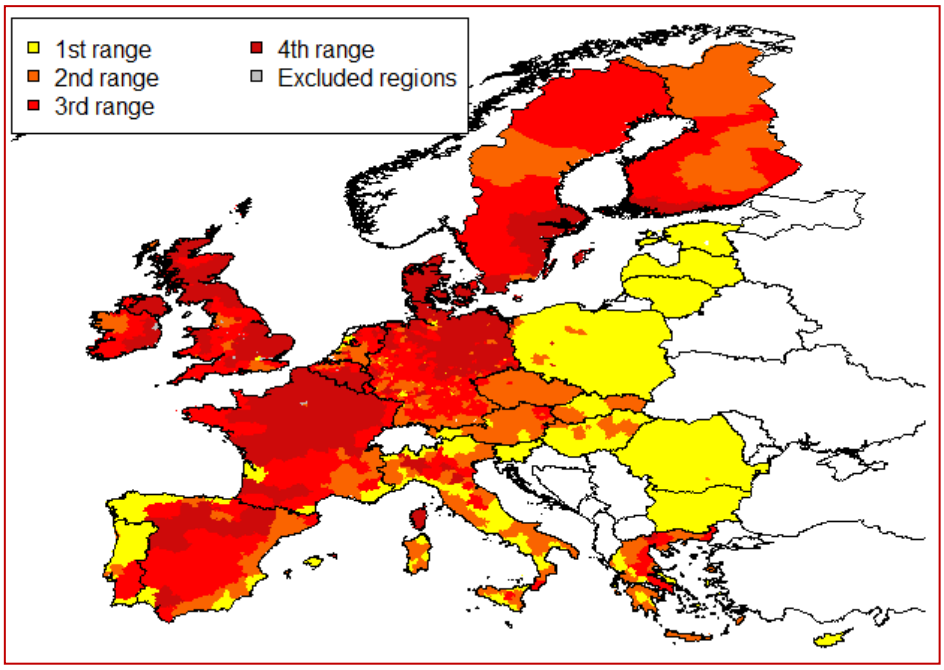
Again, a different picture comes from the analysis of Pillar One expenditure intensity with regard to agricultural gross value added (Figure 3.14). According to this specific index, the intensity of the support which is observed in EU Eastern regions is greater than the intensity in terms of agricultural land and agricultural labour force. Conversely, many Mediterranean regions (e.g., those belonging to Spain, Southern France and Italy) show a lower support than the EU average and median values. Accordingly, the Eastern-Western divide appears to be less sharp here. Despite of these findings, the North-Western EU flatlands are again the most supported regions throughout the EU, when considering overall Pillar One expenditure (i.e., the whole set of agricultural policies, actually implemented within the CAP).

Figure 3.12 – Spatial quartile distribution for Pillar One expenditure intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



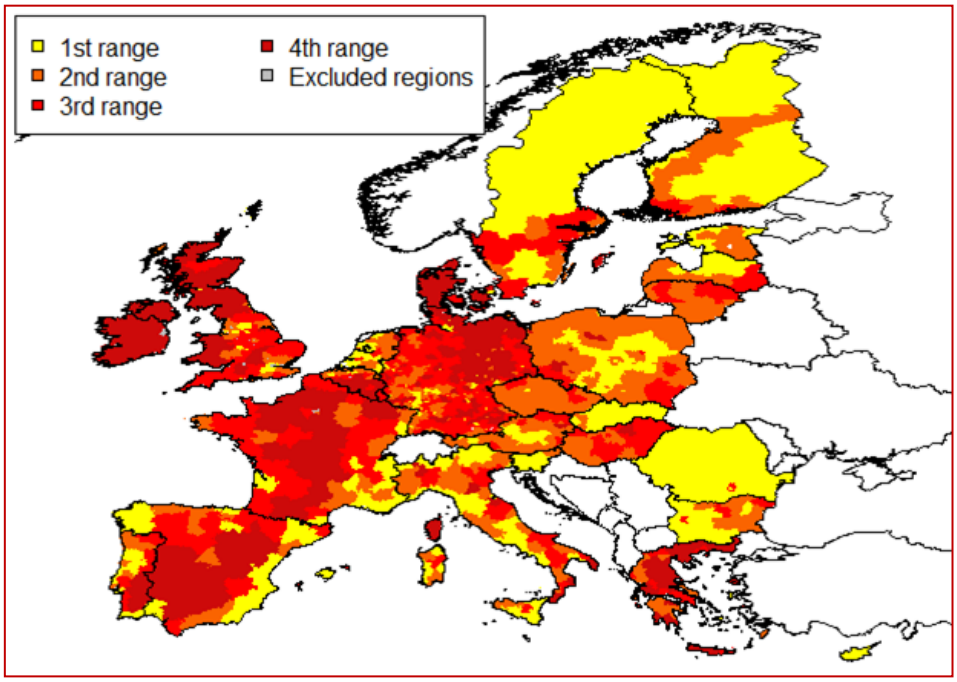
Source: own elaboration

Figure 3.13 – Spatial quartile distribution for Pillar One expenditure intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Figure 3.14 – Spatial quartile distribution for Pillar One expenditure intensity per thousand Euros of agricultural GVA (€/.000 €) at NUTS 3 level (2007-2011 values)



Source: own elaboration

3.3.2 Disentangling First Pillar's Measures

Very different measures comprise Pillar One. According to the work purposes, two types of Pillar One expenditure are distinguished: Direct Payment (DP); Market Intervention (MI) measures. Table 3.10 shows main descriptive statistics about the absolute levels of the above-mentioned two types of Pillar One expenditure. Mean, standard deviation and quartiles are computed from the list of 1288 NUTS 3 regions in the EU-27 Member States. On average, each NUTS 3 region received about 149 million Euros as Pillar One DP, while each of them just got 14 million Euros as MI measures in years 2007 to 2011. Then, dispersion measures are even greater referring to these variables. By considering the overall period 2007 to 2011, some EU regions did not receive any amount of money as DP for farming activities. Moreover, when specifically focusing on MI measures, negative values were recorded in some regions: they probably refer to the presence of negative compensations from previous programming period that have not been counterbalanced by new payments so far. On the opposite side, some NUTS 3 regions received an amount of DP even 10 times larger than average payment. When referring to MI measures, payments in some regions were even 50 times larger than the average amount of support[15] (Table 3.10 and Figure 3.15).

According to the above-mentioned figures, it is noticeable how the support from MI measures is much more concentrated in a few NUTS 3 regions throughout the EU than the support coming from DP. Even from a spatial perspective, data seem confirming previously findings about the allocation of Pillar One expenditure. Referring to their absolute levels, DP is particularly significant in mostly Western EU regions, but also in some Eastern EU ones (e.g., those belonging to Hungary, the Czech Republic and Poland) (Figure 3.16). MI measures spatial quartile distribution follows a rather peculiar spatial allocation: in this case, many British, German, Austrian and even French regions belong to the 1st range of the distribution, thus sharing the lowest amounts of support per single NUTS 3 region. The same phenomenon is observed throughout Northern EU NUTS 3 regions (Finland and the Baltic Countries). Generally, the distribution of MI measures at NUTS 3 level throughout the EU-27 follows a rather scattered pattern, thus confirming the existence of a very concentrated distribution in a few numbers of regions. This distribution partially reflects the fact the just certain types of products current benefit from MI (Figure 3.17).

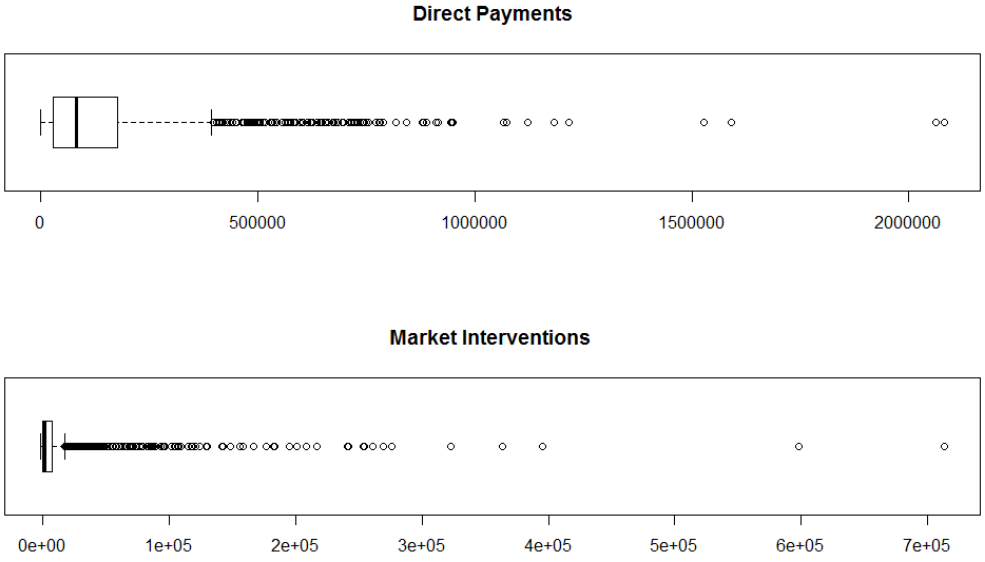
15. This effect could be partially explained as MI payments are presumably paid to some "downstream" actors in the supply chain. Actually, most of these beneficiaries are concentrated in some specific regions (e.g., urban areas).

Table 3.10 – Pillar One Direct Payment and Market Intervention measures descriptive statistics, 2007-2011 (.000 €) (Total number of observations: 1288)

	Direct Payments	Market Interventions
Mean	149,060.17	14,266.63
Standard Deviation	206,737.71	44,580.37
Minimum	0.00	-1,323.67
1st Quartile	28,967.05	358.56
Median	80,603.25	1,764.02
3rd Quartile	176,072.40	7,258.57
Maximum	2,081,931.84	713,104.14

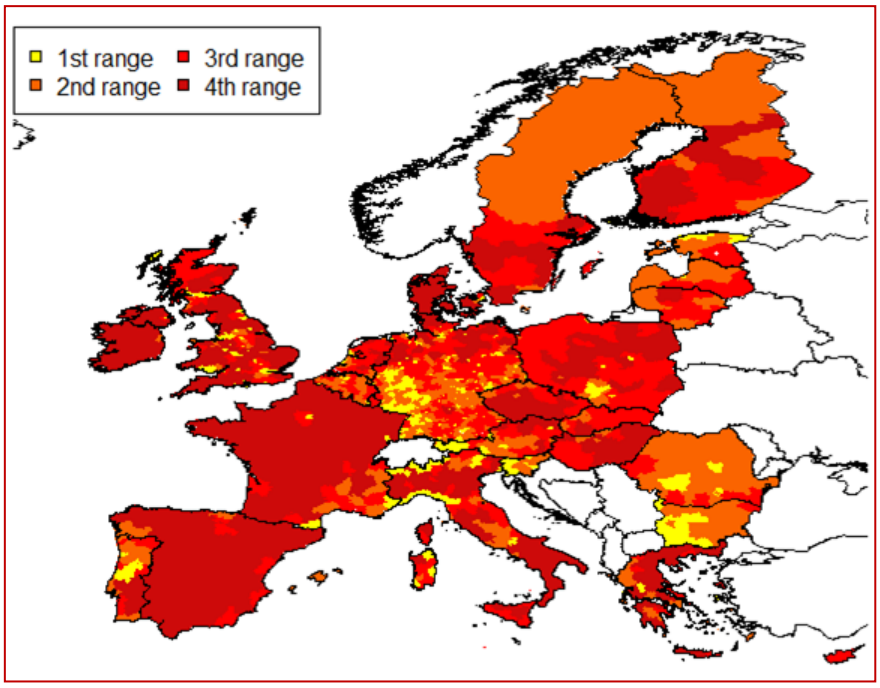
Source: own elaboration

Figure 3.15 – Distribution of Pillar One Direct Payment and Market Intervention measures by NUTS 3 region, 2007-2011 (in .000 €) (Total number of observations: 1288)



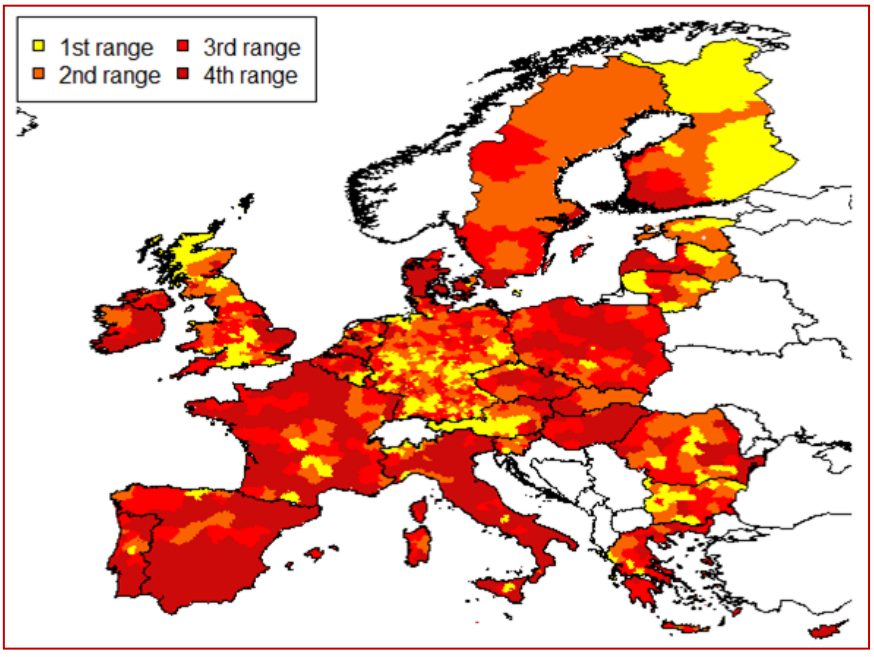
Source: own elaboration

Figure 3.16 – Spatial quartile distribution for Direct Payment (Pillar One) at NUTS 3 level (overall 2007-2011 values)



Source: own elaboration

Figure 3.17 – Spatial quartile distribution for Market Intervention measures (Pillar One) at NUTS 3 level (overall 2007-2011 values)



Source: own elaboration

Again, by analysing the intensity indices, a different picture emerges. On average, Direct Payment amounted to 1,327.47€ per hectare of UAA in each EU region under study (1258 observations), whereas Market Intervention measures accounted for just 213.01€ per hectare of UAA. On average, DP and MI measures per AWU employed in agriculture respectively equalled to 36,560.32€ and 3,795.58€. Lastly, the amount of DP per thousand Euros of agricultural GVA equalled to 1,314.04 while MI measures were just 163.27€ (Table 3.11) in the same years. By analysing standard deviations as well as distributions by quartile, a large dispersion (especially when considering the upper quartile) is again observed.

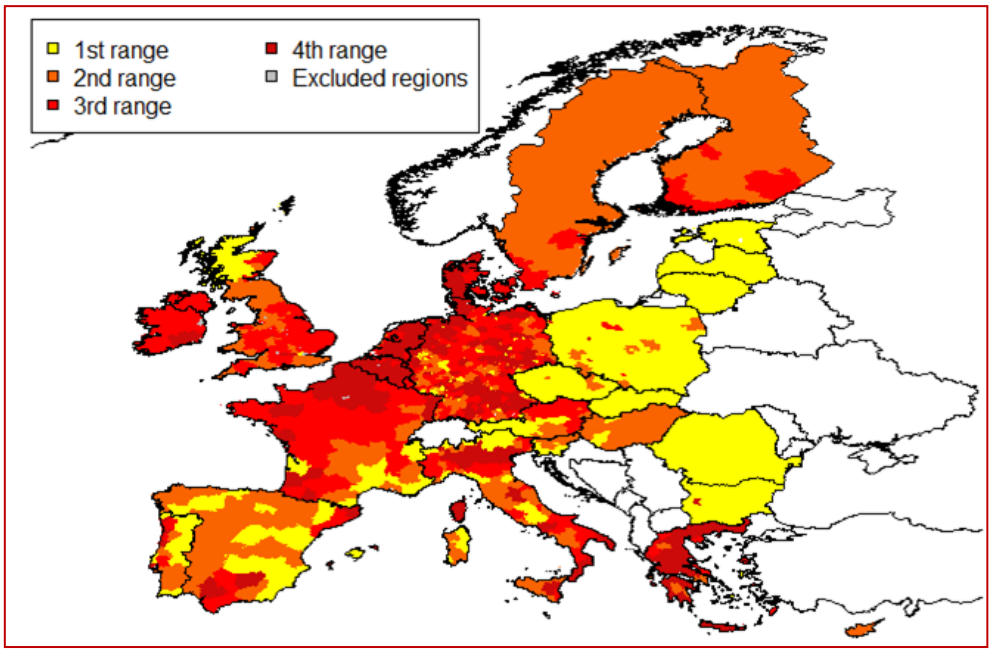
Referring to the spatial distribution of DP intensity, it largely differs according to which index is actually chosen (expenditure per land, labour or agricultural GVA) (Figure 3.18, Figure 3.19, Figure 3.20). Nevertheless, no matter which index is chosen, most supported regions are flatland areas throughout North-Western Europe. Indeed, even when considering the intensity of this support with respect to agricultural GVA, those regions share the highest intensities. This is due to the types of agricultural activity taking place in those regions. Conversely, Pillar One DP is in its lower quartile in most Eastern EU regions as well as in area located in Southern Europe.

Table 3.11 – Pillar One Direct Payments and Market Interventions intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

	Direct Payments			Market Interventions		
	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Mean	1,327.47	36,560.32	1,314.04	213.01	3,795.58	163.27
Standard Deviation	1,006.92	46,418.93	1,364.79	1,424.85	30,593.38	1,333.80
Minimum	0.00	0.00	0.00	-6.90	-287.75	-9.00
1st Quartile	718.46	9,983.58	604.38	8.18	145.92	8.59
Median	1,210.50	28,607.65	1,092.04	26.14	582.24	25.92
3rd Quartile	1,712.61	49,448.72	1,719.12	95.99	1,861.68	75.60
Maximum	21,581.45	870,067.34	28,373.98	40,604.37	840,435.95	32,069.50

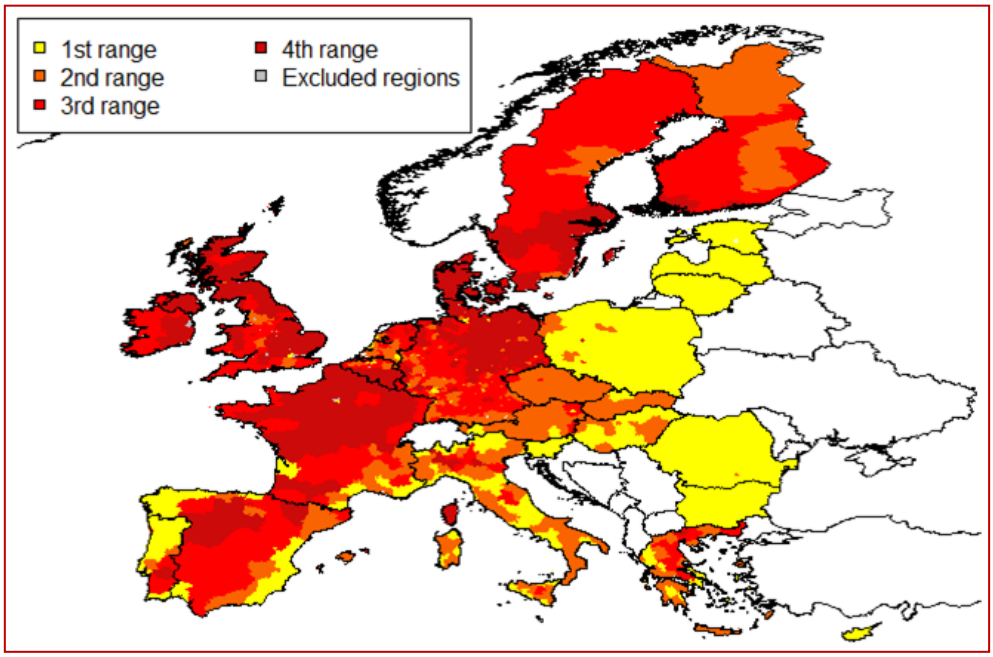
Source: own elaboration

Figure 3.18 – Spatial quartile distribution for Direct Payments intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



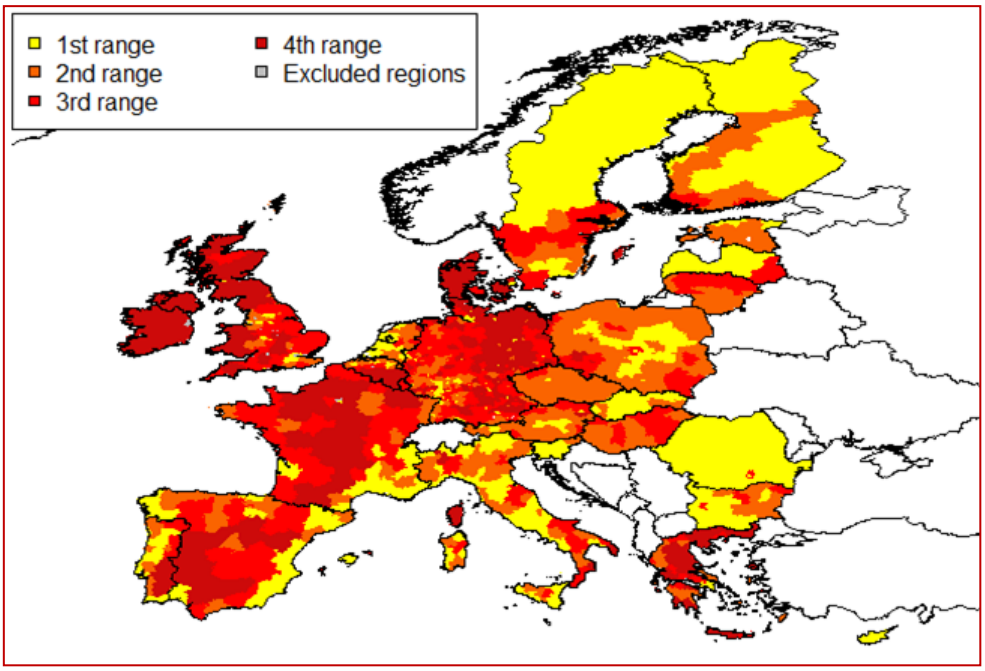
Source: own elaboration

Figure 3.19 – Spatial quartile distribution for Direct Payments intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Figure 3.20 – Spatial quartile distribution for Direct Payments intensity per thousand Euros of agricultural GVA (€/.000 €) at NUTS 3 level (2007-2011 values)

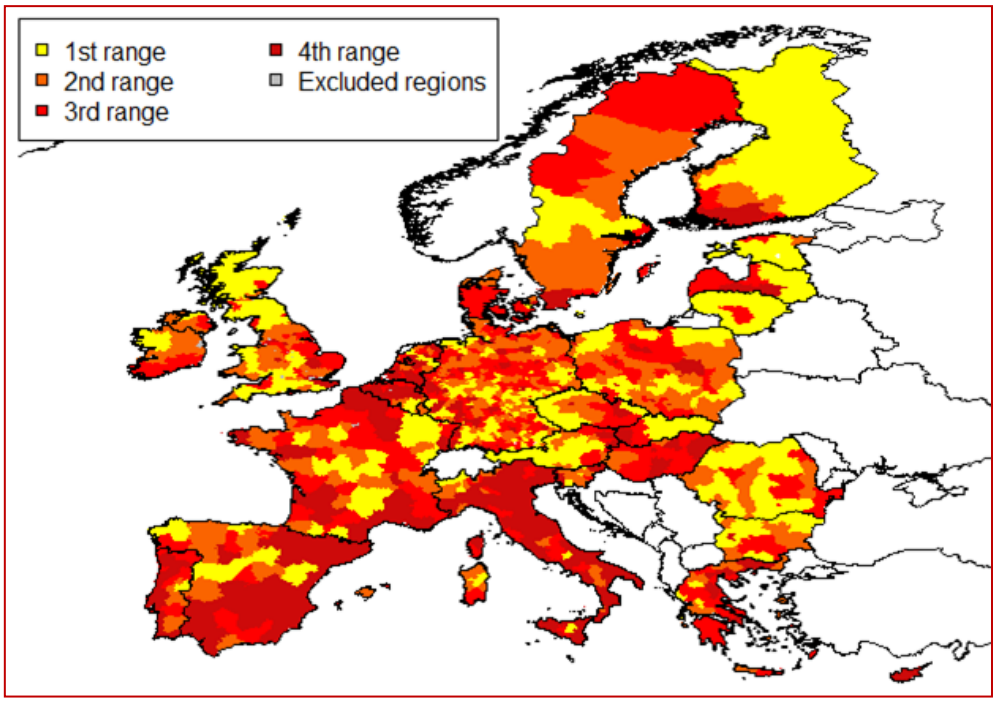


Source: own elaboration

The spatial allocation of MI measures intensity indices is much more scattered than DP one. Actually, whatever intensity index is considered, both central and peripheral regions may share the highest intensity values as well as the lowest ones. Therefore, it is hard to find a clear territorial pattern, here. Furthermore, general figures are largely different if compared to those observed for both DP and overall Pillar One expenditure (Figure 3.21, Figure 3.22, Figure 3.23). Such a pattern, enhancing territorial concentration, could be explained by considering both the historical reforms and the current aims of those specific measures (one of the latest crops still subsidised by the CAP through MI measures is sugar produced from sugar beet)[16]. Nevertheless, it is important to remind that MI measures just account for a low share of overall Pillar One expenditure (less than 9.0%).

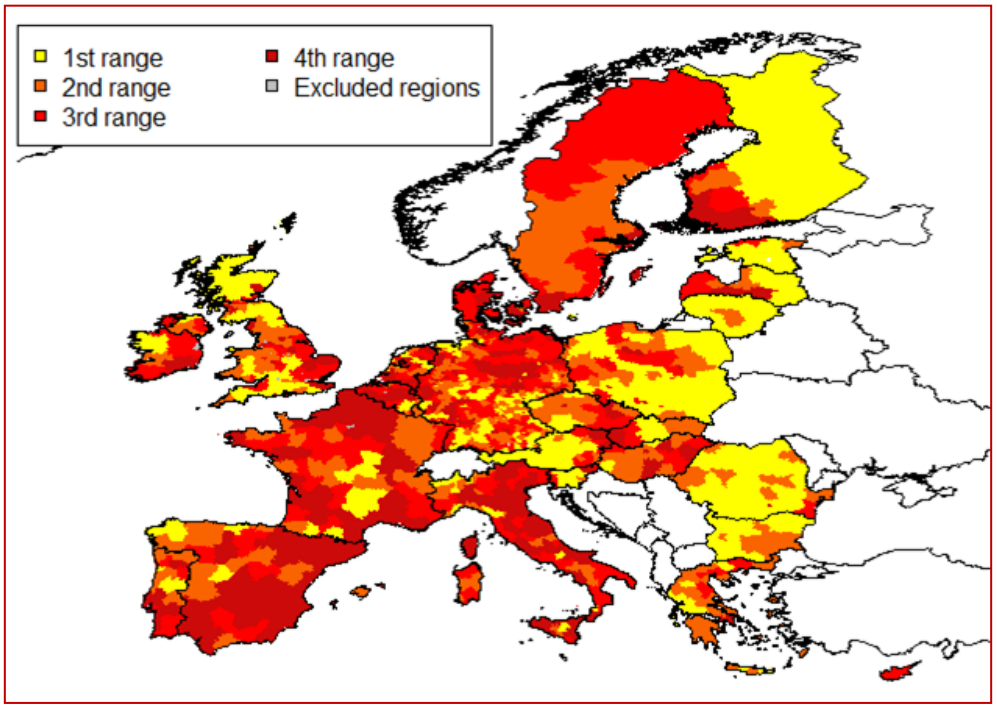
16. Furthermore, data largely confirm that most MI payments are probably paid to 'downstream' actors (e.g., dealers processors) that are not located in agricultural and production areas.

Figure 3.21 – Spatial quartile distribution for Market Interventions intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



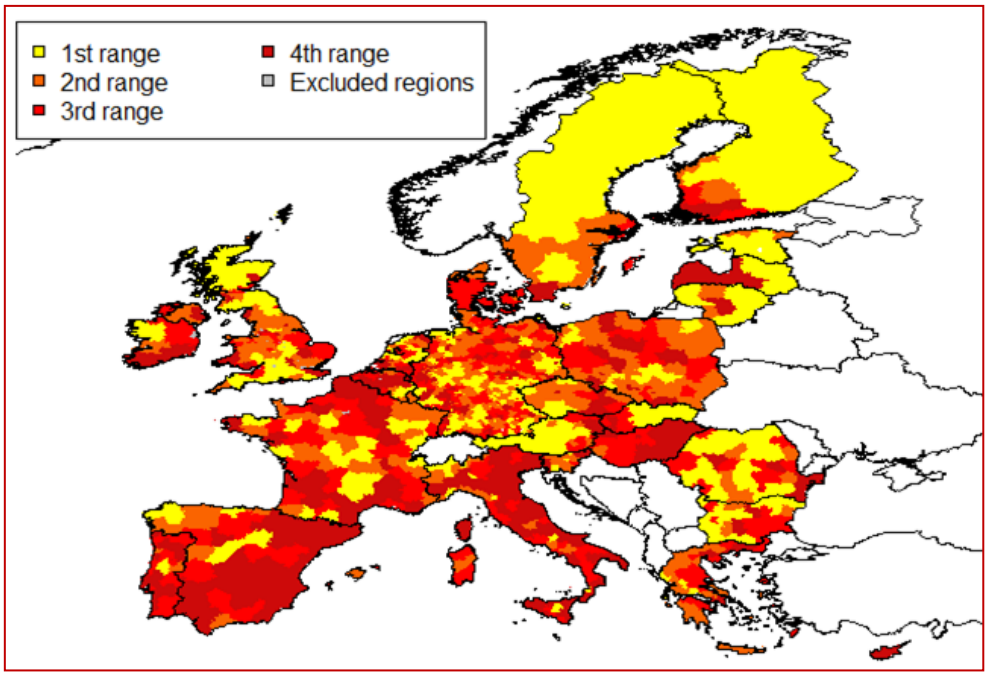
Source: own elaboration

Figure 3.22 – Spatial quartile distribution for Market Interventions measures intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011)



Source: own elaboration

Figure 3.23 – Spatial quartile distribution for Market Interventions measures intensity per thousand Euros of agricultural GVA (€/.000 €) at NUTS 3 level (2007-2011)



Source: own elaboration

3.3.3 The Second Pillar of the CAP: Total Expenditure

Pillar Two is funded by the European Agricultural Fund for Rural Development, (EAFRD) and it is aimed at supporting the implementation of rural development programmes. In spite of the major challenges rural areas are currently facing (that would justify strong rural development policies), Pillar Two accounted for just 15.75% out of total CAP expenditure in years 2007 to 2011. Therefore, although major reforms have affected the overall framework of CAP over time, rural policies still play a lower role than agricultural measures in the 2007-2013 CAP framework.

Nevertheless, it is important to point out how the distribution of expenditure from Pillar Two (Rural Development) differ from Pillar One expenditure at NUTS 3 level throughout the EU. According to NUTS 3 level territorial disaggregation, Table 3.12 shows Pillar Two expenditure main descriptive statistics (mean, standard deviation and quartiles). On average, each NUTS 3 region received just 30.5 million Euros in years 2007-2011, thus confirming that figures from RDP are lower than the ones from CAP Pillar One. Again, a positive skewed distribution is observed: indeed, the median value was just 16.3 million Euros. Even standard deviation is large (40.98 million Euros).

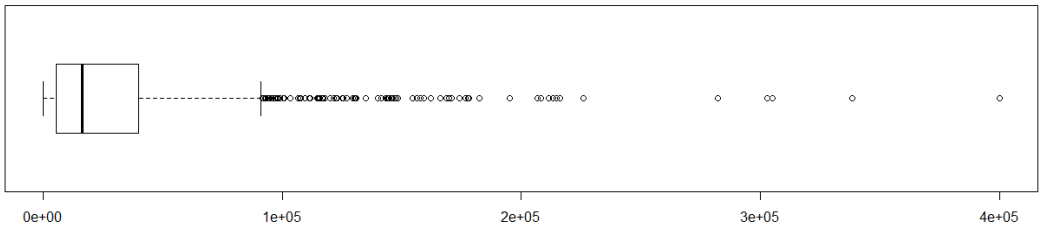
Moving from these very general figures, a boxplot for the same distribution (Figure 3.24) stresses the presence of few regions showing higher values for Pillar Two expenditure than other EU regions. In a few regions, Pillar Two expenditure in years 2007-2011 was even greater than 200 million Euros.

Table 3.12 – Pillar Two (Rural Development) expenditure descriptive statistics, 2007-2011 (in .000 €) (Total number of observations: 1288)

	Pillar Two Expenditure
Mean	30,533.90
Standard Deviation	40,975.81
Minimum	3.72
1st Quartile	5,195.37
Median	16,353.52
3rd Quartile	39,598.34
Maximum	400,143.46

Source: own elaboration

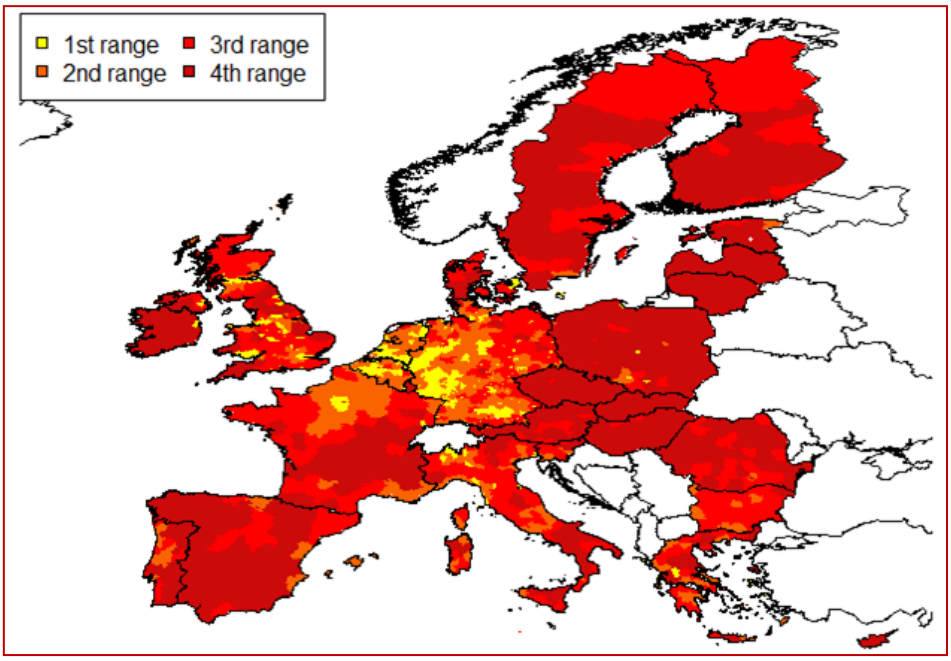
Figure 3.24 – Distribution of Pillar Two expenditure by NUTS 3 region, 2007-2011 (in .000 €) (Total number of observations: 1288)



Source: own elaboration

Focusing on the spatial quartile distribution (Figure 3.25), largest amounts of Pillar Two expenditure generally go to more peripheral EU regions (e.g., those belonging to Ireland, Portugal and the Scandinavian Countries). Regions in Eastern EU Member States also received large amounts for Pillar Two expenditure, in absolute values. Conversely, NUTS 3 regions in central Countries (e.g., Germany, the Netherlands, Belgium and the United Kingdom) received lower absolute levels of support: some German and British city-regions actually received less than 50,000 € in the overall period 2007-2011.

Figure 3.25 – Spatial quartile distribution for Pillar Two expenditure at NUTS 3 level (overall 2007-2011 values)



Source: own elaboration

When computing specific intensity indices for Rural Development expenditure, different patterns emerge (Table 3.13). On average, each NUTS 3 regions respectively received 303.65€ of Rural Development expenditure per hectare of UAA, 7,226.69€ per AWU employed in agriculture and 322.97€ per thousand Euros of Agricultural GVA in years 2007 to 2011. Standard deviation is very large in all three cases, even after having removed those regions with very limited rural features (see above section 3.2.2). Actually, whereas some regions received a really reduced support (e.g. less than a hundred Euros either per hectare of UAA or AWU employed in agriculture), other regions were highly supported (e.g., more than 2,000€ per hectare of UAA).

When considering the relevance of each quartile in terms of Pillar Two overall expenditure, the lower quartile (i.e., 25% of regions showing lowest Pillar Two expenditure intensity) accounts for less than 15% out of total expenditure. Share of both 3rd and 4th ranges are particularly high: regions sharing the highest intensity in RD expenditure intensity thus account for largest shares of total RDP expenditure (Table 3.14).

Table 3.13 – Pillar Two (Rural Development) expenditure intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Mean	303.65	7,226.69	322.97
Standard Deviation	460.08	15,256.31	550.07
Minimum	4.78	53.21	2.85
1st Quartile	122.68	1,890.18	96.28
Median	207.96	3,963.44	197.04
3rd Quartile	355.36	8,284.38	400.15
Maximum	8,905.23	439,274.40	11,589.90

Source: own elaboration

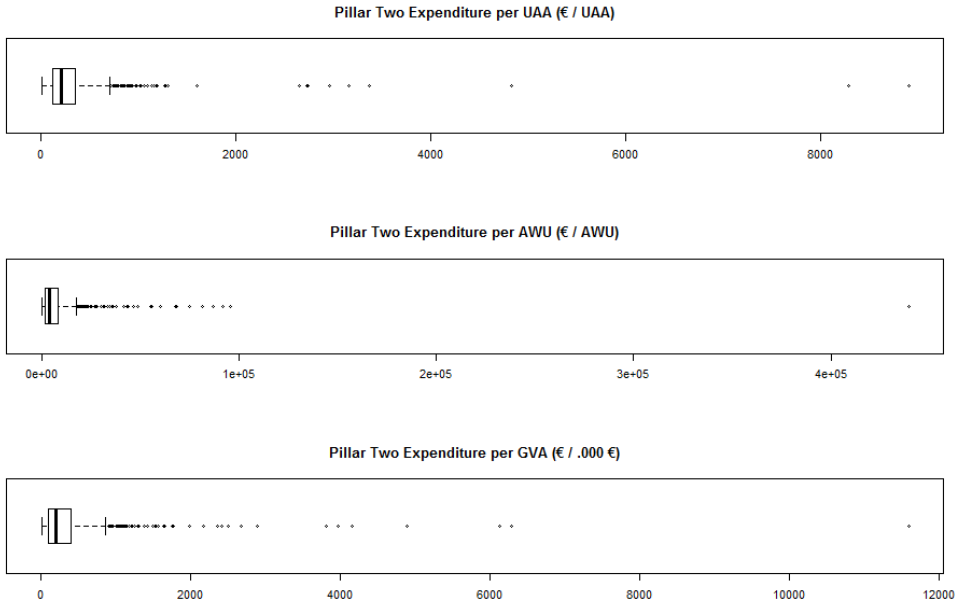
Table 3.14 – Cumulative shares of Pillar Two expenditures (2007-2011) by quartiles of expenditure intensity (Total number of observations: 1258)

	Cumulative % of Pillar Two expenditure		
	Pillar One Expenditure per UAA (€ / UAA)	Pillar One Expenditure per AWU (€ / AWU)	Pillar One Expenditure per GVA (€ / .000 €)
Minimum	0.00	0.00	0.00
1st Quartile	12.28	15.77	8.47
Median	16.11	23.62	16.48
3rd Quartile	55.81	64.06	51.83
Maximum	100.00	100.00	100.00

Source: own elaboration

Barely similar information is depicted in Figure 3.26: actually, a boxplot helps in identifying very extreme values within each distribution. In particular, just few NUTS 3 regions show those high and extreme values.

Figure 3.26 – Distribution of Pillar Two expenditure intensity by NUTS 3 region, 2007-2011 (Total number of observations: 1258)



Source: own elaboration

Furthermore, it is possible to map Pillar Two expenditure intensity throughout the EU (Expenditure intensity per hectare of UAA, per AWU, employed in agriculture, per thousand Euros of agricultural GVA). By analysing expenditure intensity, it is easy to notice how spatial allocations of Pillar One and Pillar Two expenditures really differ to each other. RDP expenditure intensity per hectare of UAA is particularly low in flatlands throughout Northern France and Spain. Also Scottish provinces and many Romanian NUTS 3 regions belong to the 1st range of the distribution. Conversely, expenditure intensity is particularly high in most regions throughout Northern and Scandinavian Countries. Also Eastern EU Member States are highly supported (ranking in either 3rd or 4th range of the distribution). Furthermore, many mountain regions (throughout the Alps and the Pyrenees) belong to the upper quartiles of the distribution (Figure 3.27).

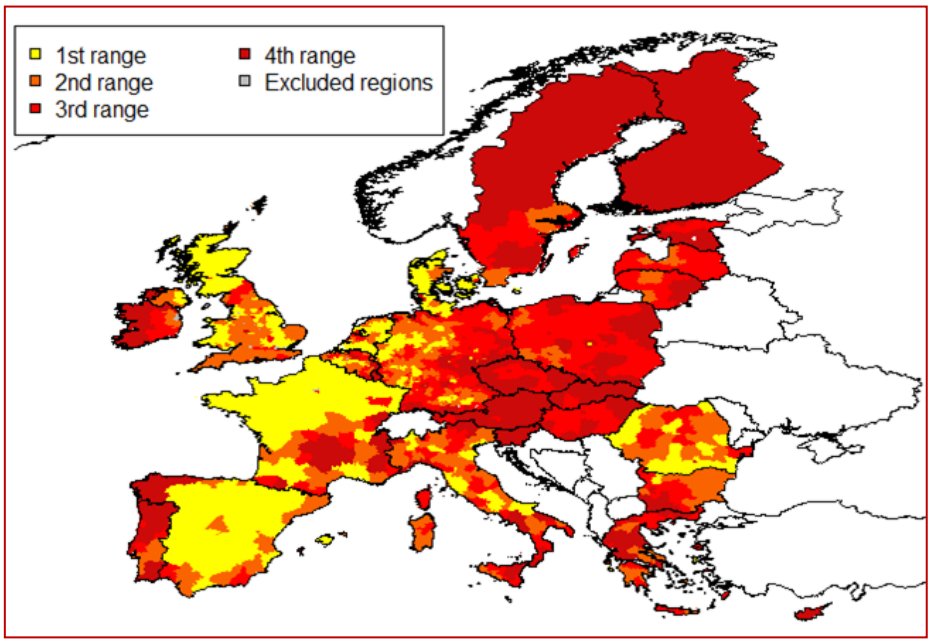
Focusing on Rural Development expenditure intensity per AWU, a different picture emerges. According to this index, regions in Eastern EU Countries show a lower support compared to regions in Germany and in other EU Western Countries. This effect is largely due to a different amount of agricultural labour force which is observed in those economies. Conversely, both Irish regions and Scandinavian ones are characterised by a larger support per AWU employed in agriculture than Mediterranean regions. In particular many Italian, Greek and Eastern Spanish regions belong to the 1st range of the distribution (Figure 3.28). Similar findings, at national level, were already pointed out by Copus (2010).

The intensity of the support in terms of agricultural GVA is again affected by large cross-country differences. In years 2007-2011, all Eastern Member States regions received the largest amount of support per thousand Euros of agricultural gross value

added: most of these regions, indeed, belong to the upper quartile of the distribution. Conversely, most regions in Italy, France and the Netherlands belong to the 1st range, sharing the lowest levels of expenditure intensity (Figure 3.29).

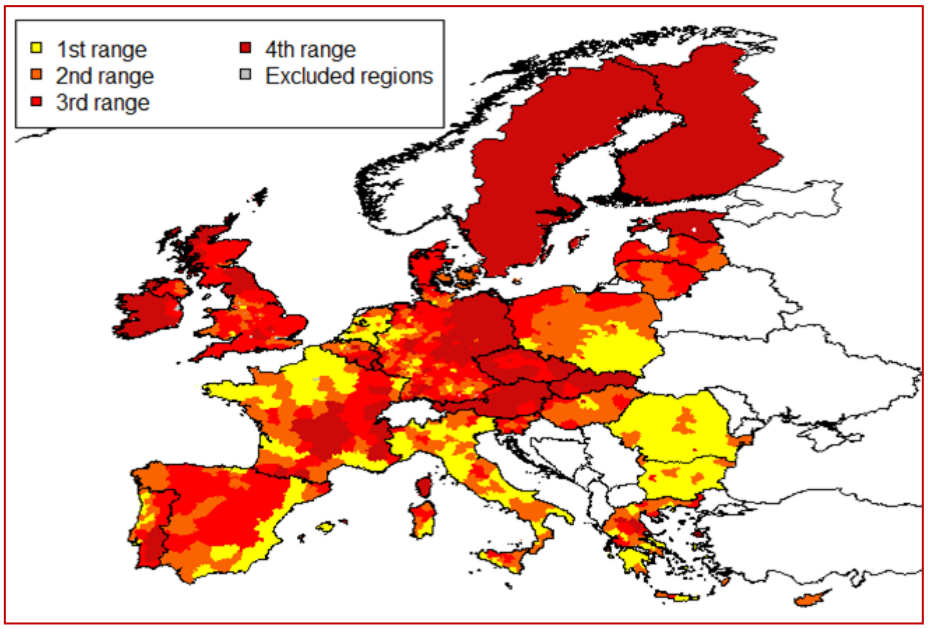
From a broader perspective, it is easy to conclude that the spatial allocation of the Rural Development expenditure intensity follows a very different pattern compared to Pillar One's. It seems that those regions that are little supported in terms of Pillar One expenditure tend to be highly supported in terms of Rural Development expenditure and vice-versa. As a consequence, when jointly analysing the territorial distribution and spatial allocation of both Pillars of CAP, throughout the EU, opposite patterns tend to be observed. Nevertheless, cross-compensation between CAP pillars is just part of the story. Disentangling Pillar Two single measures helps in better framing Rural Development expenditure as well. CAP Pillar Two is actually comprised of many different measures. Although Pillar Two is mostly aimed at promoting rural development measure, it also comprises important environmental measures. Due to this particular framework, single Pillar Two expenditure will be disentangled according to the main axes composing it, thus observing major differences in terms of both rural and environmental measures.

Figure 3.27 – Spatial quartile distribution for Rural Development Policy intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



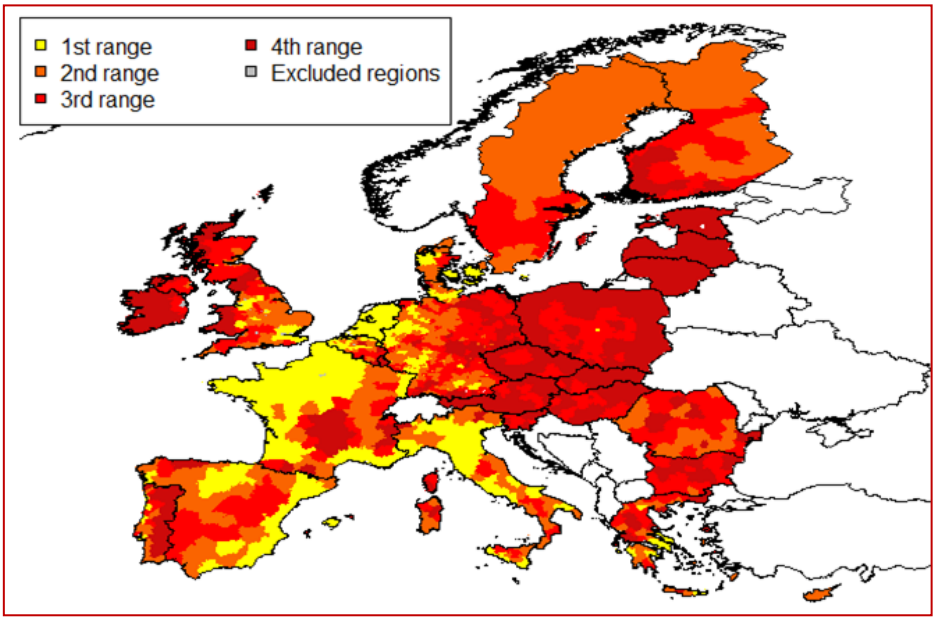
Source: own elaboration

Figure 3.28 – Spatial quartile distribution for Rural Development Policy intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Figure 3.29 – Spatial quartile distribution for Rural Development Policy intensity per thousand Euros of agricultural GVA (€/.000 €)at NUTS 3 level (2007-2011 values)



Source: own elaboration

3.3.4 Disentangling Second Pillar's Measures

As described in Section 2, Pillar Two of the CAP comprises a number of quite distinct measures, whose relative importance varies widely between Member States (Shucksmith *et al.*, 2005). For the purposes of the analysis, we decided to disentangle expenditure from Pillar Two, just according to its main Axes. In particular, we mainly refer to the following classification:

- Axis 1 is aimed at improving the competitiveness of the agricultural and forestry sector;
- Axis 2 is aimed at improving the environment and the countryside;
- Axis 3 is aimed at improving the quality of life in rural areas and encouraging diversification of the rural economy.

According to this framework, expenditure from both Axis 1 and Axis 3 can be mostly considered as rural measures. Conversely, expenditure from Axis 2 is mainly aimed at tackling environmental issues.

Due to different national/regional priorities, the relative importance of Pillar Two axes and measures deeply varies between Member States and their regions. Nevertheless, Axis 2 is the most important one in terms of total expenditure at EU level. Therefore, although just a single Axis shows specific environmental purposes, its relevance within the Second Pillar of the CAP is crucial. Actually, in terms of real 2007-2011 Pillar Two expenditure, Axis 2 expenditure accounted for 58.12% of the total, while its share on the total 2007-2013 planned budget equals to 44%.

Major descriptive statistics about expenditure at NUTS 3 level throughout the EU may confirm these imbalances. Table 3.15 actually shows the absolute levels of expenditure at NUTS 3 level per single axis of Pillar Two. On average, each EU NUTS 3 region received 8.98 million Euro as Axis 1 expenditure in years 2007 to 2011; in the same period, expenditure from Axis 2 measures was more than double (17,3 million Euros). Conversely, expenditure from Axis 3 (measures for the improvement of the quality of life and well-being in rural areas) was just 2,5 million Euros. Nevertheless, average values do not take into account the large dispersion that is shown throughout the EU. Boxplots in Figure 3.30 may help in describing these major characteristics. In particular, it is possible to notice that dispersion equally affects expenditures from all three axes. In particular, when considering just the expenditure from Axis 3, 105 NUTS 3 regions did not receive any support at all.

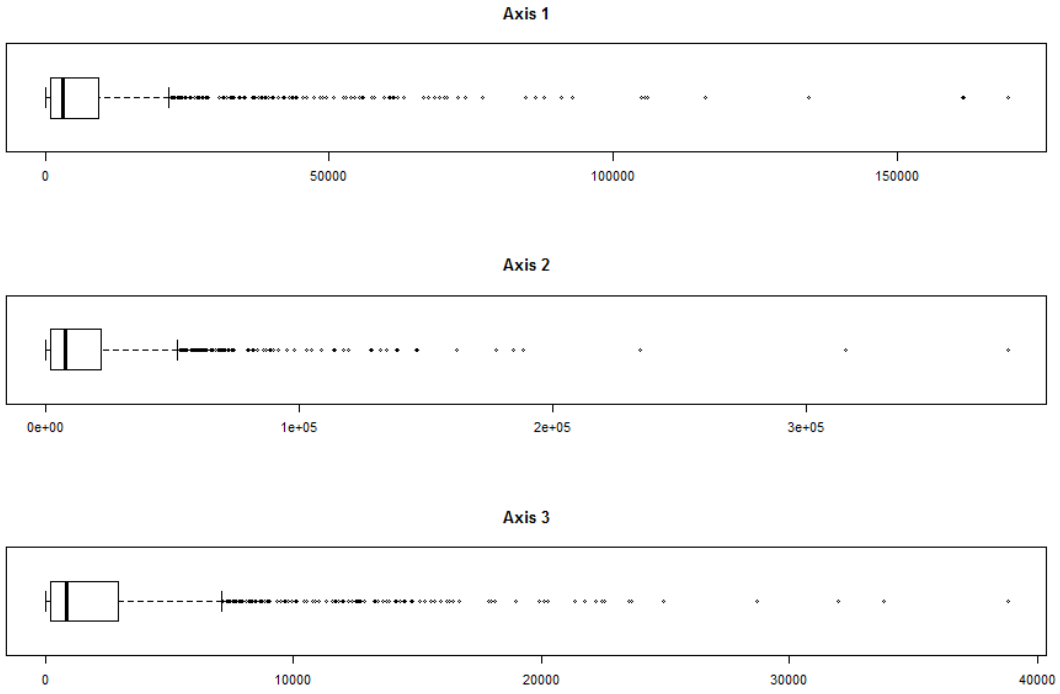
When turning our attention to the spatial allocation of distinct Axes expenditure, data suggest the existence of some major differences among them. Actually, spatial allocation of expenditure from Axis 1 (competitiveness of the agricultural and forestry sector) is shown in Figure 3.31. Many British and German NUTS 3 regions share the smallest amount of support. Very similar figures are observed across regions in Belgium and the Netherlands as well as in Sardinia (Italy): all these NUTS 3 regions belong to the 1st and 2nd range of the distribution. Conversely, most of Eastern Member States NUTS 3 regions belong to the 4th range of the distribution: accordingly, they share the largest absolute values of support from Axis 1 throughout the EU-27.

Table 3.15 – Pillar Two Axes expenditure descriptive statistics, 2007-2011 (in .000 €) (Total number of observations: 1288)

	Axis 1	Axis 2	Axis 3
Mean	8,978.47	17,350.18	2,505.08
Standard Deviation	16,512.31	27,710.24	4,214.62
Minimum	0.00	0.00	0.00
1st Quartile	825.01	1,959.25	194.53
Median	3,185.36	7,827.13	832.97
3rd Quartile	9,357.77	22,043.06	2,946.02
Maximum	169,448.47	379,412.62	38,793.36

Source: own elaboration

Figure 3.30 – Distribution of Pillar Two Axes expenditure by NUTS 3 region, 2007-2011 (in .000 €) (Total number of observations: 1288)

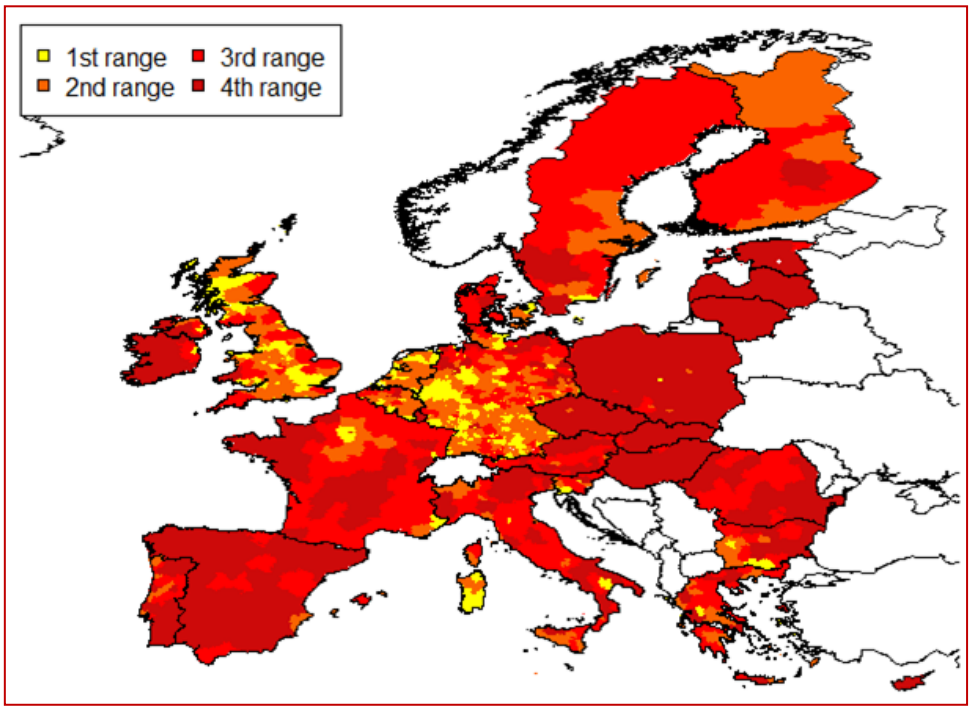


Source: own elaboration

As previously stressed, Axis 2 measures are mostly aimed at improving the European environment and at managing the countryside, as well. Spatial allocation of these expenditures is shown in Figure 3.32. According to it, Axis 2 expenditure is below the median value in many North-Western EU flatlands (from Brittany to Northern Germany) and in many Romanian and Bulgarian regions as well. Conversely, most NUTS 3 regions in the Northern Countries (e.g. Sweden, Finland and the Baltic States) belong to the 4th range of the distribution, showing very high levels of expenditure. More surprisingly, similar values are observed in many Mediterranean NUTS 3 regions (from Portugal to Greece) as well.

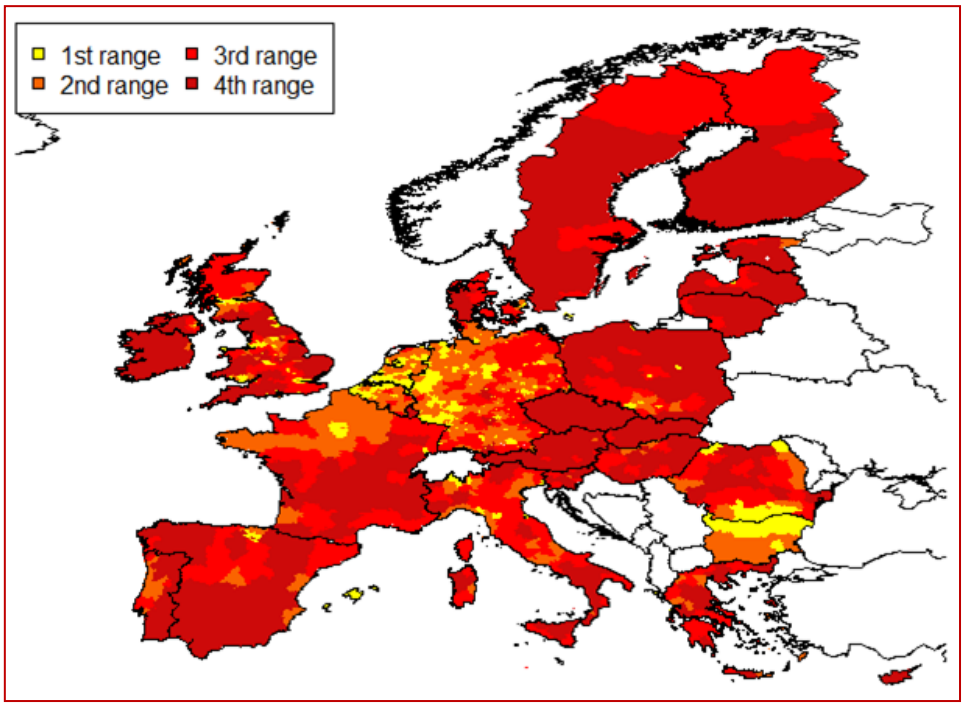
Lastly, Axis 3 is aimed at improving the quality of life in rural areas as well as encouraging diversification of EU rural economy. In absolute terms, Northern and Eastern EU regions received the largest amount of support according to this policy in years 2007 to 2011. Conversely, the amount of support from Axis 3 is definitely lower across Irish, Portuguese and Spanish NUTS 3 regions. Generally, many French, Italian and Greek regions appear to be less supported than other Eastern Member States regions, in the same period. Thus, when dealing with Axis 3 expenditure, a sort of South-Western North-Eastern trend seems coming to light, at least referring to years 2007-2011 (Figure 3.33).

Figure 3.31 – Spatial quartile distribution for Axis 1 (Pillar Two) at NUTS 3 level (overall 2007-2011 values)



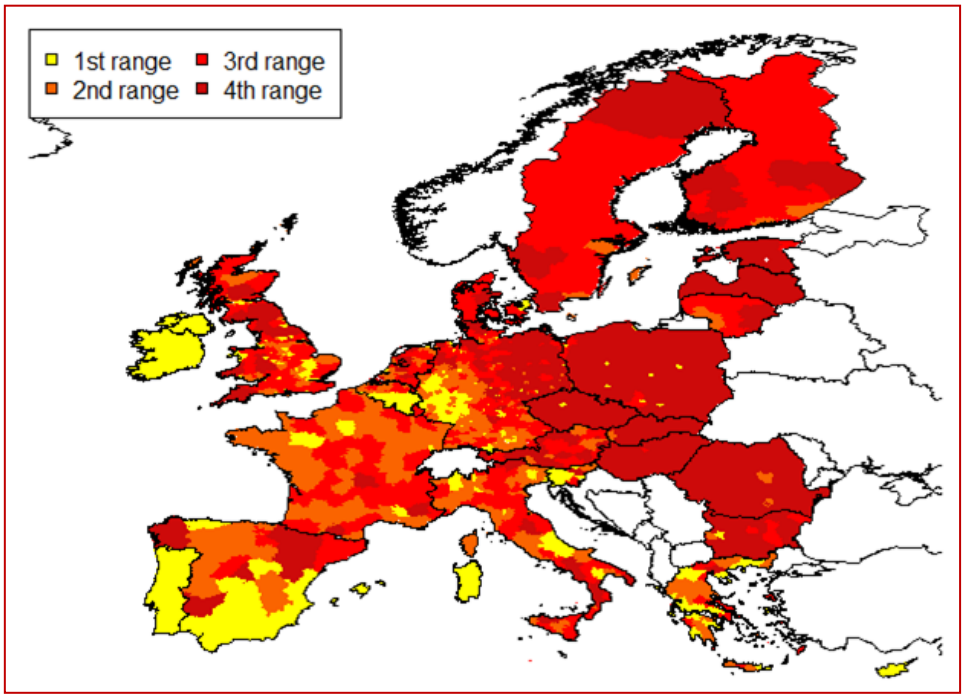
Source: own elaboration

Figure 3.32 – Spatial quartile distribution for Axis 2 (Pillar Two) at NUTS 3 level (overall 2007-2011 values)



Source: own elaboration

Figure 3.33 – Spatial quartile distribution for Axis 3 (Pillar Two) at NUTS 3 level (overall 2007-2011 values)



Source: own elaboration

According to the above-mentioned analyses, major differences among Pillar Two single axes fairly emerged. In particular, when disentangling Pillar 2 distinct axes, the core-periphery pattern (mostly due to administrative divisions) that affects overall CAP and Pillar One expenditure seems to be less sharp. On the opposite side, major differences affecting the spatial distribution of Pillar Two axes seem to be mostly due to country specificities. Therefore, a more thorough analysis on expenditure intensity could either support this hypothesis or reject it.

Referring to the overall distribution (based on 1258 observations), expenditure intensities appear to be rather differentiated when considering specific Pillar Two axes. Actually, when considering expenditure from Axis 1 (years 2007-2011), each NUTS 3 region under study on average received 86.11€ per hectare of UAA; 1,776.59€ per AWU employed in agriculture and 88.21€ per thousand Euros of agricultural GVA. In spite of these rather low average values, few NUTS 3 regions concentrated a larger amount of support, even larger than 1,000 € per hectare of UAA (Table 3.16).

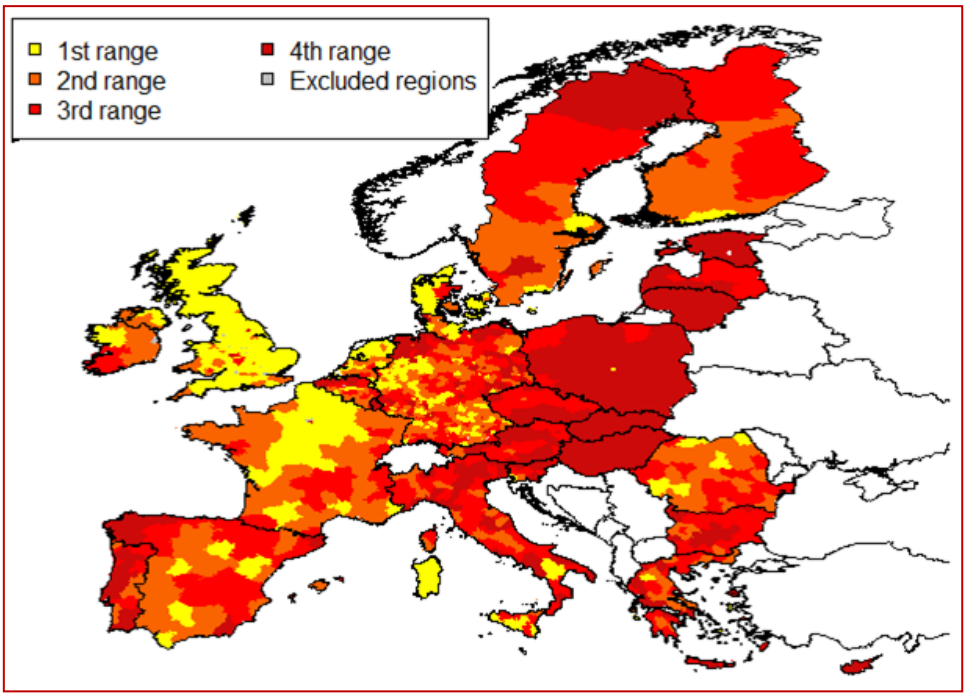
From a geographical perspective, some German city-regions as well as other national capital cities received the most intense support according to Axis 1 expenditure (partially due to the reduced overall amount of UAA there). Also many Polish, Hungarian and Baltic NUTS 3 regions were highly supported in terms of €/UAA, in years 2007-2011. Conversely, in many Western Germany NUTS 3 regions as well as in many British, French and Italian NUTS 3 regions, the support from Axis 1 was less intense or even absent (Figure 3.34). The picture just slightly changes when considering Axis 1 support per AWU employed in agriculture (Figure 3.35): in this case, British and German city-regions are little supported, but the same is true for Romanian and Bulgarian NUTS 3 regions. On the opposite side, Scandinavian, Austrian and Spanish NUTS 3 regions, as well as regions in Hungary, the Czech Republic, Slovakia and the Baltic States tend to be highly supported. Lastly, when considering the intensity of Axis 1 support per thousand Euros of Agricultural GVA, Scandinavian and Western Countries regions appear to be less supported than Eastern EU Member States ones (Figure 3.36).

Table 3.16 – Axis 1 expenditure intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Mean	86.11	1,776.59	88.21
Standard Deviation	262.18	10,753.16	312.40
Minimum	0.00	0.00	0.00
1st Quartile	19.68	373.77	16.02
Median	43.52	823.03	38.40
3rd Quartile	90.78	1,656.41	87.39
Maximum	7,505.13	370,210.66	9,767.71

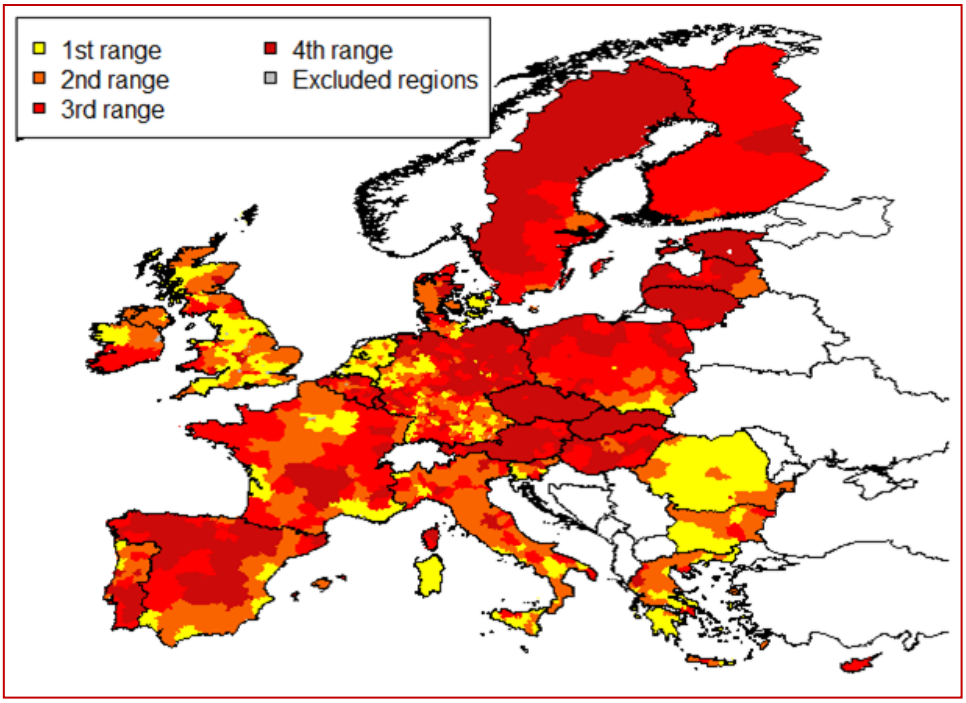
Source: own elaboration

Figure 3.34 – Spatial quartile distribution for Axis 1 intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



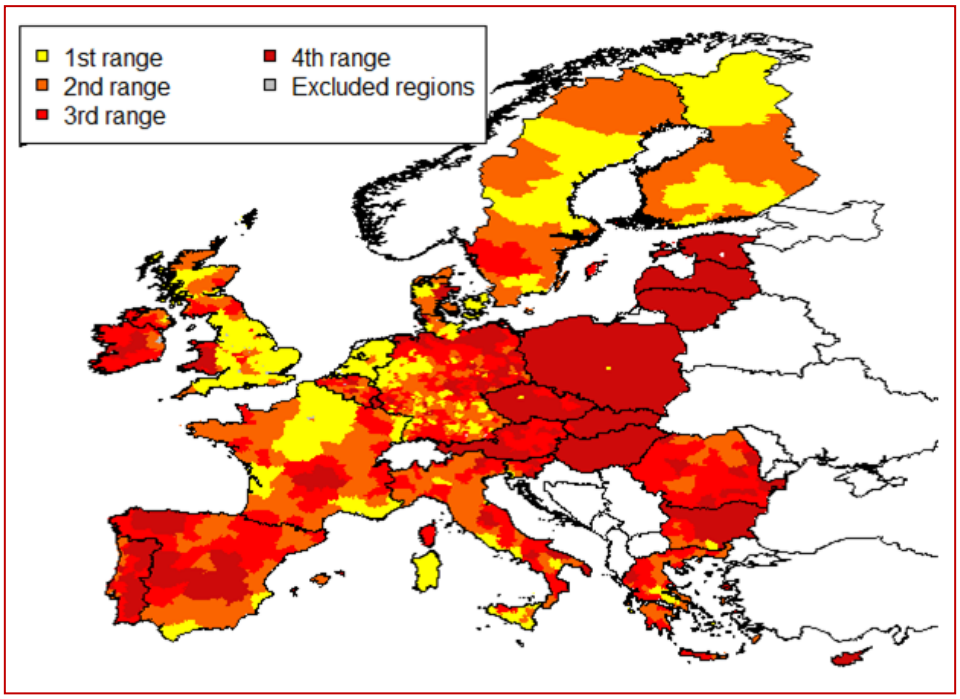
Source: own elaboration

Figure 3.35 – Spatial quartile distribution for Axis 1 intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Figure 3.36 – Spatial quartile distribution for Axis 1 intensity per thousand Euros of agricultural GVA (€/.000 €) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Due to larger absolute values, average Axis 2 intensity is generally higher than those of other Axes', when considering the overall set of NUTS 3 regions. In years 2007-2011, each EU-27 NUTS 3 region on average received 159.91€ per hectare of UAA directly aimed at both promoting the environment and managing the countryside. Figures are rather similar when considering the intensity of support per agricultural GVA (164.48€ per thousand Euros of GVA). Conversely, expenditure intensity equalled to 3,877.05€ per AWU employed in agriculture, in years 2007 to 2011. Nevertheless environmental measures show a large dispersion throughout the sample as well. Standard deviation values are generally very large whatever index is considered (Table 3.17).

Furthermore, when directly considering the intensity of the support per hectare of UAA, many flatlands in Western Europe (from Spain to Denmark) as well as Scottish regions belong to the 1st range of the distribution, thus sharing the least intense supports throughout the EU. Similarly, also Romanian and Bulgarian regions are less supported than the EU average. Conversely, many mountain regions (throughout the Alps, in Greece and in the Scandinavian Countries) belong to the 4th range of the distribution: they actually show the most intense support when taking into account Axis 2 expenditure per hectare of UAA (Figure 3.37).

Actually, when considering Axis 2 support expenditure per AWU employed in agriculture, many Eastern and Mediterranean regions rank in a lower position; the opposite is true for regions belonging to Spain and France which tend to be highly supported compared to the previous indicator (Figure 3.38). Lastly, when focusing on

the support intensity of Axis 2 per thousand Euros of Agricultural GVA, Eastern regions are more supported than Western ones (Figure 3.39).

Axis 3 of the Second Pillar of CAP is not particularly signficant at EU level in terms of total expenditure. Therefore, also its intensity at NUTS 3 level is rather low. In years 2007-2011, each NUTS 3 region just received 34.43€ per hectare of UAA,, 965.36€ per AWU employed in agriculture and 40.83€ per thousand Euros of Agricultural GVA as payments from Axis 3. Nevertheless, the above-mentioned average values come from a rather skewed distribution. Actually, 75% of EU NUTS 3 regions respectively received less than 37.25€ per ha. of UAA, 685.10€ per AWU and 41.88€ per thousand Euros of Agricultural GVA in the same period. Furthermore, when directly considering Axis 3 support, about 105 NUTS 3 regions did not receive any expenditure, in years 2007 to 2011. Conversely, the intensity of the expenditure from Axis 3 tends to be rather concentrated in a few NUTS 3 regions (Table 3.18).

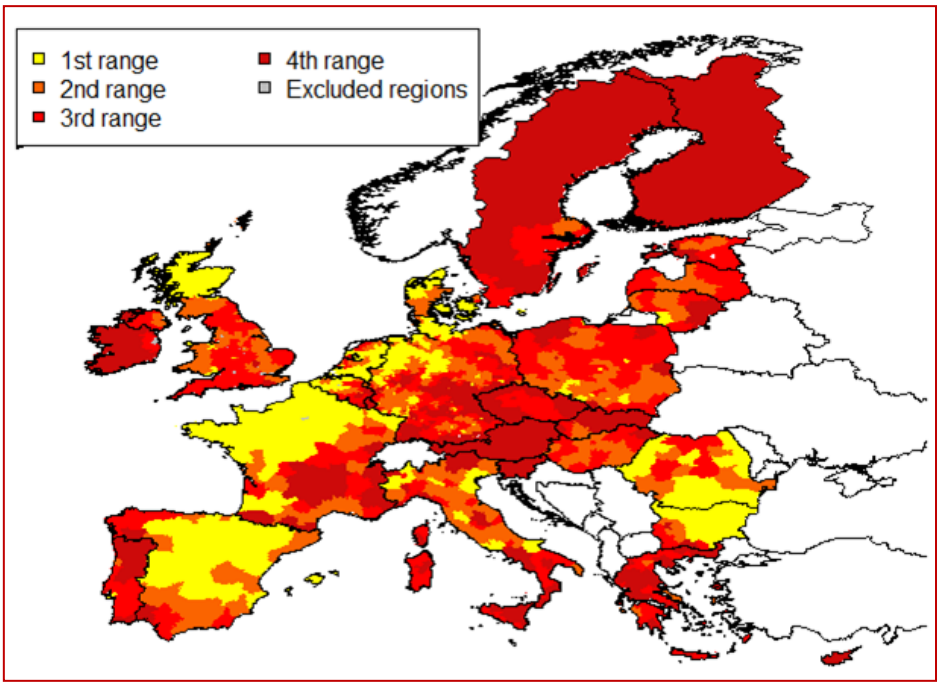
Moreover, by mapping the spatial quartile distribution of Axis 3 expenditure at NUTS 3 level throughout the EU-27 (Figure 3.40, Figure 3.41, Figure 3.42), the above-mentioned features of the allocation of funds strongly emerge even from a geographical perspective. Firstly, it is easy to notice that, whatever intensity index is considered, the intensity of Axis 3 support is generally low in all Western EU regions: actually, in some of them the total amount of Axis 3 expenditure equals to zero (e.g., some Irish, Italian, Portuguese and Spanish regions). Conversely, Axis 3 support intensity is above the median value throughout the UK, Eastern Germany as well as the Scandinavian Countries. Referring to the set of regions belonging to Eastern Member States, the intensity of Axis 3 measures support is generally above the median value, thus belonging to either 3rd or 4th range of the distribution. Nevertheless, Eastern Member States regions show lower support intensities (e.g., below the median value) when the intensity per AWU is taken into account. Once again, this is mostly due to the fact that the presence of agricultural labour force is larger in those regions than in other EU NUTS 3 regions.

Table 3.17 – Axis 2 expenditure intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Mean	156.91	3,877.05	167.48
Standard Deviation	194.19	5,252.28	236.06
Minimum	0.00	0.00	0.00
1st Quartile	54.14	851.53	40.60
Median	107.17	2,040.15	99.49
3rd Quartile	196.91	5,078.85	207.74
Maximum	4,656.58	57,243.32	3,533.08

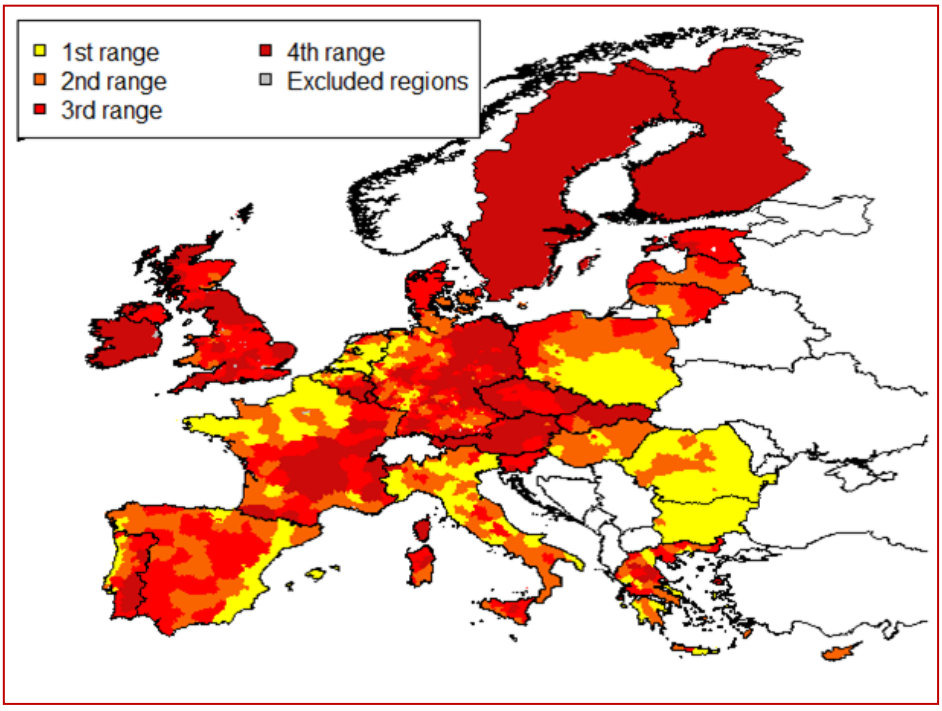
Source: own elaboration

Figure 3.37 – Spatial quartile distribution for Axis 2 intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



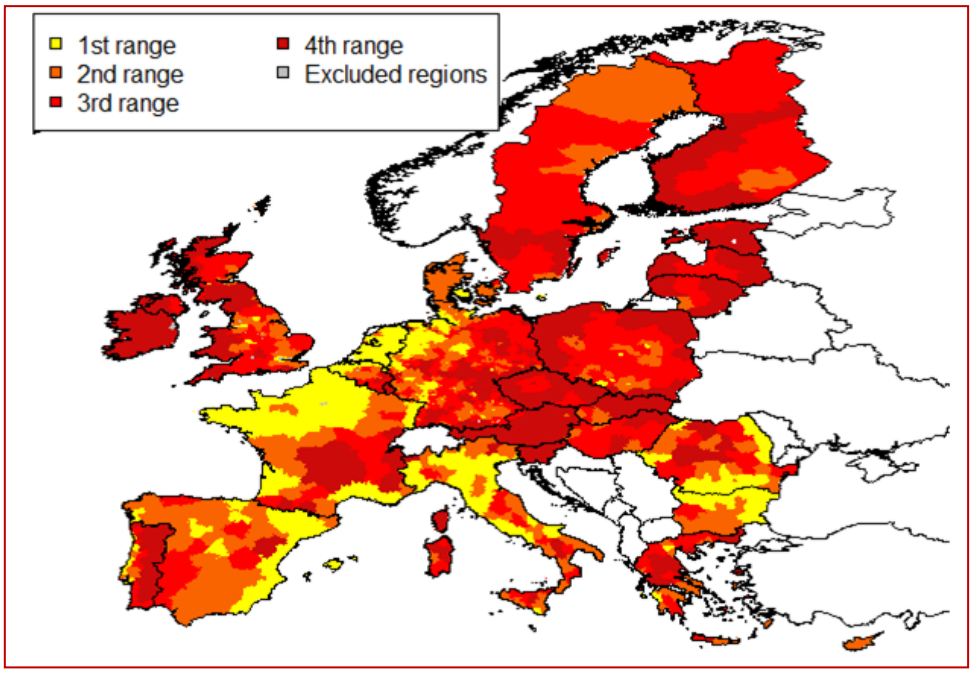
Source: own elaboration

Figure 3.38 – Spatial quartile distribution for Axis 2 intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Figure 3.39 – Spatial quartile distribution for Axis 2 intensity per thousand Euros of agricultural GVA (€/.000 €) at NUTS 3 level (2007-2011 values)



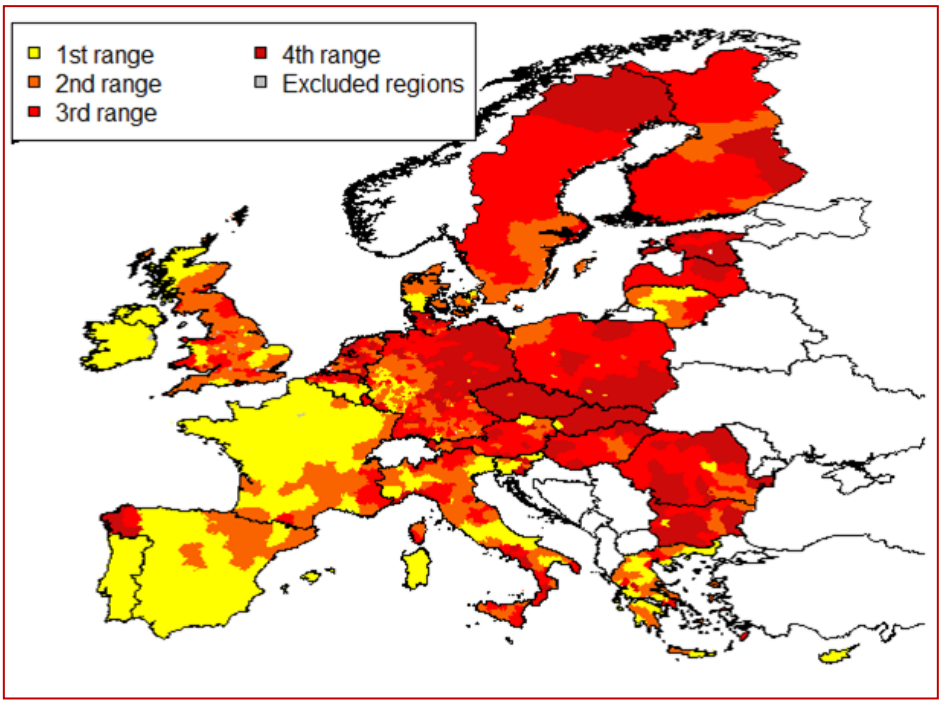
Source: own elaboration

Table 3.18 – Axis 3 expenditure intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Mean	34.43	965.36	40.83
Standard Deviation	83.16	3,274.89	140.43
Minimum	0.00	0.00	0.00
1st Quartile	3.61	74.31	2.92
Median	13.75	232.04	11.22
3rd Quartile	37.25	685.10	41.88
Maximum	1,201.11	65,697.87	3,141.21

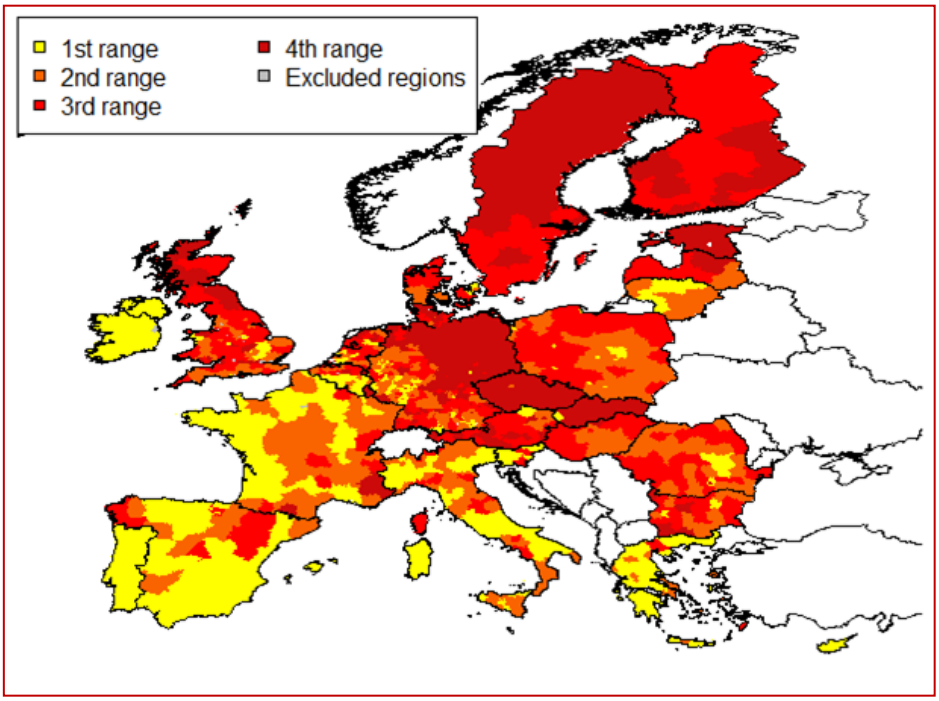
Source: own elaboration

Figure 3.40 – Spatial quartile distribution for Axis 3 intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



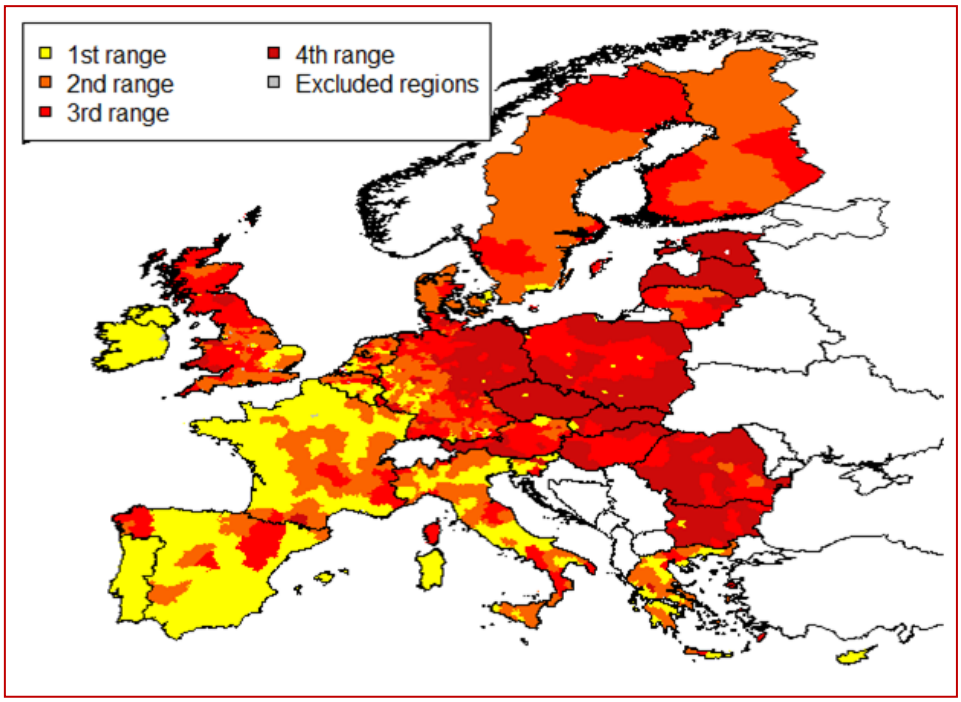
Source: own elaboration

Figure 3.41 – Spatial quartile distribution for Axis 3 intensity per agricultural AWU (€/AWU) at NUTS 3 level (2007-2011 values)



Source: own elaboration

Figure 3.42 – Spatial quartile distribution for Axis 3 intensity per thousand Euros of agricultural GVA (€/.000 €) at NUTS 3 level (2007-2011 values)



Source: own elaboration

According to this very mixed picture, the distribution of CAP is confirmed to be rather scattered throughout the EU. Due to both structural and historical differences, EU regions benefit from this policy in very different ways: some areas are highly supported by Pillar One measures (e.g., agricultural regions in France, Belgium and Germany) while others show a stronger support from Rural Development Policy. Actually, in the following section a different analysis will be carried out: CAP expenditure will be directly linked to both the extent of rurality and the presence of agricultural activities. In particular, we are going to test whether or not CAP is actually targeted to the most rural and agricultural regions throughout the EU.

4. How much rural is the EU Expenditure?

4.1 Alternative Definitions and Measures of Rurality

Section 4 is aimed at analysing the allocation of EU expenditure from a different perspective. Actually, this section focuses on the relationship between the CAP and the degree of rurality of target regions: in particular, this section focuses on the existence of a 'rural' effect in the allocation of CAP expenditure, by assessing whether or not CAP funds prevalently go to most rural regions throughout the EU-27. Furthermore, by

disentangling distinct CAP measures (i.e., agricultural, rural and environmental measures), the extent of rurality of different policies will be tested as well. Then, in the following section, an analogous analysis will focus on what extent same EU measures are "agricultural", that is to what extent their funds mostly go to more agricultural areas and regions.

The above-mentioned research questions are not really new: previous studies have already investigated the territorial allocation of EU policies, for example by observing the territorial distribution of RDP funds (Shucksmith *et al.*, 2005; Crescenzi *et al.,* 2011). Actually, this issue shows great relevance as rural regions still play a key role within the EU economy and society. This is still true, even though the relative dominance and major vitality of EU urban space (from mega cities to the network of its medium-sized cities) has been repeatedly pointed out (ESPON, 2005). Moreover, EU rural areas are facing both greater challenges and new opportunities which are due to ongoing major transformations. For example, socio-demographic transformations (outmigration and population ageing) have lately affected remotest rural areas throughout the EU. Conversely, improvements in the ICT and in transportation systems have increased the accessibility of more central rural areas, fostering counter urbanization and the spread of industrial activities out of major urban areas. As a consequence, increasing heterogeneity has affected EU rural areas, since the enlargement of the EU towards Eastern countries. Therefore, the role of EU policies in both supporting and facing those major transformations is worth being thoroughly investigated.

We have already stressed the major novelty of this work compared to previous analysis on the same topic: territorial disaggregation up to NUTS 3 level; overall coverage of the EU-27; nature of the expenditure data (i.e., real payments as registered *ex post* by the EU bureaus). Nevertheless, a further novelty has to do with the way rurality is expressed in the current analysis. Actually, when trying answering the above-mentioned empirical research questions, properly defining and measuring "rurality" represents a preliminary and preparatory conceptual and practical issue to be considered.

Previous studies mostly linked the EU support to the degree of rurality expressed through conventional indicators (e.g., the OECD-Eurostat urban-rural typologies). Nevertheless, as most of these indicators are largely outdated now, more comprehensive definitions of rural areas should be adopted. Actually, when dealing with the concept of rurality, a somehow evolutionary pattern emerges. In this work, the concept of rurality that was suggested in Sotte (2003) and Sotte *et al*. (2012) is adopted. According to the authors, in the 50s and 60s, the concept of "rurality" was usually related to a sector-based approach (the so-called agrarian rurality model) for the role of agriculture was crucial at that time. Therefore, also the identification and classification of rural areas usually came from sectoral variables (e.g., the share of the agricultural employment). Since the 70s, the importance of agriculture in EU regions has fallen steadily. This decline in agricultural activities was accompanied by rapid rural depopulation and urbanization (Basile and Cecchi, 1997). According to these transformations, the agrarian rurality model was progressively replaced by the industrial rurality framework: within this framework, rural areas were mainly defined and classified according to demographic criteria (i.e., population density). Despite these generalized demographic trends, some rural regions still experienced successful development patterns: they were often based on manufacturing activities thanks to other favourable conditions (e.g., economic dynamism, social mobility and cohesion,

etc.) (Esposti and Sotte, 2002). Mostly following these cases of “rural success”, in the 90s a different concept of rurality emerged (the so-called post-industrial rurality). Two major features characterise rural areas within this new model. First, the territorial dimension of rurality has become increasingly important. In particular, stronger integrations across the rural space and between rural and urban territories are taking place (e.g., in terms of commuting, flows of goods and flows of information). Within this new spatially-integrated framework, rural regions are assigned new important functions. Actually, they supply the society with a whole set of services associated to public goods, either environmental goods (e.g., clean air and water, biodiversity…) or “cultural” goods (e.g., landscape, historical heritage, agricultural traditions, etc.). The second element is that, given this large set of possible services provided by rural areas, many different forms of rural-rural and rural-urban integration have emerged and may co-exist as well. Therefore, polymorphism has thus become one of the key feature of the rural space in post-industrial societies. Together with the current co-existence of the three different models of rurality across the EU-27, this polymorphism clearly affects the way rural areas may be defined and classified. Thus, none of the conventional measures (based on either sectoral or demographic indicators) can capture these complex and polymorphic features: conversely, it seems increasingly evident that a proper definition and classification needs to be multidimensional. Nevertheless, it is still useful that more conventional indicators remain included within such a multidimensional framework.

The above-mentioned evolution of the concept of rurality inevitably opens the debate about how to properly define rural areas throughout the EU. According to the suggested evolutionary pattern, a new geography of EU rural space has clearly emerged: as a consequence, new taxonomies, going beyond the traditional urban-rural divide, are needed. Nevertheless, in spite of a wide literature on the topic, univocal and homogeneous definitions of rural areas still lack at international level (Montresor, 2002; Anania and Tenuta, 2008). For example, the European Commission does not provide any formal criteria to identify those areas where Rural Development Policies are to be implemented: as a consequence, each Member State (or each NUTS 2 region) is autonomously in charge of defining its own rural areas. This major lack is due to two major reasons: i) considerable differences in terms of demographic, socio-economic, and environmental conditions occur across the EU rural space (European Commission, 2006; Hoggart *et al*., 1995; Copus *et al*., 2008); ii) comparable statistical information which may foster the identification of a common statistical definition of rural areas lack at a very disaggregated territorial level (Bertolini *et al*., 2008; Bertolini and Montanari, 2009).

Nevertheless, since the 90s, significant steps forward in providing a homogeneous definition of rurality have been taken. In particular, some general criteria are now widely accepted. The most well-known urban-rural typologies are those adopted by the OECD (1994; 1996; 2006) and the EC (Eurostat, 2010). Both follow a similar approach, which is simply based on demographic density and on the presence of major urban areas (thus recalling the aforementioned industrial rurality model). According to the OECD-Eurostat methodology, NUTS 3 regions in EU-27 Member States are classified as *predominantly urban* (PU), *intermediate* (IR) and *predominantly rural* (PR) (Eurostat, 2010). Due to their simplicity, both population density and the OECD-Eurostat methodologies are commonly used to define rural areas throughout the EU.

However, even the OECD-Eurostat approach suffers from some major drawbacks. In particular, it measures “rurality” by using a single indicator (i.e., demographic density)

which is then collapsed into a discrete ordinal variable. Actually, just three typologies of rurality/urbanity are distinguished. As a consequence, this very synthetic measure can not capture the increasing polymorphism observed throughout EU rural space: the emergence of a post-industrial concept of rurality really makes measures just based on density outdated and insufficient[17].

As a direct consequence of those major drawbacks, multidimensional approaches in classifying rurality started emerging. According to them, rurality is described by combining a wider set of variables, usually ranging from socio-demographic (e.g. population density) and sector-based variables (e.g., the share of agriculture within the economy) to territorial/geographical features (e.g., land-use, remoteness, integration with the urban space, etc.). Then, different typologies of rural areas are identified by applying multivariate statistical approaches to a broad list of quantitative variables. A thorough review of similar multidimensional approaches can be found in Copus *et al.* (2008)[18].

Moving from those approaches, a comprehensive PeripheRurality Indicator (PRI) was computed by Camaioni *et al.* (2013a; 2013b). Methodology largely followed the above-mentioned multidimensional approach, although some further improvements in its definition were suggested. The relevance of more conventional socio-economic features in characterising rural areas was again stressed, but an additional set of indicators covering geographical features was also proposed. Indeed, according to the post-industrial rurality model, geography matters when defining rural areas, as rurality and its different possible forms also have to do with the degree and quality of integration of a given area with the surrounding space[19]. On the basis of this key idea, a set of spatial/geographical variables was combined with a more conventional set of indicators expressing rurality and its evolutionary stage (agrarian, industrial, post-industrial). The PRI is a synthetic indicator of PeripheRurality, obtained by applying a principal component analysis (PCA) to a set of 24 variables, grouped in four different thematic areas (Camaioni *et al.*, 2013a; 2013b):

- Socio-demographic features (7 indicators) focus on the demographic structure and on the major demographic trends;
- Structure of the economy (7 indicators) refers to the structural composition of the economy at sub-regional level (share of agricultural activities, manufacturing sectors and services on total economy, per capita GDP…);
- Land use characteristics (3 indicators) take into account the presence of forests, agricultural areas and artificial areas;
- Geographical features (7 indicators) mainly refer to the accessibility of regions[20] and their distance from major urban areas[21]. Those variables more

17. Recently, the OECD and the FAO have launched new research strands in order to put forward more comprehensive measures of rurality based on a qualified set of variables (FAO-OECD Report, 2007; The Wye Group, 2007).

18. Many studies focus on either single EU Member States (Auber *et al.*, 2006; Buesa *et al.*, 2006; Kawka, 2007; Lowe and Ward 2009; Merlo and Zaccherini, 1992; Anania and Tenuta, 2008) or a few of them (Barjak, 2001; Psaltopoulos *et al.*, 2006). Other works analyse the rural space across the whole EU (Terluin *et al.*, 1995; Copus, 1996; Ballas *et al.*, 2003; Bollman *et al.*, 2005; Vidal *et al.*, 2005).

19. Few other studies had focused on links between economic and geographical features in defining rural areas (Cecchi, 1999; Ballas et al., 2003). Nevertheless, this have never been done at NUTS3 level throughout the EU-27.

20. Here, some indexes computed by ESPON (2005) are adopted: multimodal and air potential accessibility. Those indexes measure how easily people living in one region can reach people located in other regions: actually, they take into account the presence of physical infrastructures connecting regions, thus reducing travel times and costs

directly catch the extent of remoteness of each region (so explaining the final name given to the synthetic indicator, i.e. *PeripheRurality* Indicator)

Data about these variables had been collected at the NUTS 3 level: main statistical source was Eurostat. Then, the PCA extracted the following Principal Components (PCs):

- PC1 – Economic and geographical centrality;
- PC2 – Demographic shrinking and ageing;
- PC3 – Manufacturing in rural areas with well performing labour market;
- PC4 – Land Use: forests vs. agricultural areas;
- PC5 – Urban dispersion.

Lastly, the comprehensive PRI was computed, moving from these five PCs. First, an ideal region characterized by extreme urban features was established. This European 'urban benchmark' was defined by calculating, for each PC, the average score between the only two EU global Metropolitan Economic Growth Areas (MEGAs): those are Paris and London (ESPON, 2005). Then, the distance between any NUTS 3 and the urban benchmark was computed for the whole set of PCs. The PRI of the *i*-th region was then computed as the following Euclidean distance (Camaioni *et al*., 2013a; 2013b;):

$$PRI_i = \sqrt{\sum_p \left(x_{ip} - x_{ubp}\right)^2}\ ,\ \forall i \in N \qquad (1)$$

where:

$N = 1, \ldots, n$ indicates the set of regions under consideration;
x_{ip} represents the *i*-th region's score for the *p*-th PC;
x_{ubp} represents the urban benchmark's score for the *p*-th PC.

By construction, the greater the PRI the more rural and/or peripheral the *i*-th region is.

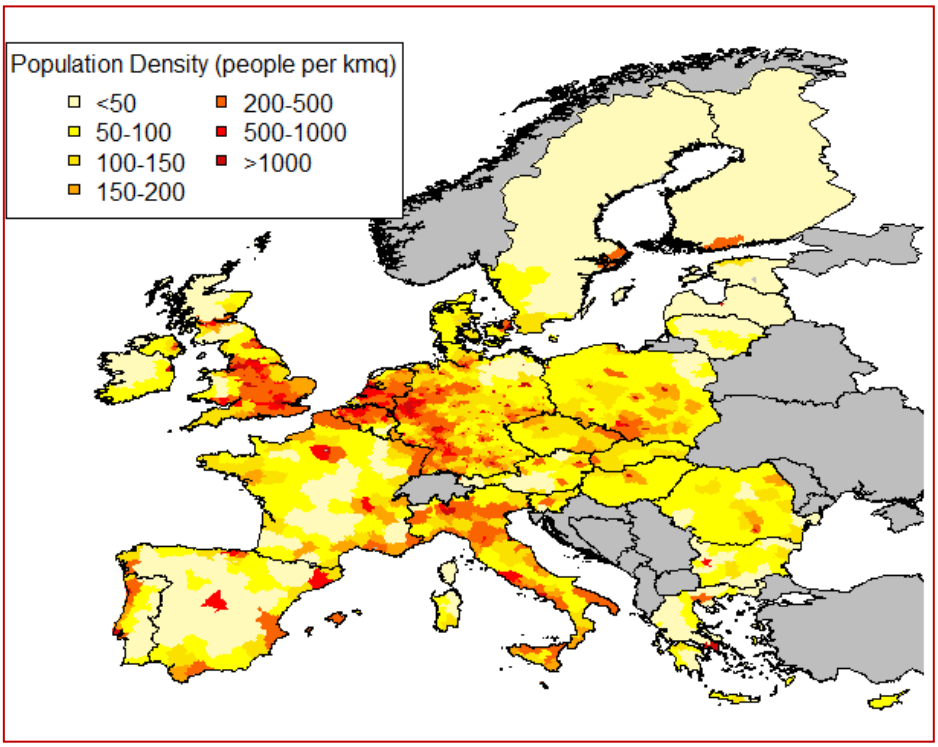
According to this methodological framework, in the current analysis, the polymorphism of rurality at NUTS 3 level is caught by adopting a set of alternative indicators. Actually, in the following analysis, rurality is alternatively expressed by:

- Population density (the lower the density the more rural the region);
- Eurostat (2010) urban-rural typologies (a discrete ordinal variable: *Predominantly Urban* regions; *Intermediate* regions; *Predominantly Rural* regions);
- *PeripheRurality* Indicator (the higher the PRI the more rural the region).

Figure 4.1, Figure 4.2 and Figure 4.3 respectively map the above-mentioned indicators of rurality. NUTS 3 level is again referred to, throughout EU-27 Member States. As already mentioned, population density and the PRI define rurality in an opposite way.

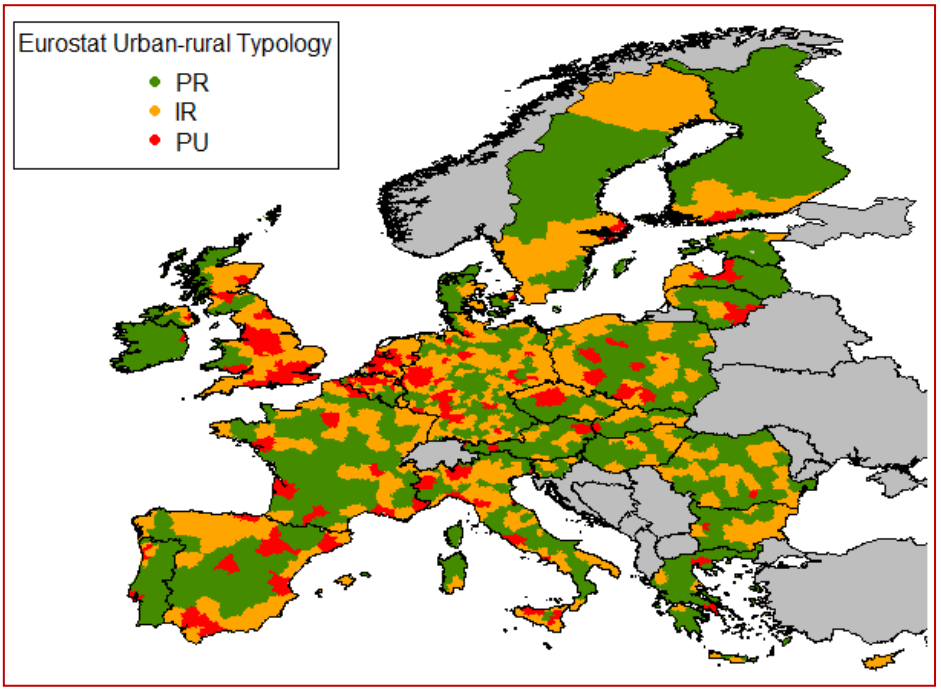
21. By computing a distance matrix between the centroids of the whole set of EU NUTS 3 regions, the distance from each EU region and MEGAs (Metropolitan Economic Growth Areas) was computed. MEGAs are the most important urban areas among the European FUAs (Functional Urban Areas), according to population, transport, tourism, industry, knowledge economy, decision-making and public administration (ESPON, 2005). Five types of MEGAs are identified: Global MEGAs, Category 1 MEGAs, Category 2 MEGAs, Category 3 MEGAs and Category 4 MEGAs.

Figure 4.1 – Population density by NUTS 3 regions



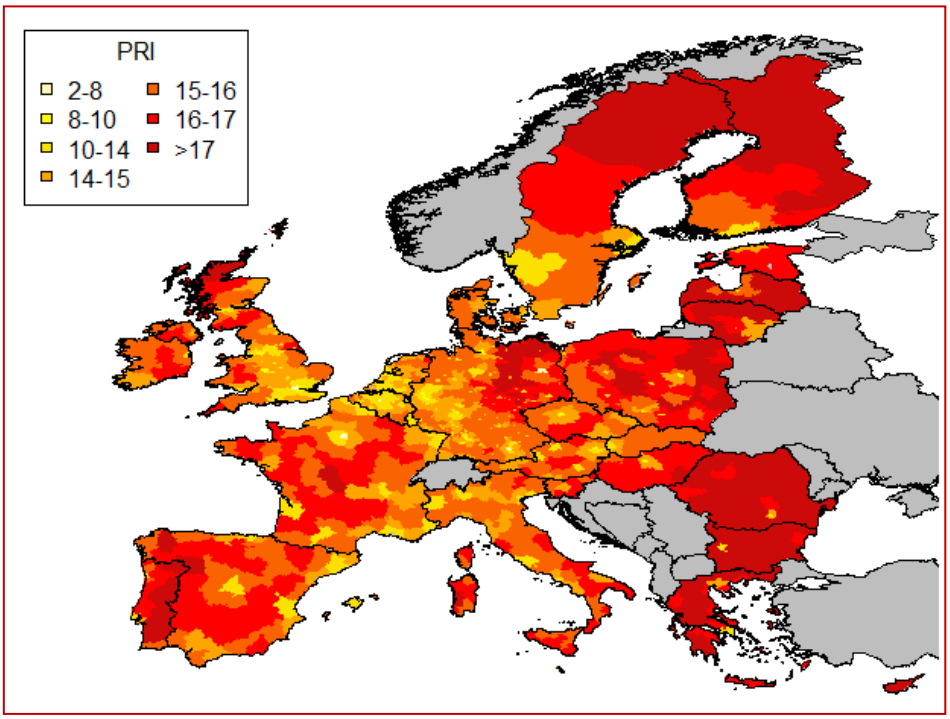
Source: own elaboration

Figure 4.2 – Eurostat urban-rural typology (NUTS 3 regions)



Source: own elaboration

Figure 4.3 – PRI across EU NUTS 3 regions



Source: own elaboration

4.2 Linking CAP Expenditures to Rurality: a Simple Statistical Analysis

According to the above-mentioned definitions of rurality that comprise different dimensions and cover a wide range of features (from population density to the relevance of agricultural sector, to geographical features), in this section we will more directly tackling the issue of existing links between CAP expenditure and the extent of rurality. Firstly, we move from the analysis of the overall CAP expenditure and its relations with rurality. Then, we will turn our attention to Pillar One and Pillar Two expenditure as well as to distinct measures expenditure.

4.2.1 Overall CAP Expenditure

When considering the overall amount of raw CAP expenditure (years 2007 to 2011), rural regions receive the largest amount of total expenditure. Actually, by considering Eurostat urban-rural typologies, PR regions are more supported than PU ones in terms of expenditure absolute levels: in years 2007-2011 each PR region received 256 million Euros whilst each PU region just received 97 million Euros. With regard to this

categorical variable, however, some significance testing have been performed as well. One-Way ANOVA (Analysis of Variance) is here used to test whether those values are statistically different or not[22]. As a major assumption of a One-Way ANOVA is that variances of populations are equal, the Levene's Test has been preliminary computed as well[23]. When variances among the groups are equal (i.e., the Levene's Test is not statistically significant), simple F test for the equality of means in a one-way analysis of variance is performed. In the opposite case, the method of Welch (1951) is used. According to tests results, observed differences among predominantly rural, intermediate and predominantly urban NUTS 3 regions are found to be statistically significant (Table 4.1).

Then, a correlation analysis is performed as well. Pearson correlation coefficients between raw CAP expenditures and other indicators of rurality strengthen these results. Correlation between density and absolute levels of CAP expenditure is negative and statistically significant (at 5%), whereas the correlation between PRI and CAP expenditure is positive and statistically significant (again at 5% level).

Nevertheless, when considering CAP expenditure intensity (thus expressed in terms of agricultural land, agricultural labour and agricultural GVA), findings are less straightforward. No statistically significant differences in CAP expenditure intensities are observed among Eurostat urban-rural NUTS 3 regions. Just the differences in CAP expenditure per hectare of UAA are found to be statistically significant: expenditure intensity is higher in PU regions than in PR and IR ones. Conversely, density is positively correlated with all the above-mentioned expenditure intensity indices: this is to say that the more densely populated a given region is, the more expenditure intensity it is interested by. Conversely, the PRI is negatively related to expenditure intensity indices, with the only exception of CAP expenditure per thousand Euros of agricultural GVA (Table 4.1).

Therefore, according to these major findings, CAP seems to be less "rural" than stated in its political intentions. Actually, in relative terms (per unit of land and of labour), urban and more central regions tend to be more supported than strongly rural and peripheral ones. In other words, rurality actually matters in the allocation of CAP expenditure throughout the EU, although this effect operates in the opposite way. This finding is not surprising: similar results were pointed out by Shucksmith *et al*. (2005). Nevertheless, these results suggest that CAP expenditure does not directly improve territorial cohesion: actually, more central areas are highly supported[24].

22. One-Way ANOVA is a widely used statistical technique to compare group means. It uses F statistics to test if all groups have the same mean.

23. It tests the null hypothesis that groups variances are equal (i.e., homoschedasticity). If the null hypothesis of equal variances cannot be accepted, it is concluded that there is a difference between the groups variances.

24. The section is mostly addressed at testing the existence of the so-called 'rurality' effect in the spatial allocation of CAP expenditure throughout the EU-27. Nevertheless, other effects may be significant in explaining CAP spatial allocation: among them, the country effect is surely important. In Appendix 2, we consider major differences in expenditure intensity among groups of EU Member States, namely Nordic Countries, the UK & Ireland, Continental Europe (France, Belgium, Luxembourg, the Netherlands, Germany, Austria); Southern Europe and New Eastern Member States. One-Way ANOVA tests have been run and differences have found to be largely significant in most cases. In Appendix 2, the results of both the Levene's Tests on homoschedasticity and the F Tests are shown.

Table 4.1 - CAP expenditure per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of total CAP support accruing to NUTS 3 regions and indicators of rurality (p-values in parenthesis)

CAP	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	256,330.16	1,663.83	42,511.49	1,846.34
Intermediate (IR) regions	189,568.66	1,776.84	51,244.56	1,776.41
Predominantly Urban (PU) regions	97,394.28	2,286.64	50,247.58	1,759.58
Levene's test	17.509*	7.684*	1.302	1.978
	(0.000)	(0.000)	(0.272)	(0.138)
One-way ANOVA	46.797*	4.086*	2.741	0.168
	(0.000)	(0.017)	(0.065)	(0.845)
Correlation				
Density	-0.193*	0.184*	0.057*	0.071*
	(0.000)	(0.000)	(0.044)	(0.012)
PRI	0.226*	-0.191*	-0.112*	-0.055
	(0.000)	(0.000)	(0.000)	(0.052)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

4.2.2 First Pillar

Moving from the overall picture of CAP expenditure, it is then possible to disentangle single Pillars expenditure. The main hypothesis here is that different CAP measures may be differently linked to rural features. In particular, the links between Pillar One expenditure (years 2007-2011) and the extent of rurality are shown in table 4.2. As previously pointed out when dealing with overall CAP expenditure, Pillar One raw expenditure mainly goes to rural regions as well. In absolute values, Eurostat PR regions tend to receive a larger share of Pillar One expenditure than PU ones (according to ANOVA, differences are statistically significant). Moreover, density is negatively correlated with the absolute levels of Pillar One expenditure, whereas the PRI is positively related with it. Therefore, according to these figure, Pillar One expenditure mostly goes to rural and peripheral areas, where most of the supported agricultural activities are expected to take place. Nevertheless, the picture broadly changes when considering Pillar One support intensity. In relative terms (per unit of

land, labour and agricultural GVA), Eurostat PU regions are more supported than PR and IR regions, even though differences in expenditure intensity are no longer statistically significant (with the exception of expenditure per ha. of UAA). Nevertheless, Pearson coefficients between Pillar One expenditure intensity and major indicators of rurality are reversed here: the PRI is negatively related with all expenditure intensity indices; population density is positively related with all indices but the intensity of expenditure per unit of agricultural labour (AWU). Therefore, when more properly considering Pillar One intensity in terms of unit of land, labour and agricultural GVA, it is possible to conclude that its support is stronger within more central and urban regions (Table 4.2).

Table 4.2 – Pillar One expenditure per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of total Pillar One support accruing to NUTS 3 regions and indicators of rurality (p-values in parenthesis)

Pillar One	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	211,687.64	1,362.72	35,714.35	1,488.19
Intermediate (IR) regions	162,770.80	1,488.36	42,797.10	1,438.79
Predominantly Urban (PU) regions	84,119.02	1,951.70	44,398.57	1,525.61
Levene's test	15.312*	4.841*	1.065	1.859
	(0.000)	(0.008)	(0.345)	(0.156)
One-way ANOVA	36.438*	4.667*	2.815	0.171
	(0.000)	(0.010)	(0.060)	(0.843)
Correlation				
Density	-0.191*	0.146*	0.036	0.056*
	(0.000)	(0.000)	(0.201)	(0.047)
PRI	0.194*	-0.179*	-0.110*	-0.071*
	(0.000)	(0.000)	(0.000)	(0.012)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

By further disentangling 2007-2011 Pillar One expenditure, it is possible to investigate the relation between the extent of rurality and both Direct Payments and Market Interventions (Table 4.3 and Table 4.4).

The links between rural areas and Direct Payments follow a pattern which is largely similar to that observed when analysing Pillar One overall expenditure: this is due to their large relevance within it. Actually, when considering the absolute levels of payments, they mostly go to more rural regions (e.g., PR regions within Eurostat classification) and they show a positively correlation with the PRI. Conversely, correlation between absolute levels of DP and density is negative and statistically significant. When measuring the DP intensity per unit of agricultural labour (AWU), differences between PR, IR and PU regions are not significant. Moreover, expenditure intensity per AWU does not show any significant correlation with density, while showing a negative correlation with the PRI (i.e., the more rural and peripheral a given region is, the lower the support it gets). A rather different pattern is observed when dealing with the DP intensity per thousand Euros of agricultural GVA: in this case, PR regions actually receive a more intense support than PU ones and this difference is statistically significant. Moreover, the index shows a negative and statistically significant correlation with density (Table 4.3).

Table 4.3 – DPs per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of total DP support accruing to NUTS 3 regions and indicators of rurality (p-values in parenthesis)

Direct Payments	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	199,267.09	1,298.31	34,344.41	1,430.53
Intermediate (IR) regions	146,697.05	1,318.03	37,987.34	1,283.95
Predominantly Urban (PU) regions	69,751.71	1,396.49	38,029.74	1,157.70
Levene's test	19.637*	1.231	0.224	0.668
	(0.000)	(0.292)	(0.799)	(0.513)
One-way ANOVA	44.965*	0.877	0.933	3.752*
	(0.000)	(0.416)	(0.394)	(0.024)
Correlation				
Density	-0.215*	0.010	-0.039	-0.072*
	(0.000)	(0.732)	(0.171)	(0.010)
PRI	0.219*	-0.102*	-0.051	0.032
	(0.000)	(0.000)	(0.071)	(0.261)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Due to their specific territorial distribution, MI measures show a rather different pattern. Firstly, expenditure absolute levels do not show any statistically significant correlation with above-mentioned indicators of rurality. For example, when considering the Eurostat urban-rural typologies, IR regions on average receive more expenditure than both PR and PU regions even though all these differences are not statistically significant. Conversely, whatever indicator of expenditure intensity (per land, labour and agricultural GVA) is considered, MI measures are positively correlated with density and negatively correlated with the PRI (in previous section, this point has already been stressed). These findings are largely confirmed when considering the Eurostat urban-rural typologies as well. Therefore, the intensity of the support seems to be once again greater in most urban and central regions than in remote ones (Table 4.4).

Table 4.4 – MI measures per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of MI measures support accruing to NUTS 3 regions and indicators of rurality (p-values in parenthesis)

Market Interventions	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	12,420.55	64.40	1,369.95	57.66
Intermediate (IR) regions	16,073.75	170.33	4,809.76	154.84
Predominantly Urban (PU) regions	14,367.32	555.21	6,368.83	367.91
Levene's test	0.849	10.444*	2.509	4.594*
	(0.428)	(0.000)	(0.082)	(0.010)
One-way ANOVA	0.830	8.668*	2.810	4.041*
	(0.436)	(0.000)	(0.061)	(0.018)
Correlation				
Density	-0.037	0.194*	0.126*	0.160*
	(0.186)	(0.000)	(0.000)	(0.000)
PRI	-0.043	-0.175*	-0.126*	-0.141*
	(0.119)	(0.000)	(0.000)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

4.2.3 Second Pillar

When focusing on the Second Pillar of CAP (Rural Development Policy), funds would be expected to mostly go to more rural areas, due to the specific aims of this policy. When taking into account the absolute values of Pillar Two expenditure (years 2007 to 2011), this hypothesis is largely confirmed. Actually, each EU PR region received 44.6 million Euros in 2007-2011, while each EU PU region just received 13.3 million Euros in the same period. Moreover, differences among groups are statistically significant according to the results from a One-Way ANOVA test, computed through the Welch method. Moreover, when considering correlation between total expenditures and either density or the PRI, the above-mentioned finding is largely confirmed: a greater support (in absolute values) goes to most rural regions throughout the EU.

Nevertheless, when focusing on the intensity of support per unit of land, labour and agricultural GVA, the picture is different. The above-mentioned relationships are reversed when considering Rural Development expenditure per hectare of UAA: in this case, the more rural a given region is, the less support it received in years 2007 to 2011. Furthermore, when considering both the support per AWU employed in agriculture and the support per thousand Euros of agricultural GVA, correlation is less statistically significant: just correlations between the intensities of Rural Development support (per labour and agricultural GVA) and density are positive and statistically significant as well (Table 4.5).

According to these figures, even the Second Pillar of CAP seems less “rural” than stated. Although its purposes are different and it is funded by a different EU fund, even Pillar Two follows the same pattern than Pillar One. Actually, according to expenditure intensity indices, more densely populated regions tend to be more supported than less densely populated ones.

Table 4.5 - Pillar Two (Rural Development) expenditure per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of total Pillar Two support accruing to NUTS 3 regions and indicators of rurality (p-values in parenthesis)

Pillar Two	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	44,642.52	301.11	6,797.14	358.14
Intermediate (IR) regions	26,797.86	288.48	8,447.46	337.62
Predominantly Urban (PU) regions	13,275.26	334.94	5,849.01	233.97
Levene's test	31. 370*	3.920*	2.364	1.334
	(0.000)	(0.020)	(0.094)	(0.264)
One-way ANOVA	62.218*	0.4882	2.886	4.828*
	(0.000)	(0.618)	(0.056)	(0.008)
Correlation				
Density	-0.107*	0.235*	0.098*	0.089*
	(0.000)	(0.000)	(0.000)	(0.002)
PRI	0.287*	-0.122*	-0.052	0.033
	(0.000)	(0.000)	(0.067)	(0.237)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Nevertheless, by disentangling single Axes data, specific patterns may be highlighted in terms of relations between extent of rurality and amount of total expenditure. In Table 4.6, the expenditure from Axis 1 of the Second Pillar ("Improving the competitiveness of the agricultural and forestry sector") is shown. Expenditure absolute values show some contradictory evidences. Average expenditure is larger in PR regions than IR and PU ones (with statistically significant differences): moreover, positive and statistically significant correlations are found for both density and the PRI. On the contrary, population density is positively correlated with all indices of Axis 1 expenditure intensity, whereas the PRI does not show any statistically significant correlations but with the intensity per hectare of UAA: in the latter case, however, correlation is negative. Lastly, according to Eurostat urban-rural typologies, Intermediate (IR) regions receive a more intense support per unit of labour and

agricultural GVA than PR and PU regions: nevertheless, in those cases, differences are not statically significant.

Referring to Axis 2 (Improving the environment and the countryside), each PR regions received more than 26 million Euros in years 2007 to 2011: absolute values are definitely larger than those observed for IR regions (15.0 million Euros) and PU regions (just 5.9 million Euros). These figures confirm that environmental expenditure (when taken in absolute values) mainly goes to more rural regions throughout the EU. Accordingly, it is not surprising that the correlation between total expenditure for environmental measures (Axis 2) and population density is negative and statistically significant, whereas the correlation with the PRI is positive and statistically significant. Furthermore, when focusing on Axis 2 expenditure intensity (per hectare of UAA, per AWU employed in agriculture, per thousand Euros of agricultural GVA), PR regions received a more intense support than other urban-rural typologies. In years 2007-2011, average expenditure per thousand Euros of agricultural GVA in PR regions was double than average expenditure in PU regions. In particular, all these differences are found to be statistically significant, according to One-Way ANOVA tests. In spite of these quite robust figures, environmental expenditure per hectare of UAA does not show any statistically significant correlation with other indicators of rurality (density and PRI). Conversely, more rural and peripheral regions tend to receive a more intense environmental support expressed in terms of Agricultural GVA. Less coherent results are found when considering Axis 2 expenditure per AWU employed in agriculture: in this case, a negative and statistically significant correlation is found with density, while no statistically significant correlation is found with the PRI (Table 4.7). Nevertheless, according to these results, Axis 2 expenditure seems to be more “rural” than other typologies of CAP measures (both from Pillar One and Pillar Two). Actually, both the absolute levels and the intensity of the support are positively related to rurality.

The last type of CAP expenditure that is taken into account refers to Axis 3 expenditure (Improving the quality of life in rural areas and encouraging diversification of the rural economy). According to the Axis’ main aims, rather coherent figures are observed in terms of absolute expenditure levels. On average, PR regions received about 3.3 million Euros in years 2007-2011: values were three times larger than average values observed in PU regions (1 million Euros each) and those differences are found to be statistically significant. Accordingly, a negative and statistically significant correlation between Axis 3 expenditure and density is observed whilst a positive and statistically significant correlation is found between Axis 3 raw expenditure and PRI. Conversely, an inverse relation is observed when focusing on both expenditure per hectare of UAA and expenditure per unit of agricultural labour (AWU): here, the more rural a given region is, the less intense the support it receives. Again, the support of specific policies that are aimed at improving the quality of life within rural areas policies is more intense in more densely populated and urban areas throughout the EU (Table 4.8).

Table 4.6 - Axis 1 (Pillar Two) expenditure per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of Axis 1 support accruing to NUTS 3 regions and indicators of rurality (p-values in parenthesis)

Axis 1

	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	12,824.60	71.86	1,379.85	87.21
Intermediate (IR) regions	7,827.42	90.01	2,469.55	99.94
Predominantly Urban (PU) regions	4,490.61	104.83	1,269.33	69.37
Levene's test	16.116*	3.482*	1.552	0.687
	(0.000)	(0.031)	(0.212)	(0.503)
One-way ANOVA	22.616*	2.258	1.655	0.846
	(0.000)	(0.106)	(0.191)	(0.429)
Correlation				
Density	0.064*	0.169*	0.071*	0.090*
	(0.021)	(0.000)	(0.012)	(0.001)
PRI	0.205*	-0.088*	-0.041	0.000
	(0.000)	(0.002)	(0.144)	(0.996)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table 4.7 – Axis 2 (Pillar Two) expenditure per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of Axis 2 support accruing to NUTS 3 regions and indicators of rurality (p-values in parenthesis)

Axis 2	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	26,585.25	187.10	4,414.96	221.06
Intermediate (IR) regions	14,984.80	140.46	3,729.65	148.13
Predominantly Urban (PU) regions	5,922.11	131.62	3,169.94	105.27
Levene's test	36.205*	4.885*	3.021*	11.166*
	(0.000)	(0.008)	(0.049)	(0.000)
One-way ANOVA	82.006*	13.179*	4.732*	23.138*
	(0.000)	(0.000)	(0.009)	(0.000)
Correlation				
Density	-0.198*	-0.043	-0.073*	-0.113*
	(0.000)	(0.125)	(0.010)	(0.000)
PRI	0.246*	0.039	0.019	0.124*
	(0.000)	(0.162)	(0.493)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table 4.8 – Axis 3 (Pillar Two) expenditure per urban-rural typology (2007-2011) and Pearson correlation coefficients between level of Axis 3 support accruing to NUTS 3 regions and and indicators of rurality (p-values in parenthesis)

Axis 3	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Urban-rural typology				
Predominantly Rural (PR) regions	3,332.76	27.41	627.79	32.61
Intermediate (IR) regions	2,586.43	41.41	1,519.49	60.21
Predominantly Urban (PU) regions	1,000.76	34.74	596.25	21.49
Levene's test	25.538*	2.620	10.726*	7.496*
	(0.000)	(0.073)	(0.000)	(0.001)
One-way ANOVA	44.957*	3.493*	7.705*	9.953*
	(0.000)	(0.031)	(0.000)	(0.000)
Correlation				
Density	-0.142*	0.216*	0.110*	0.093*
	(0.000)	(0.000)	(0.000)	(0.001)
PRI	0.358*	-0.088*	-0.024	0.023
	(0.000)	(0.002)	(0.386)	(0.406)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

4.3 Linking CAP Expenditures to Agricultural Activities

4.3.1 "Agricultural" Regions: Some Indicators

In spite of the evolution of the concept of rurality over time, agricultural activities still play an important role within multidimensional approaches in defining it. Therefore, the analysis provided in the previous sections can be coupled with the investigation of the major links existing between CAP expenditure and agricultural activities at local level. Former analysis focused on the generic extent of rurality of a given area: here, the role of agriculture is taken into account in a stricter sense. Actually, the CAP, and in particular the Pillar One, is directly aimed at supporting agricultural activities across Europe. Therefore, the coherence of that policy can also be assessed referring to the extent of agricultural activities throughout the EU. Nevertheless, even in case of agricultural activities, the definition of the extent of agricultural activities at local level is

not an easy task: some major issues deal with the way these activities are properly defined. In order to solve this issue, alternative approaches may be followed.

In more traditional studies from regional economics, the relevance of agricultural sector (as well as other sectors of the economy) is usually considered in relative terms. In other words, the relevance of each sector of the economy is defined by referring to its share out of total economy. Similar indicator can refer to both national and regional level; furthermore, either the share of employment or the share of gross value added (GVA) out of the total are generally used as a proxy to compute the relevance of the sector under study.

Although it is generally adopted in regional studies, such a methodology shows major drawbacks. Actually, according to it, the relevance of the agricultural sector is usually larger in poor Countries or Regions than in the rich ones. This is mostly due to a lower presence of both industrial and service sectors in those areas rather than in richer Countries. Accordingly, the above-mentioned indicators are generally used in development economics, in order to define under-developed regions.

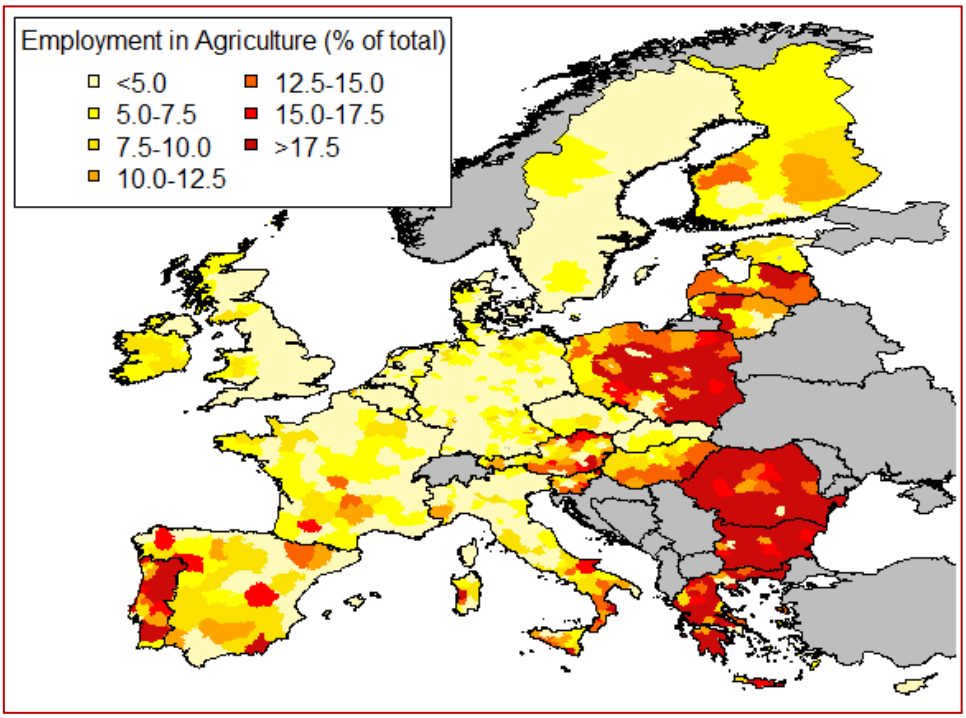
An alternative approach may refer to the definition of the relevance of economic sectors at regional level in “absolute” terms. Actually, the relevance of any sector of the economy can be considered without taking into account the relevance of all other sectors. For example, the extent of agricultural activities can be referred to by considering, for example, the total amount of either employment or GVA from agricultural sector. In this specific case, no mention is made to other sectors’ employment or GVA. Nevertheless, such a definition just based on absolute values might provide further biased results, due to the existence of major dimensional differences among regions, as well as the variation in land quality and productive capacity. Possible weights, that do not take into account other sectors’ relevance, come from dimensional characteristics of regions (e.g., the total surface): according to this methodology, the relevance of agricultural sector is somehow kept in absolute terms.

According to the different perspectives that were previously described, in this analysis, “agricultural” regions are alternatively identified by the following indicators:

i) Share of employment in agriculture out of the total employment (in %);
ii) Share of Agricultural GVA out of the total GVA (in %);
iii) Intensity of Agricultural GVA (average value 2007-2010) per square kilometre of total surface (thousand Euro / km^2).

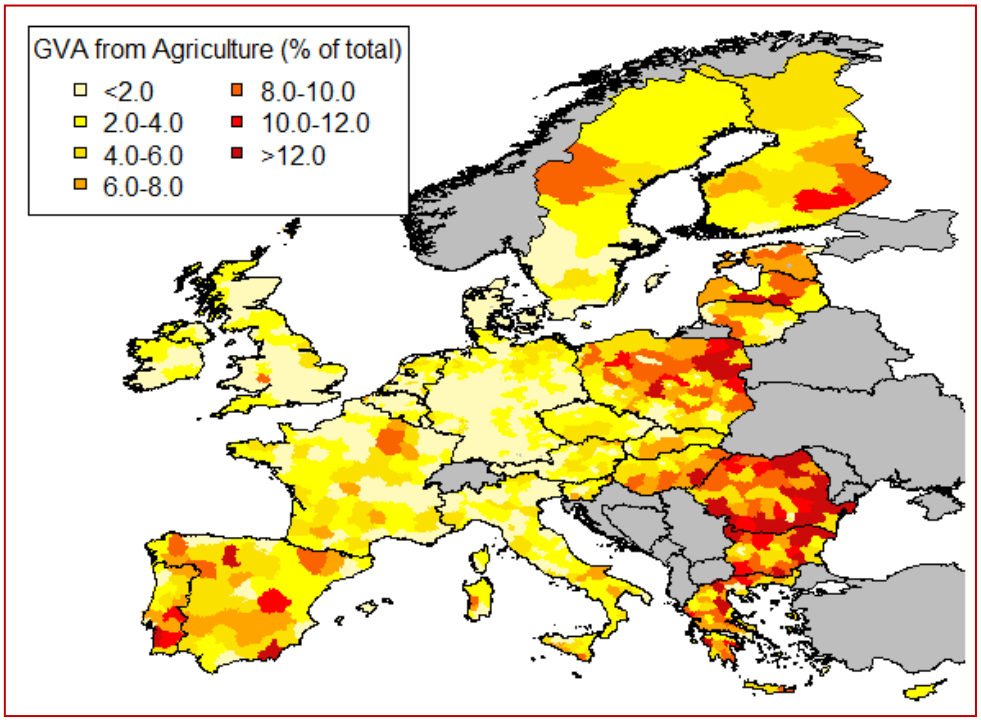
Figure 4.4, Figure 4.5 and Figure 4.6 respectively map the above-mentioned indicators of agricultural activity at NUTS 3 level, throughout the EU-27. Emerging findings are rather interesting. Firstly, it is easy to notice that both indicator i) and indicator ii) map agricultural activities in a similar way. Actually, they both refer to the relevance of agricultural sector in relative terms. Accordingly, highest values throughout the EU-27 are observed in those regions located on the EU Eastern border (e.g., NUTS 3 regions in Poland, Romania, Bulgaria and Greece). These areas are deeply affected by both a lower economic wealth and economic development. Conversely, indicator iii) refers to the absolute levels of agricultural activity, by weighting GVA from the agricultural sector by regional surface. According to this definition, highest intensities of agricultural activities are observed in Western EU Countries’ flatlands (e.g., the Netherlands, North-Western France and Northern Italy).

Figure 4.4 – Share of employment in agriculture by NUTS 3 regions



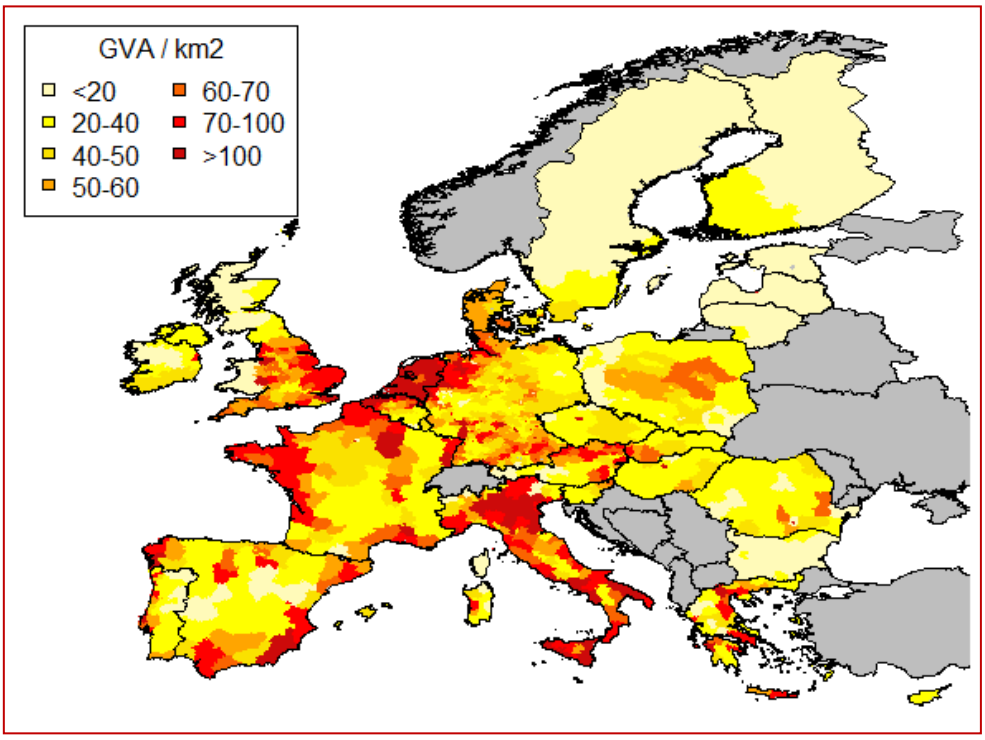
Source: own elaboration

Figure 4.5 – Share of agricultural GVA by NUTS 3 regions



Source: own elaboration

Figure 4.6 – Agricultural GVA (2007-2010) / km^2



Source: own elaboration

4.3.2 Overall CAP Expenditure

The relationship between overall CAP expenditure and the extent of agricultural activities at NUTS 3 level is under study in this section. The role and the relevance of agriculture throughout the EU is alternatively analysed according to the aforementioned definitions (share of employment in agriculture out of the total; share of agriculture GVA out of the total and intensity of agricultural GVA per square kilometre of regional surface) [25]. According to previous sections' analysis, we will first move from the analysis of overall CAP expenditure and then we will consider disaggregated expenditure.

Data about overall CAP expenditure (years 2007 to 2011) and the relationship with major indicators of agricultural activities provide some contradictory evidences. Whatever we consider the intensity of overall CAP expenditure (per land, labour, agricultural GVA), it is negatively correlated with both the share of agricultural employment and the share of the agricultural GVA out of the total economy. These negative relationships are all statistically significant, when considering the overall sample of 1,288 EU NUTS 3 regions: nevertheless, those data seem to be deeply affected by cross-country differences in the intensity of the CAP throughout the EU-27

25. Absolute CAP expenditure is compared to some intensity indices of the agricultural activity (e.g., intensity of agricultural GVA per square kilometre of regional surface) as the relative relevance of agriculture is under study here.

Member States[26] (see section 3). Conversely, when focusing on absolute measures of agricultural activity (i.e., when measuring it according to the intensity of Agricultural GVA per square kilometre of land area), findings are rather different. Intensity of overall CAP expenditure per hectare of UAA is positively related to this indicator, whereas the intensity of CAP expenditure per thousand Euros of agricultural GVA is negatively related to it. Lastly, the intensity of expenditure per unit of agricultural work is not significantly related to the Agricultural GVA expressed in terms of square kilometre of surface (Table 4.9).

Table 4.9 – Pearson correlation coefficients between total CAP support (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

CAP	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	-0.102*	-0.250*	-0.085*
	(0.000)	(0.000)	(0.003)
Share of agricultural GVA	-0.107*	-0.203*	-0.129*
	(0.000)	(0.000)	(0.000)
Agricultural GVA / km^2	0.175*	-0.045	-0.083*
	(0.000)	(0.107)	(0.003)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

These results apparently contrast with major aims of CAP. The policy is intended to support agricultural activities throughout the EU, so it is rather surprising that most agricultural regions throughout the EU received a lower amount of support in years 2007 to 2011. Nevertheless, those findings can be interpreted according to a different framework: results largely confirm that CAP expenditure in years 2007 to 2011 were largely supporting the richest agricultural regions throughout the EU-27, and in particular those characterised by a lower share of agricultural activity out of the total economy. Those regions show very diversified and modern economies as well, with large industrial and service sectors. Actually, they were benefiting the most from the overall CAP expenditure throughout the EU in years 2007-2011.

26. Differences in the average CAP expenditure intensity among group of EU Countries (e.g., Northern Countries, Mediterranean ones…) have been tested through One-way ANOVA tests. Most of those differences are statistically significant. Nevertheless, the major purpose of the current analysis is to focus on EU rurality and not on single MSs or groups of them.

4.3.3 First Pillar

Due to its overwhelming relevance, Pillar One expenditure is expected to follow a largely similar pattern than overall CAP expenditure. According to Table 4.10, this hypothesis is mostly confirmed. In years 2007-2011, most agricultural regions throughout the EU received the lowest amount of CAP expenditure in relative terms (i.e., per hectare of UAA, per agricultural annual work unit and per thousand Euros of agricultural GVA). In particular, the above-mentioned relationships just hold when the relevance of the agricultural is computed in relative terms (in comparison to the relevance of other sectors of the economy). Conversely, a positive and significant relationship is found when the intensity of CAP expenditure per unit of utilised agricultural area is linked with the indicator of agricultural activities in “absolute” terms (i.e. without taking into account the relevance of other sectors). Nevertheless, the latter indicator is not correlated with the intensity of CAP expenditure per AWU employed in agriculture, whereas a negative correlation is found when considering the intensity of CAP expenditure per thousand Euros of GVA.

By disentangling Pillar One expenditure among DP and MI measures, similar patterns emerge. Actually, DP largely follows the major patterns previously highlighted referring to overall Pillar One expenditure. Negative and statistically significant relationships are observed between the intensity of support, however it is computed (per UAA, per AWU and per Agricultural GVA) and both the share of agricultural employment and agricultural GVA out of total economy. Conversely, the intensity of agricultural GVA per square kilometre of land surface is positive related to the intensity of the support per hectare of UAA, whereas it is negatively related to the intensity of support per thousand Euros of Agricultural GVA (Table 4.11).

The same relationships are observed referring to MI measures, as well. Nevertheless, in this case, when considering the intensity of agricultural GVA per square kilometre of land surface, just positive and statistically significant relationship is observed with the intensity of the support per hectare of UAA. Conversely, when referring to “absolute” relevance of agricultural indicator, no correlations are found to be statistically significant (Table 4.12).

Table 4.10 – Pearson correlation coefficients between total Pillar One support (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

Pillar One	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	-0.111*	-0.238*	-0.107*
	(0.000)	(0.000)	(0.000)
Share of agricultural GVA	-0.107*	-0.192*	-0.140*
	(0.000)	(0.000)	(0.000)
Agricultural GVA / km^2	0.187*	-0.038	-0.072*
	(0.000)	(0.182)	(0.011)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table 4.11 – Pearson correlation coefficients between level of DP (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

Direct Payments	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	-0.131*	-0.249*	-0.104*
	(0.000)	(0.000)	(0.000)
Share of agricultural GVA	-0.142*	-0.194*	-0.147*
	(0.000)	(0.000)	(0.000)
Agricultural GVA / km^2	0.063*	-0.049	-0.098*
	(0.025)	(0.081)	(0.001)

*:Correlation statistically significant at 5% (2-tailed)
Source: Authors' elaboration

Table 4.12 – Pearson correlation coefficients between level of MI measures (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

Market Interventions	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	-0.061*	-0.064*	-0.058*
	(0.032)	(0.023)	(0.041)
Share of agricultural GVA	-0.048	-0.062*	-0.064*
	(0.088)	(0.028)	(0.023)
Agricultural GVA / km^2	0.214*	0.005	-0.010
	(0.000)	(0.866)	(0.730)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

4.3.4 Second Pillar

Relationships between Pillar Two expenditure and the extent of agricultural activities are supposed to be less straightforward than those observed referring to Pillar One. Indeed, Rural Development Policy is not aimed at directly supporting agricultural production. Therefore, the link between Pillar Two expenditure and agricultural activity is supposed to be less significant.

Results from the analysis of 2007-2011 expenditure just partially confirm this main hypothesis. Indicators of agricultural activity in relative terms (i.e. share of agricultural employment and share of agricultural GVA out of the total economy) are not correlated with the intensity of Pillar Two support with the only exception of the intensity in terms of AWU employed in agriculture: in latter case, indeed, the relation is found to be negative (in a similar way than Pillar One and overall CAP expenditure). The indicator of absolute agricultural activity (intensity of agricultural GVA per square kilometre of land surface) is just negatively correlated to the intensity of Pillar Two expenditure per thousand Euros of agricultural GVA (Table 4.13).

Accordingly, it is straightforward that Pillar Two expenditure in years 2007-2011 does not follow any particular pattern referring to the allocation of agricultural activities throughout the EU. Due to its specific characteristics and major aims, Rural Development Policy seems to be not particularly affected by the presence of a large agricultural sector at local level.

Table 4.13 – Pearson correlation coefficients between total Pillar Two support (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

Pillar Two	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	-0.003	-0.133*	0.043
	(0.918)	(0.000)	(0.129)
Share of agricultural GVA	-0.038	-0.113*	-0.022
	(0.181)	(0.000)	(0.441)
Agricultural GVA / km^2	0.013	-0.046	-0.080*
	(0.653)	(0.106)	(0.004)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Moving from the results computed for the overall Pillar Two expenditure, it is possible to disentangle distinct Axes measures, focusing on the relationships between the extent of agricultural activity at NUTS 3 level and the intensity of support from specific measures. Once again, the major idea behind this specific kind of analysis is that different Rural Development measures could be linked in different ways to the extent of agricultural activity at NUTS 3 level.

In Table 4.14, Pearson correlation coefficients between Axis 1 expenditure intensity (years 2007 to 2011) and different indicators of agricultural activity are shown. According to these figures, measures for improving the competitiveness of the agricultural and forestry sector (Axis 1) are not directly related to any indicator of agricultural activity at all. This result is quite surprising, as it deeply differs from overall Pillar Two expenditure.

Axis 2 expenditure refers to payments that primarily go to measures for the improvement of the environment as well as the management of the countryside. The intensity of support per unit of agricultural area (UAA) is not related to any of the indicators of agricultural activity at local level. Conversely, the intensity of support per AWU employed in agriculture is found to be negatively correlated with all the indicators of agricultural activity: thus, the lower the presence of agricultural activity at regional level, the higher the expenditure per AWU. Lastly, the intensity of Axis 2 expenditure per thousand Euros of Agricultural GVA is positively correlated with the share of agricultural employment out of the total, while it is negatively correlated with the intensity of agricultural GVA per square kilometre of land surface (Table 4.15).

Measures from Axis 3 of the Rural Development Policy are aimed at improving the quality of life in rural areas as well as at encouraging the diversification of the rural economy. The intensity of this kind of support to rural areas is found to be not related to the extent of agricultural activity at NUTS 3 level. Actually, just the intensity of Axis 3 support per AWU employed in agriculture is negatively related to the share of

agricultural activity out of the total (respectively the share of agricultural employment and the share of agricultural GVA) (Table 4.16).

Table 4.14 – Pearson correlation coefficients between level of Axis 1 support (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

Axis 1	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	0.004	-0.046	0.042
	(0.876)	(0.100)	(0.136)
Share of agricultural GVA	-0.009	-0.038	0.022
	(0.755)	(0.181)	(0.426)
Agricultural GVA / km^2	0.043	-0.009	-0.031
	(0.126)	(0.761)	(0.273)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table 4.15 – Pearson correlation coefficients between level of Axis 2 support (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

Axis 2	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	0.033	-0.166*	0.066*
	(0.243)	(0.000)	(0.020)
Share of agricultural GVA	-0.014	-0.131*	-0.031
	(0.610)	(0.000)	(0.265)
Agricultural GVA / km^2	-0.032	-0.090*	-0.110*
	(0.254)	(0.001)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table 4.16 – Pearson correlation coefficients between level of Axis 3 support (2007-2011) and indicators of agricultural activity (p-values in parenthesis)

Axis 3	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Share of agricultural employment	-0.027	-0.123*	-0.013
	(0.334)	(0.000)	(0.653)
Share of agricultural GVA	-0.045	-0.120*	-0.042
	(0.113)	(0.000)	(0.135)
Agricultural GVA / km^2	0.006	-0.033	-0.045
	(0.827)	(0.235)	(0.110)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

According to the main results from the statistical analysis that has been reported above, expenditure from Pillar Two main axes are generally negatively related to the main indicators of agricultural activity. This is quite astonishing, although it can be interpreted according to the major characteristics of EU regions. Actually, funds from Pillar Two mostly go to mountain regions as well as regions covered by forests. Generally, those regions show a lower amount of agricultural activities, compared to flatlands, for example. Moreover, most of those funds as well as expenditure go to regions in Western and Northern Europe: once again, those areas are generally affected by a lower presence of agricultural activities, especially if compared to Eastern Europe NUTS 3 regions.

5. Concluding Remarks

This report is aimed at analysing the distribution of EU agricultural, rural and environmental support across the EU-27 space. In order to perform this analysis, CAP actual expenditure over years 2007-2011 observed at the NUTS3 level is disentangled into major groups of measures and interventions. Focusing on these data, the work has been firstly aimed at describing the spatial allocation of CAP expenditure throughout the EU, then, at assessing to what extent this rural, agricultural and environmental policy was really supporting “rural” and “agricultural” regions more than “non-rural”, or urban, and “non-agricultural” ones.

The analysis of the spatial allocation of CAP expenditure has shed light on some major patterns across the EU space. In absolute terms, central and urban regions on average receive a lower amount of total CAP expenditure than more rural and peripheral ones.

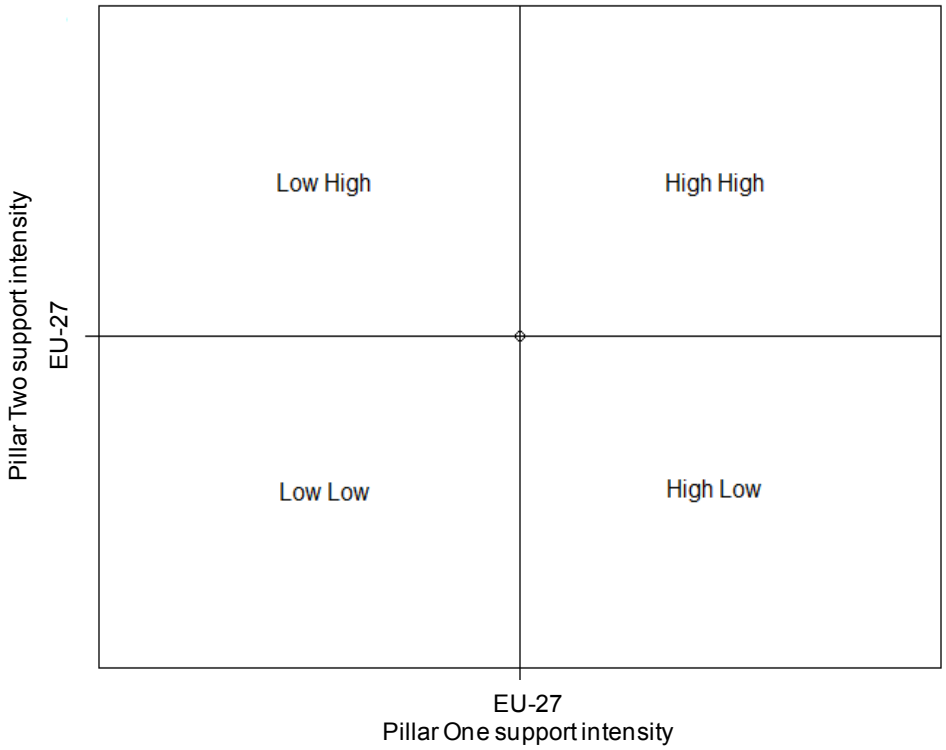
This result is quite robust as similar evidence is obtained distinguishing among distinct Pillars and measures from the overall CAP intervention. Nevertheless, the intensity of this support (i.e., the support per unit of agricultural land, agricultural labour and agricultural GVA) shows a rather different pattern. In this case, the support received by urban and central regions tends to be higher than that received by more rural and peripheral ones. Moreover, CAP expenditures (both in absolute values and as intensity indices) show a strong concentration in flatlands in North-Western EU. Conversely, the support intensity is lower in most of Eastern Europe NUTS 3 regions. In these regions, however, a greater amount of Pillar Two expenditure (compared to Western Countries regions) is generally observed.

To better summarize and stylize the geographical distribution of the CAP support (and the consequent territorial imbalances), it is helpful to identify NUTS 3 regions whose CAP First and Second Pillar support is above and below the EU-27 value.[27] Each regions can be positioned on a Cartesian plane where the *x*-axis refers to Pillar One support intensity and the *y*-axis to Pillar Two support intensity. The origin of the plane (0,0) is positioned in the respective EU-27 values. This representation thus splits the EU-27 NUTS regions into four quadrants (groups) (Figure 5.1):

- High-High cases (Quadrant I): NUTS 3 regions where Pillar One and Pillar Two support intensity is above the respective EU-27 value;
- Low-Low cases (Quadrant III): NUTS 3 regions where Pillar One and Pillar Two support intensity is below the respective EU-27 value;
- High-Low cases (Quadrant IV): NUTS 3 regions where Pillar One support intensity is above the EU-27 value while Pillar Two support intensity is below the EU-27 value;
- Low-High cases (Quadrant II): NUTS 3 regions where Pillar One support intensity is below the respective EU-27 value while Pillar Two support intensity is above the EU-27 value.

27. Here, with “EU-27 value” we mean the support intensity computed over the whole EU-27 (i.e., total EU-27 support divided by total EU-27 UAA, AWU, agricultural GVA). This value differs from the EU-27 average shown in previous sections that expressed the average computed on all the observed EU-27 NUTS 3 regions.

Figure 5.1 – Support from Pillar One and Pillar Two: alternative situations



Source: own elaboration

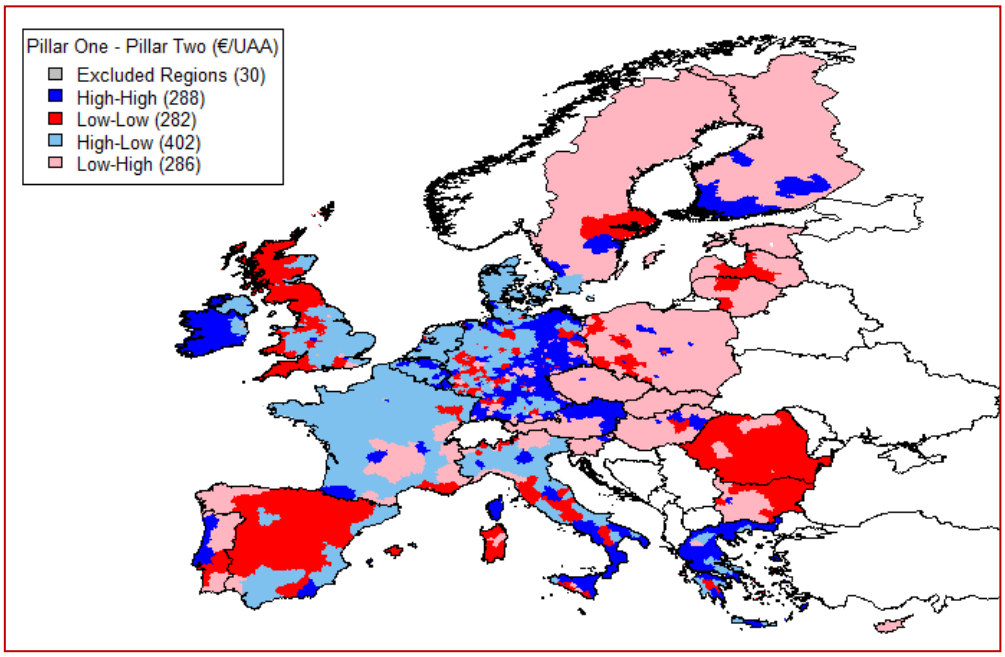
Following this rough classification, Figure 5.2 maps the four groups of regions when support is expressed per hectare of UAA. Pillar One and Pillar Two supports are jointly above (High-High) their respective EU-27 values in 288 regions, mostly located in Eastern Germany, Southern Italy, Greece and Ireland. Generally, however, Western EU regions show Pillar One's support above the EU-27 value, whilst Pillar Two's support is below the EU-27 value (High-Low). Conversely, NUTS 3 regions in Eastern Member States as well as across Scandinavia generally fall in the Low-High case. Lastly, 282 regions are less supported referring to both CAP Pillars (Low-Low): areas of Scotland and Wales, the wide majority of Spain, Romania and Bulgaria as well as other Italian regions fall in this class.

When considering the support per AWU employed in agriculture, however, a different picture emerges (Figure 5.3). Actually, the divide between Eastern and Western Member States is sharper. About 560 NUTS 3 regions fall in the High-High case as both Pillar One and Pillar Two supports per AWU are above the EU-27 value. They mostly are Western EU regions, with a few exceptions. Conversely, Pillar One and Pillar Two supports per AWU are both below the EU-27 value (Low-Low) in 304 NUTS 3 regions that are mainly located in Eastern EU Countries (Poland, Romania, Bulgaria) as well as in Mediterranean regions. Once again, flatlands in Northern France and Northern Italy, as well as in the Netherlands, show a greater support from Pillar One (above the EU-27 value) than from Pillar Two (High-Low case). On the opposite side,

many Baltic regions as well as NUTS 3 regions in Hungary and in Austria fall in the Low-High case.

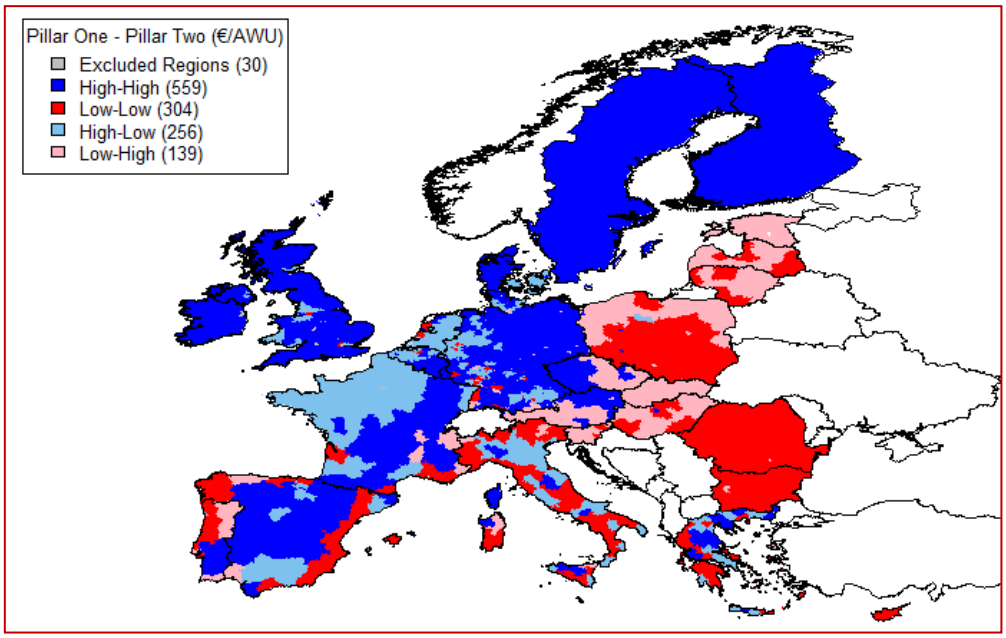
Lastly, when considering the support per thousand Euros of agricultural GVA (Figure 5.4), NUTS 3 regions in Ireland, Scotland, Eastern Germany, Greece and Southern Italy are characterised by a large CAP expenditure: in those regions, expenditure intensity is well above the EU average value for both pillars. Conversely, most Northern NUTS 3 regions as well as regions in the Mediterranean area received a support from both pillars below the EU value. Again, NUTS 3 regions in Western EU Countries (e.g., France, Spain, Germany and Denmark) show a Pillar One support per agricultural GVA that is above the EU value, whilst Pillar Two support is below it (High-Low case). The opposite situation is observed in Eastern NUTS 3 regions (Low-High case).

Figure 5.2 – Pillar One and Pillar Two support per hectare of UAA: joint analysis



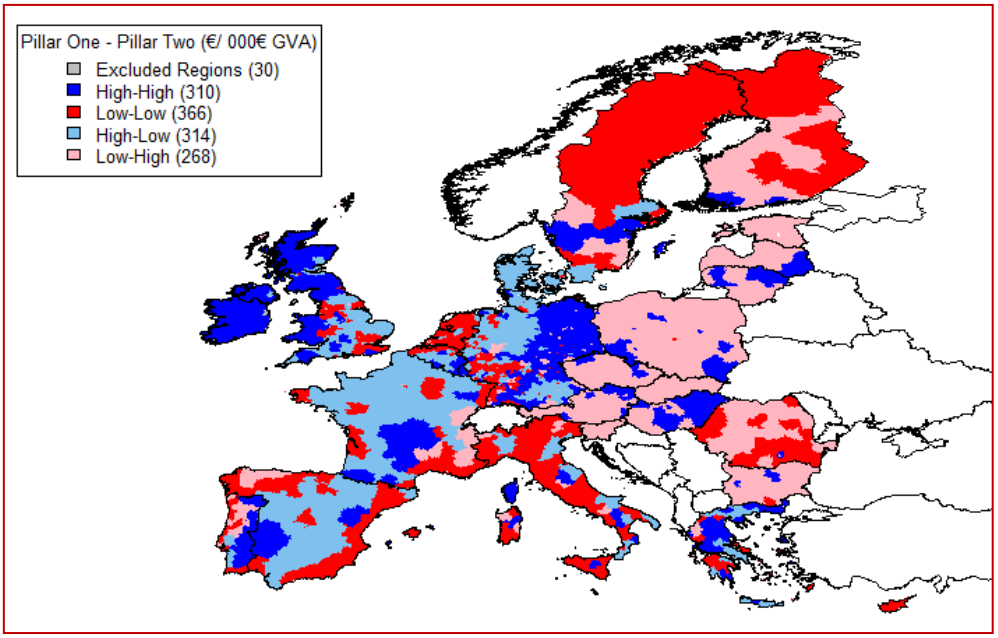
Source: own elaboration

Figure 5.3 – Pillar One and Pillar Two support per agricultural AWU: joint analysis



Source: own elaboration

Figure 5.4 – Pillar One and Pillar Two support per agricultural GVA: joint analysis



Source: own elaboration

According to these patterns, it comes quite natural to wonder about the extent CAP and its measures really support more “rural” and “agricultural” regions throughout the EU-

27. The second part of the work, thus, is aimed at providing a simple statistical assessment of these relationships. Actually, both 'rural' and 'agricultural' effects have been tested in the analysis, in order to verify whether or not both rurality and the presence of agricultural activities matter in the allocation of CAP expenditure.

Some preliminary conceptual and practical issues have been considered in this respect, especially considering the proper definition of both "rural" and "agricultural" regions. Regarding the former, the objective here is to go beyond conventional definitions of urban-rural typologies proposed by the OECD (1994; 1996; 2006) and Eurostat (2010). A multidimensional approach seems more appropriate in order to capture multiple features and the considerable heterogeneity within the EU rural space. A composite and comprehensive indicator (the PRI) applied at an appropriate territorial scale (NUTS 3 level) is therefore adopted to express the degree of rurality. The "agricultural" character of NUTS 3 regions is expressed through alternative indicators of the relevance of the agricultural sector within the regional economy.

In conclusion, by performing a simple statistical analysis on the indicators of expenditure intensity, the CAP appears to be less "rural" and less "agricultural" than stated in its political intentions. In relative terms (per unit of land and, above all, of labour), urban and central regions tend to be more supported than strongly rural and peripheral ones. In fact, this is not a completely new and surprising result. In other words, both rurality and the presence of agricultural activities matter in the allocation of CAP expenditure, even though they do not operate in the expected direction: the less the region is rural (agricultural), the larger is the expenditure intensity that is observed. Working on a different geographical scale and only referring to the EU-15, previous findings (Shucksmith *et al.*, 2005, Crescenzi *et al.*, 2011) already suggested a positive relationship between the degree of rurality and the amount of support delivered through the CAP. Actually, the CAP as a whole does not determine any real redistributive effect from the urban to the rural space across the EU. This paper strongly confirms that the empirical evidence seriously challenges the territorial targeting of this EU policy. Further research efforts are needed to understand the main forces behind this spatial allocation and to analyse more thoroughly the RDP expenditure by looking at the spatial allocation of single axes and measures.

Nonetheless, the evidence here provided goes beyond the policy issue of better targeting the rural policy to the rural space. It also questions how the EU space itself is defined and identified according to its major features (e.g., rurality and agricultural characters). Traditional indicators (such as population density or the share of agricultural employment) do not necessarily provide an accurate representation of EU geography and, therefore, of its rural space as the multidimensional nature of rurality involves many other socio-economic characteristics like remoteness and peripherality.

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Appendix 1

More information about CAP expenditure intensity indices at NUTS 3 level are given in the file available at the link below. In the hyperlinked file, EU-27 NUTS 3 regions are ranked according to CAP support intensity levels. In particular, CAP expenditure has been disentangled in specific measures and Axes. Accordingly, the intensity levels per hectare of UAA, per AWU employed in agriculture and per thousand Euros of agricultural GVA are shown. In particular, the following 24 ranks are provided:

- Total CAP support per hectare of UAA;
- Total CAP support per AWU employed in agriculture;
- Total CAP support per thousand Euros of agricultural GVA;
- Total Pillar One support per hectare of UAA;
- Total Pillar One support per AWU employed in agriculture;
- Total Pillar One support per thousand Euros of agricultural GVA;
- DP support per hectare of UAA;
- DP support per AWU employed in agriculture;
- DP support per thousand Euros of agricultural GVA;
- MI measures support per hectare of UAA;
- MI measures support per AWU employed in agriculture;
- MI measures support per thousand Euros of agricultural GVA;
- Total Pillar Two support per hectare of UAA;
- Total Pillar Two support per AWU employed in agriculture;
- Total Pillar Two support per thousand Euros of agricultural GVA;
- Axis 1 support per hectare of UAA;
- Axis 1 support per AWU employed in agriculture;
- Axis 1 support per thousand Euros of agricultural GVA;
- Axis 2 support per hectare of UAA;
- Axis 2 support per AWU employed in agriculture;
- Axis 2 support per thousand Euros of agricultural GVA;
- Axis 3 support per hectare of UAA;
- Axis 3 support per AWU employed in agriculture;
- Axis 3 support per thousand Euros of agricultural GVA.

Together with the rank, both the name of each region (NAME) and its codification in the NUTS 2006 classification (CODE) are shown. Moreover, Eurostat urban-rural typology and the name of the Country are reported. Lastly, data about the level of the support are expressed as indices, with EU-27 global average = 100. Please, note that the overall EU-27 average support is taken into account here: the value differs from the average support among NUTS 3 observations (as described in section 3).

All EU-27 NUTS 3 regions are listed (1288 observations): excluded regions (possible outliers) are shown in red colours.

Link to NUTS 3 regions rankings: Excel-file

Appendix 2

In Section 4, the coherence between CAP expenditure and the extent of rurality at NUTS 3 level has been observed. In particular, differences in CAP support between urban and rural regions are analysed by adopting different measures of rurality: population density, Eurostat (2010) urban-rural typologies (predominantly rural, intermediate and predominantly rural regions) and the PRI (Camaioni *et al*., 2013a; 2013b). The analysis is mainly aimed at assessing the so-called "rural effect" in the allocation of CAP expenditure. Nevertheless, even national and/or macro-region differences can play a significant role in explaining the spatial allocation of these expenditures. Thus, the existence of a "country effect" should be admitted as well.

Here, the allocation of CAP expenditure is analysed between groups of Member States. In particular, the following macro-regions have been taken into account:

1. Nordic Countries (Denmark, Finland, Sweden);
2. The United Kingdom and Ireland;
3. Continental Europe (France, Luxembourg, Belgium, the Netherlands, Germany and Austria);
4. Southern Europe (Portugal, Spain, Italy, Greece, Malta and Cyprus);
5. New Eastern EU Member States (Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Slovenia, Hungary, Romania and Bulgaria).

According to this taxonomy, the differences in CAP expenditures have been analysed. CAP as whole as well as specific measures have been considered and One-Way ANOVA have been used to test whether values are statistically different or not. The Levene's Test have been preliminary computed to test homoschedasticity among groups variances. If homoschedasticity is verified, simple F test is performed; in the opposite case, the method of Welch (1951) is used.

In Table A.1-A.8, main results are shown. From those tables, it is straightforward that 'country effect' plays a significant role in explaining major differences among expenditure allocation for almost all types of CAP expenditures. Nevertheless, in spite of its significance, country effect can not completely explain the allocation of CAP expenditure at NUTS 3 level. Actually, other effects, such as the rural effect and the spatial effect, might play a significant role in explaining the spatial allocation of CAP expenditure at NUTS 3 level.

Table A.1 – CAP expenditure (2007-2011) per group of EU-27 Member States

CAP	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	268,129.19	1,677.56	66,354.49	1,271.65
The UK and Ireland	197,974.26	1,425.32	88,550.08	2,693.87
Continental Europe	145,895.44	2,011.72	58,554.40	1,858.60
Southern Europe	321,973.12	2,208.53	25,038.27	1,431.31
New Eastern EU Member States	174,319.25	1,197.22	12,080.67	1,664.78
Levene's test	17.689*	3.688*	50.769*	4.638*
	(0.000)	(0.000)	(0.000)	(0.001)
One-way ANOVA	15.978*	17.906*	146.973*	11.904*
	(0.000)	(0.000)	(0.000)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table A.2 – Pillar One expenditure (2007-2011) per group of EU-27 Member States

Pillar One	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	220,361.60	1,273.71	51,780.51	1,036.74
The UK and Ireland	172,367.50	1,259.62	79,018.24	2,402.81
Continental Europe	129,179.45	1,729.30	49,885.04	1,554.36
Southern Europe	286,331.43	1,903.55	22,189.79	1,231.98
New Eastern EU Member States	108,285.99	776.63	7,351.60	1,104.65
Levene's test	20.588*	4.327*	15.223*	5.055*
	(0.000)	(0.002)	(0.000)	(0.001)
One-way ANOVA	19.351*	18.610*	138.441*	11.556*
	(0.000)	(0.000)	(0.000)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table A.3 – Direct Payments (2007-2011) per group of EU-27 Member States

Direct Payments	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	213,831.47	1,241.21	50,439.31	1,010.42
The UK and Ireland	167,081.60	1,177.09	75,121.29	2,319.54
Continental Europe	120,473.89	1,488.33	44,649.38	1,358.76
Southern Europe	245,813.54	1,623.30	19,373.73	1,108.60
New Eastern EU Member States	98,846.78	607.47	6,284.59	915.75
Levene's test	18.151*	18.642*	22.474*	15.751*
	(0.000)	(0.000)	(0.000)	(0.000)
One-way ANOVA	17.687*	30.157*	241.694*	13.221*
	(0.000)	(0.000)	(0.000)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table A.4 – Market Interventions (2007-2011) per group of EU-27 Member States

Market Interventions	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	6,530.13	32.50	1,341.20	26.32
The UK and Ireland	5,285.90	82.52	3,896.96	83.27
Continental Europe	8,705.57	240.98	5,235.66	195.60
Southern Europe	40,517.89	280.24	2,816.06	123.38
New Eastern EU Member States	9,439.21	169.16	1,067.01	188.90
Levene's test	25.163*	0.592	0.849	0.433
	(0.000)	(0.669)	(0.494)	(0.785)
One-way ANOVA	10.094*	0.700	0.915	0.407
	(0.000)	(0.593)	(0.454)	(0.803)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table A.5 – Pillar Two expenditure (2007-2011) per group of EU-27 Member States

Pillar Two	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	47,767.59	403.86	14,573.98	234.91
The UK and Ireland	25,606.76	165.70	9,531.84	291.07
Continental Europe	16,715.98	282.42	8,669.36	304.24
Southern Europe	35,641.69	304.98	2,848.48	199.34
New Eastern EU Member States	66,033.26	420.59	4,729.06	560,13
Levene's test	23.535*	2.522*	5.255*	2.868*
	(0.000)	(0.039)	(0.000)	(0.022)
One-way ANOVA	61.593*	26.685*	57.262*	16.641*
	(0.000)	(0.000)	(0.000)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table A.6 – Axis 1 (2007-2011) per group of EU-27 Member States

Axis 1	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	4,873.29	39.23	1,408.45	23.05
The UK and Ireland	2,205.86	22.79	918.88	33.75
Continental Europe	3,957.43	76.89	2,340.71	74.39
Southern Europe	11,657.87	98.10	905.41	55.39
New Eastern EU Member States	26,829.66	147.76	1,626.96	214.31
Levene's test	67.954*	1.645	0.937	3.615*
	(0.000)	(0.160)	(0.441)	(0.006)
One-way ANOVA	57.425*	5.444*	1.046	34.989*
	(0.000)	(0.000)	(0.382)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table A.7 – Axis 2 expenditure (2007-2011) per group of EU-27 Member States

Axis 2	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	35,861.27	305.02	10,947.94	178.63
The UK and Ireland	21,231.95	119.21	6,976.25	210.94
Continental Europe	10,461.00	140.60	4,147.35	152.16
Southern Europe	21,244.63	174.11	1,690.22	126.67
New Eastern EU Member States	26,842.33	172.36	2,069.95	233.20
Levene's test	12.294*	4.718*	19.152*	4.182*
	(0.000)	(0.001)	(0.000)	(0.002)
One-way ANOVA	31.120*	15.940*	77.172*	5.916*
	(0.000)	(0.000)	(0.000)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

Table A.8 – Axis 3 expenditure (2007-2011) per group of EU-27 Member States

Axis 3	Expenditure (.000 €)	Expenditure per UAA (€ / UAA)	Expenditure per AWU (€ / AWU)	Expenditure per GVA (€ / .000 €)
Group of Countries				
Nordic Countries	2,008.33	17.97	631.60	9.60
The UK and Ireland	867.04	11.01	730.64	21.60
Continental Europe	1,546.24	44.13	1,539.16	53.83
Southern Europe	1,088.33	15.21	95.02	6.20
New Eastern EU Member States	8,348.56	44.03	423.96	59.17
Levene's test	119.75*	6.865	10.593*	5.559*
	(0.000)	(0.000)	(0.000)	(0.000)
One-way ANOVA	64.286*	26.067*	51.256*	73.372*
	(0.000)	(0.000)	(0.000)	(0.000)

*:Correlation statistically significant at 5% (2-tailed)
Source: own elaboration

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Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs change. The financial crisis has exposed long-neglected deficiencies in the present growth path, most visibly in the areas of unemployment and public debt. At the same time, Europe has to cope with new challenges, ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundation for a new development strategy that will enable a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four-year research project within the 7th Framework Programme funded by the European Commission was launched in April 2012. The consortium brings together researchers from 33 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). The project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

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