Regional perspectives and distributional effects of European regional policies

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Abstract

A major objective of this study is to analyse the evolutionary patterns of regional linkages and disparities across the EU space, especially those related to rural and peripheral/remote regions. In particular, this report assesses the economy-wide effects, in terms of GDP and employment, induced, at the European level, by the 2007-2011 CAP payments and by the possible future scenarios concerning the next programming period (2014-2020). A multiregional closed I-O approach applied at a NUTS-3 level is adopted. Particular attention focuses on the (re-) distributive effects produced by spatial and sectoral relationships. In defining regional policy, the knowledge of spillover effects is particularly strategic in that it can assist policy makers in better calibrating allocation of funds among regions and evaluating distribution of final policy effects more correctly. With reference to the next programming period, three main scenarios are analysed. Two are based on different and extreme shares of funds apportioned to basic payments. They are in turn divided into sub-scenarios based on three different criteria of regional distribution of funds devoted to basic payments: utilized agricultural area, agricultural value added and historical payments. A third scenario assumes the suppression of the actual framework based on two pillars and the transfer of all available funds to rural development policy. Results indicate that intersectoral and interregional linkages, which characterise the EU economic space, redirect a large part of effects, for any policy framework and scenario considered, from rural regions and from primary and secondary sectors (representing the main targets of policy) to urban and tertiary sectors, respectively. Moreover, they reveal that the best option for MSs in allocating basic payments among regions would be a criterion based on eligible hectares, which is the general principle on which the new CAP is based, since it would produce higher and more balanced distribution of effects among all regions. They also suggest that a total rethinking of the CAP by introducing only a single co-financed policy would lead to higher contribution to reduction in differences between rural and urban regions. Finally, the analysis shows that the policy decision taken for the 2014-2020 programming period to redistribute funds in favour of poorer regions not only is fair from an equity point of view but can also produce economic advantages for the regions directly penalised by a fund reallocation.

Contribution to the Project

This report analyses the evolutionary patterns of regional linkages and disparities across the EU space, especially those related to rural and peripheral/remote regions. In particular, it assesses distributive and redistributive effects of EU policies targeted to these territories and offers useful policy reccomandations.

Keywords:

Demographic change, Ecological innovation, Economic growth path, EU integration, New technologies, Social capital as growth driver, Socio-ecological transition, Sustainable growth

Jel codes:

O18, Q01, R11, R58

Content

1. Introduction: the objectives of the study

A major objective of this study is to analyse the evolutionary patterns of regional linkages and disparities across the EU space, especially those related to rural and peripheral/remote regions. In this respect, the attention is here concentrated on the distributive and redistributive effect of EU policies in particular when targeted to these territories.

This analysis is conducted at the higher possible degree of disaggregation (NUTS-3) since, only at this level, territorial integration relationships (e. g., urban-rural linkages) can be adequately assessed. In this context, the objective is to identify both spatial relationships across the European space and the role of European policies in determining the evolution of regional disparities. In other terms, the aim is to analyse the degree of integration of European regions as well as to assess (re)distributive effects produced by policies. Consistently with previous work (Camaioni et al., 2014), the focus is on the Common Agriculture Policy (CAP).

This choice is motivated by three main reasons. 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 (payments) may be analysed even at a 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 is a transversal policy, including a wide range of measures, from agricultural policies to rural interventions and environmental measures. Pillar One of the CAP is mainly aimed at supporting agricultural activities and farmers' income while the Second Pillar is aimed at improving the local rural economies by promoting innovation, knowledge, competitiveness, environment and diversification.

While previous works aimed at investigating territorial allocation of these policies (Camaioni et al., 2013, 2014), here the objective is to estimate their effects on the economy. The focus is in particular on redistributive effects across sectors and space. To achieve this, we constructed and applied a multiregional I-O model at a NUTS-3 level, which represents, to our knowledge, an original attempt at this high level of disaggregation. I-O analysis is widely used to estimate overall effects that a given project, investment and policy produce on a given economy. Through apposite extensions, it allows the representation of sectoral and territorial linkages as well as the measurement of spatial redistributive effects induced by exogenous shocks. This methodology is applied to both the past policy framework (2007-2011 CAP expenditure) and the next programming period (2014-2020) assuming alternative scenarios about its volume of support and implementation.

The use of an I-O model is not motivated by the purpose of providing precise quantification of impact of this complex set of policies. This would be unfeasible since I-O approach fails in capturing effects produced, for example, by policies fostering competitiveness as well as technological changes and other systemic impacts such as price adjustments. This is particularly evident in the case of rural development policy where several measures are just finalised to stimulate competiveness in agricultural sector (Lukesch and Schuh, 2010). On the contrary, the aim, here, is to assess to what

extent effects induced by the policies targeted and delivered to a specific sector of a given region distribute across EU space, by means of intersectorial and spatial relationships. On the basis of alternative policy scenarios, this analysis also aims to verify how effects may depend on specific policy choices concerning the 2014-2020 programming period.

The present study is articulated as follows. Section 2 describes in detail the methodological approach adopted, the multiregional I-O model, and how it is designed to investigate redistributive effects of EU policies across space. Section 3 provides information on EU agricultural, rural and environmental policies under study (the CAP and its most important measures). In particular, it shortly describes the policy data used at NUTS-3 level and gives an overview of new policy framework. After defining alternative policy choices for the 2014-2020 programming period, it also illustrates how policy enters the I-O model used. Section 4 presents and discusses the results showing, firstly, evidence concerning the 2007-2011 expenditure and, secondly, comparing the effects associated to alternative 2014-2020 scenarios. Section 5 concludes the report, by drawing the main policy implications of the analysis.

2. Methodology

2.1 I-O Analysis

The approach used to measure the degree of spatial integration and estimate policy redistributional effects is based on a multi-regional closed I-O model of the European Union at a NUTS-3 level. While a few attempts to construct multiregional I-O databases and models including the European territory (i.e. GTAP, WIOD, EXIOPOL, EORA) have been made (Powell, 2007; Lutter et al., 2011; Peters et al., 2011; Timmer, 2012; Murray and Lenzen, 2013), derivation of models at this high level of territorial disaggregation of European MSs has not been attempted yet. Therefore, we feel that the experiment here conducted can represent an important improvement of research in this direction.

Despite some criticism that its underlying assumptions can arise (Gerking et al., 2001), the I-O methodology is still considered a powerful tool to quantify the economy-wide effects generated by a final demand variation over a given time period in terms of output and, by specific extensions, of other aggregates such as value added, Gross Domestic Product (GDP) and employment. Moreover, it can be effectively used to identify key sectors and regions as well as representing the level of integration across sectors and space.

Due to the representation of the relationships among sectors and, through appropriate modifications, between intermediate and institutional sectors, particularly households, an I-O model is able to identify and measure three types of effects: direct, indirect and induced effects. More importantly, in relation to the objectives of this study, I-O analysis also allows to identify that part of these effects that are produced by spatial linkages among industries, the so-called *interregional spillovers* and *feedback effects*.

Figure 2.1 shows a schematic and simplified representation of the abovementioned mechanism of production and transmission of effects. A simple economy of two regions

is represented. Each economy has three sectors, of which two are intermediate (agriculture and industry) and one is an institutional sector, the household sector.

Suppose that an increase in the final demand of a given sector (i.e. agriculture) occurs: direct effects are those changes that are produced in this sector to satisfy the initial final demand change (i.e. increase in the relevant production, GDP and employment).

Indirect effects are feedback effects deriving from linkages among sectors. Specifically, to satisfy the initial increase in final demand, the directly involved sector will purchase inputs from other sectors. These sectors could increase their levels of production to satisfy requirements. However, to increase production, even these sectors could purchase inputs from others, including the initially activated sector, so producing further effects. The latter represents indirect effects.

Induced effects are additional impacts in the economy, which are generated by increases in household consumption due to increases in labour income paid by producers to satisfy direct and indirect requirements. In other terms, producers who have been involved directly or indirectly by the initial final demand variation could employ more labour units in order to satisfy final and input demands. This will bring about an increase in labour income that will lead households to demand more goods and services. To satisfy this additional demand, producers will increase their production, so generating further effects in the economy (induced effects).

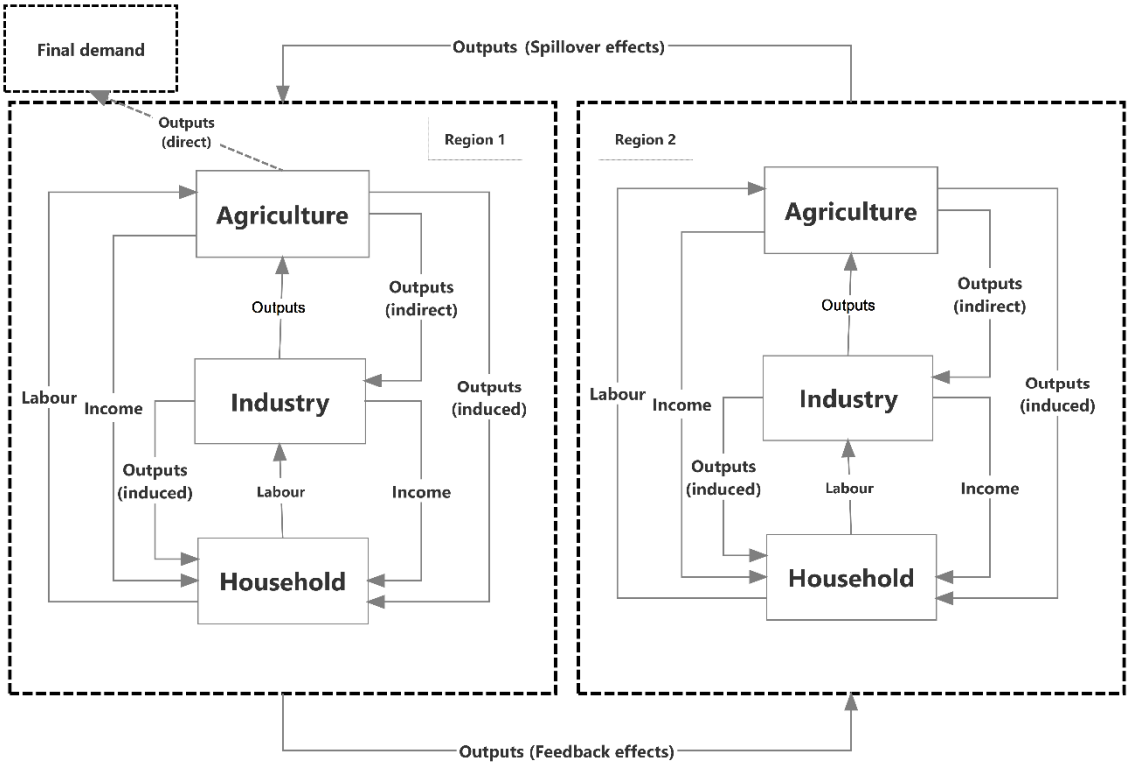
If a region is completely self-sufficient, only the effects described above are produced. More likely, however, a region needs inputs from outside to sustain internal production to an extent that depends on its level of dependency, which generally relate to its size. In this case, further effects are produced. They are interregional spillover and feedback effects. Interregional spillover effects are changes in exporting regions induced by regions that purchase inputs from outside to satisfy internal requirements while interregional feedback effects are those effects that return to importing regions since they can also be exporting regions for others. For instance, the region that has been initially involved by a variation of final demand could purchase inputs from another region. This latter could increase the level of production to satisfy external requirements. This increase is part of spillover effects. Moreover, the exporting region could in turn purchase inputs from the former region. The change in output that this could bring about represents a feedback effect.

In defining and calibrating regional policy, the knowledge of spillover effects is particularly strategic. In fact, they imply that there are policy effects going to regions that were not directly targeted by policy. Fund allocation should take into account this redistributional effect, by also considering the support provided to those regions that benefit from policy indirectly. The risk, in fact, is that some regions benefit twice from policy and this can jeopardize the initial policy objectives, for instance that of reducing disparities between regions.

The measurement of such spatial effects is possible by adopting multi-regional version of I-O model, which offers further advantages in comparison with single-country or single-region models. It ensures more internal consistency than a single-region table since the sum of flows and components must equal the aggregate (national) ones. Moreover, it allows the analyst to assess this distribution of effects across space and, in particular, across rural and urban regions.

Though it is based on specific assumptions and, for this reason, with the known limitations, the I-O approach represents a more feasible tool to investigate sectoral and interregional linkages and assess policy distribution effects in a context characterised by scarce data availability about regional economic structure at very disaggregated territorial levels (i.e. NUTS-3 level). More sophisticated methodologies, such as Computable General Equilibrium (CGE) models based on the use of Social Accounting Matrices (SAMs) or hybrid econometrics-Input-Output models, are too demanding in terms of data and assumptions and cannot be applied effectively.

Figure 2.1 – Schematic representation of the effects measured by a multiregional closed I-O model



Note: the direction of arrows refers to the direction of flows of outputs (inputs), labour and income rather than the sector or the region where effects are directed. In this sense, for instance, spillover effects are those effects produced in Region 2 that come from exports of outputs towards Region 1, which are imports of inputs for Region 1. Feedback effects are instead those effects produced in Region 1 that come from exports of outputs towards Region 2, which are imports of inputs for Region 2.

2.2 The multiregional I-O model

A multiregional I-O model is based on an I-O table that describes both inter-industry relationships and inter-regional trade of the regions involved. The multiregional I-O table, here considered, involves 1,288 European regions at NUTS 3 level according to 2006 classification.[1] Assuming *R* regions and *s* sectors in each regions (with $r=1,\ldots,R$ expressing the generic region and $k=1,\ldots,s$ the generic sector) the multiregional I-O closed model used takes the following form:

$$\begin{bmatrix} \mathbf{x}^1 \\ \mathbf{x}^2 \\ \vdots \\ \mathbf{x}^R \\ y \end{bmatrix} = \left(\mathbf{I} - \underbrace{\begin{bmatrix} \mathbf{A}^{11} & \mathbf{A}^{12} & \cdots & \mathbf{A}^{1R} & \mathbf{k}^1 \\ \mathbf{A}^{21} & \mathbf{A}^{22} & \cdots & \mathbf{A}^{2R} & \mathbf{k}^2 \\ \vdots & \vdots & \cdots & \vdots & \vdots \\ \mathbf{A}^{R1} & \mathbf{A}^{R2} & \cdots & \mathbf{A}^{RR} & \mathbf{k}^R \\ \mathbf{h}_1^{-1} & \mathbf{h}_2^{-1} & \cdots & \mathbf{h}_R^{-1} & y_x \end{bmatrix}}_{\mathbf{A}} \right)^{-1} \begin{bmatrix} \mathbf{d}^1 \\ \mathbf{d}^2 \\ \vdots \\ \mathbf{d}^R \\ d_x \end{bmatrix} \tag{1}$$

where $\mathbf{x}^r$ is the (*s*x1) output column vector of region *r*, *y* is the EU-27 labour income, **I** is the (*N*x*N*) identity matrix (where *N*=*sR*+1), $\mathbf{A}^{rr}$ is the (*R*x*R*) intraregional input coefficients matrix of region *r*, $\mathbf{A}^{lr}$ is the (*R*x*R*) interregional trade coefficients matrix between region *l* and region *r* (exports from region *l* to region *r*, or imports of region *r* from region *l*), $\mathbf{h}_r$ is the (1x*s*) row vector of labour income coefficients (shares of income on output) in region *r*, $\mathbf{k}_r$ is the (*s*x1) column vector of consumption coefficients (shares of consumption on income) in region *r*, y_x is the share of household income for services offered to institutional sectors (i.e. domestic services) and $\mathbf{d}_r$ is the (*s*x1) final demand column vector of region *r*. The (*N*x*N*) matrix $\mathbf{B}=\left(\mathbf{I}-\mathbf{A}\right)^{-1}$ is the total requirement matrix (or Leontief added inverse matrix). The sum of column *j* (with $j=1,\ldots N-1$) $\sum_{i=1}^{N-1} b_{ij}$ (where *b* is an element of **B**), represents output multiplier of sector $k=j-\text{int}\left[\left(j-1\right)/s\right]\cdot s$ of region $r=\text{int}\left[\left(j-1\right)/s\right]+1$ that measures total output variation in the European Union (including direct, indirect, induced, interregional feedback and spillover effects) produced by a change in final demand of one monetary unit in sector *k* of region *r*.[2]

To isolate interregional effects from intra-regional effects, matrix **B** can be easily decomposed into the following two matrices:

[1] See Camaioni et al. (2013, 2014) for more clarification on the sample composition.
[2] It has to be reminded that the last row/column of the added inverse matrix **B** refer to households. Therefore, it has to be excluded from the calculation of output multipliers.

$$\begin{bmatrix} \mathbf{B}^{11} & \mathbf{B}^{12} & \cdots & \mathbf{B}^{1R} \\ \mathbf{B}^{21} & \mathbf{B}^{22} & \cdots & \mathbf{B}^{2R} \\ \vdots & \vdots & \cdots & \vdots \\ \mathbf{B}^{R1} & \mathbf{B}^{R2} & \cdots & \mathbf{B}^{RR} \end{bmatrix} = \underbrace{\begin{bmatrix} \mathbf{B}^{11} & \mathbf{0} & \cdots & \mathbf{0} \\ \mathbf{0} & \mathbf{B}^{22} & \cdots & \mathbf{0} \\ \vdots & \vdots & \cdots & \vdots \\ \mathbf{0} & \mathbf{0} & \cdots & \mathbf{B}^{RR} \end{bmatrix}}_{\mathbf{L}} + \underbrace{\begin{bmatrix} \mathbf{0} & \mathbf{B}^{12} & \cdots & \mathbf{B}^{1R} \\ \mathbf{B}^{21} & \mathbf{0} & \cdots & \mathbf{B}^{2R} \\ \vdots & \vdots & \cdots & \vdots \\ \mathbf{B}^{R1} & \mathbf{B}^{R2} & \cdots & \mathbf{0} \end{bmatrix}}_{\mathbf{S}} \tag{2}$$

where (*N*x*N*) matrix **L** measures local effects that come from both intra-regional effects and feedback effects, and (*N*x*N*) matrix **S** measures interregional spillover effects or extra-local effects.

To assess impact in terms of employment, the inverse matrix can be transformed into an employment inverse matrix (**E**) as follows: $\mathbf{E} = \hat{\mathbf{e}}\mathbf{B}$, where **e** is a (*N*x*1*) vector of employment coefficients that are derived as ratios between sectoral employment and outputs. The assumption is that there is a fixed proportionality between output and employment.

Similarly, to capture the effects in terms of GDP (value added at basic prices plus net taxes on products), the I-O model can be modified converting the inverse matrix into a GDP inverse matrix (**G**), i.e. $\mathbf{G} = \hat{\mathbf{g}}\mathbf{B}$, where **g** is a (*N*x*1*) vector of GDP coefficients obtained as ratios between sectoral GDP and outputs. Also in this case it is assumed that GDP linearly varies in relation to output.

2.3 Sectoral and regional linkages

The degree of integration between sectors operating in a given region or in different regions can be expressed by the number and the intensity of relationships that exist between sectors. Within I-O framework, these relationships correspond to sectoral linkages, which can thus be used to measure the extent to which a sector is integrated with another one. Sectoral linkages can be also aggregated so obtaining an average measure of integration between regions rather than single sectors.

In literature, several techniques have been proposed to measure sectoral interdependencies (or linkages) such as: coefficients of I-O matrix (Chenery and Watanabe, 1958) or Leontief inverse (Rasmussen, 1956); hypothetical extractions (Miller and Lahr, 2001); qualitative input-output analysis (Schnabl, 1994): inverse important coefficients (Aroche-Reyes, 1996); fields of influence (Sonis and Hewings, 1992); eigenvectors (Dietzenbacher, 1992). For an overview, see for instance (Miller and Blair, 2009). More recently, further indicators have been introduced, i.e. average propagation lengths (Dietzenbacher et al., 2005), which measure the economic distance between sectors. They require the calculation of Ghosh inverse matrix (Ghosh, 1958) and are derived irrespective of the size of linkages. The consequence is that high average propagation lengths do not necessarily correspond to strong linkages.

The choice of the indicator(s) is evidently correlated with the research aims. In this paper, we decided to measure backward and forward linkages from the Leontief

inverse matrix. This approach is straightforward and allows an immediate interpretation of results. Moreover, it is fully consistent with both the objectives pursued and the model used to analyse redistribution effects, since it uses the same inverse matrix.

Within I-O framework, industry production generates two kinds of economic effects on other industries: a variation of demand and a variation of supply. When an industry increases its production, it also increases its demand for inputs from other industries, whose therefore adjust their production upwards. In the input-output model, this demand is defined as a backward linkage. On the other hand, an increase in production by a given industry leads to additional output required from other industries to supply inputs to meet the increased demand. This supply function is referred to as forward linkage. In this paper, we derive both backward and forward linkages from the Leontief inverse matrix.

From **B**, let define:

$$BL_j = \sum_{i=1}^{N-1} b_{ij}$$

the sum of rows for column *j* (with $j = 1,\ldots N-1$) from the total requirements matrix. Since BL_j measures the total output from all industries generated from one unit final demand of product $k = j - \text{int}\left[\left(j-1\right)/s\right]\cdot s$ of region $r = \text{int}\left[\left(j-1\right)/s\right]+1$, it is called the backward linkage of industry *k* of region *r*. Similarly, let define

$$FL_i = \sum_{j=1}^{N-1} b_{ij}$$

the sum of columns for row *i* (with $i = 1,\ldots N-1$) from the total requirements coefficient matrix as a measure of forward linkage.

The global intensity of the Leontief inverse matrix, in terms of linkages, is defined as the sum of the total requirements coefficients for all sectors given by:

$$V = \sum_{i=1}^{N-1}\sum_{j=1}^{N-1} b_{ij}$$

Intersectoral comparisons can be made by computing the sensitivity of dispersion or forward linkage index, defined as:

$$FI_i = \frac{FL_i}{N-1} \Big/ \frac{V}{\left(N-1\right)^2} = \left(N-1\right)\frac{F_i}{V}$$

and the power of dispersion or backward linkage index, given by:

$$BI_i = \frac{B_i}{N-1} \Big/ \frac{V}{\left(N-1\right)^2} = \left(N-1\right)\frac{B_i}{V}$$

The forward linkage index or sensitivity of dispersion reflects the degree by which changes in the demand of the other sectors will affect the sector, while the backward linkage index or power of dispersion indicate the extent of the impact of changes in a sector on the other sectors.

From definition, it results that the indexes are average sectoral requirements, $\frac{F_i}{N-1}$ or $\frac{B_i}{N-1}$ relative to overall average requirement $\frac{V}{(N-1)^2}$

Hence, if the forward linkage index of sector *k* of region *r* is greater than one, then a unit increase in all sectors' final demand will produce an above-average increase in output from sector *k*. On the contrary, if the backward linkage index of sector *k* of region *r* is greater than one, then a unit change in its final demand will stimulate an above-average increase in activity in the rest of the economy. If both indices are greater than one, the sector *k* of region *r* is highly integrated within the economy and can be considered a key sector (Guo and Hewings 2001). For policy and investment purposes, it is important to identify key sectors because expansion of these sectors will have a greater impact on the whole economy. An increase in a key sector's demand (with above-average backward linkages index) will require substantially more inputs from other sectors and the growth in the rest of the economy will produce a significant increase in key sector's output (with above-average forward linkages index) .

In this study, we apply the same approach to a regional level in order to express the integration occurring among regions rather than sectors. For the *r*-th region, regional forward linkages can be obtained by aggregating sectoral forward linkages as follows:

$$FL^r = \sum_{i=1+(r-1)s}^{rs+(r-1)s} \sum_{j=1}^{N-1} b_{ij}$$

Analogously, regional backward linkages can be derived in the following way:

$$BL^r = \sum_{i=1}^{N-1} \sum_{j=1+(r-1)s}^{rs+(r-1)s} b_{ij}$$

From regional linkages, it is easy to derive regional forward and backward linkages indices as follows:

$$FI^r = \frac{FL^r}{R} \Big/ \frac{V}{R^2} = R\frac{FL^r}{V}$$

$$BI^r = \frac{BL^r}{R} \Big/ \frac{V}{R^2} = R\frac{BL^r}{V}$$

If forward linkages index of region *r* is higher than unity, then an average unit increase in all regions' final demand will require an above-average increase in average output from region *r*. If regional backward linkages index of region *r* is higher than unity, a change in final demand of region *r* will stimulate an above-average increase in activity

in the rest of the regions. If both indices are greater than one, the region is highly integrated with the rest of regions and can be considered as a key region. The knowledge of key regions can help policy makers to address and calibrate funds and resources at a regional level taking into account spatial spillovers and feedbacks.

2.4 Regionalisation

The multiregional I-O model is constructed through a hybrid procedure of regionalisation, starting from national data (*top-down approach*). Regionalisation is needed for the unavailability of intraregional and interregional sectoral data and the unfeasible costs associated with a survey approach especially at a very high level of territorial disaggregation. This is a frequent problem in regional studies, which is typically solved by applying indirect (purely mechanical or hybrid) techniques aimed at reducing the need of data. Here, we adopt the Bonfiglio's (2006) approach, which is based on a three-stage estimation method.

Stage 1 consists in the application of a location quotient technique to estimate the intersectoral flows within a given region (input coefficient matrix) and imports of the region from the rest of the country (total trade coefficient matrix). Amongst location quotients, the Augmented Flegg Location Quotient (AFLQ) (Flegg and Webber, 2000) was selected as an estimation method since empirical evidence has demonstrated that it would be able to produce more reliable multipliers in comparison with other techniques (Bonfiglio and Chelli, 2008; Bonfiglio, 2009).

The AFLQ takes the following form:

$$AFLQ_{ij} = \begin{cases} CILQ_{ij}\lambda^* \cdot \left[\log_2\left(1+SLQ_j\right)\right] & \text{for } SLQ_j > 1 \\ CILQ_{ij} \cdot \lambda^* & \text{for } SLQ_j \leq 1 \end{cases}$$

where i and j index given sectors, $CILQ_{ij} = \left(SLQ_i / SLQ_j\right)$, $\lambda^* = \left[\log_2\left(1+E^R/E^N\right)\right]^{\delta}$, $0 \leq \delta < 1$, $0 \leq \lambda^* \leq 1$, $CILQ_{ij} \cdot \lambda^* = FLQ_{ij}$, $SLQ_i = \left(E_i^R / E^R\right) / \left(E_i^N / E^N\right)$; E is employment, R and N indicate the region and the nation, respectively. The term $\log_2\left(1+SLQ_j\right)$ is included to allow for the effects of regional specialization. If $SLQ_j > 1$ and $FLQ_{ij} \geq 1$, the national coefficients are scaled upwards. However, to avoid an excessive upward adjustment, the constraint $FLQ_{ij} \leq 1$ is imposed. Even with this constraint, the AFLQ could produce coefficients that are larger than the corresponding national coefficients, where there is a highly specialized purchasing sector. In this way, this method provides a solution to the problem of asymmetric adjustment that is common to location quotients. To apply the AFLQ, parameter δ has to be estimated or calibrated. This parameter allows greater modification for regional imports and avoids the problem of overestimation of I-O coefficients that is common to traditional location quotients. The higher the value of δ, the larger the adjustment for regional imports. We adopted a value of 0.36 since it turns out to have the highest probability of being the best at different regional levels (Bonfiglio, 2009).

The AFLQ is used to estimate both the input flows matrix, $\mathbf{A}^{rr}$ (where *r* represents a given region), and the total trade flows matrix, $\mathbf{A}^{cr}$ (where *c* here expresses the rest of the country).

In stage 2, a gravity model is used to allocate total imports of a given region (total trade flows matrix) among the other regions (trade flows matrices). The hypothesis of the model is that the probability of attraction of import flows exerted by a region is an indirect function of its distance from the import region and a direct function of its ability to attract import flows. Given regions *l* and *r,* the attraction probability of region *l* relative to import flows of good *i* to region *r* is given by:

$$p_i^{lr} = \left[X_i^l / (d_{lr})^2 \right] \Big/ \left[\sum_{t=1}^{R} X_i^t / (d_{tr})^2 \right]$$

with $t \neq r$, where d_{lr} is the geographical distance between export region *l* and import region *r*; X_i^l is the output of sector *i* in export region *l* and is used as a proxy of the ability of attracting import flows. It is assumed that import flows of a given good (or service), whatever import sector it is, are mostly attracted (or rather produced and exported) by regions with high levels of output in the relevant sector. Output has a greater importance than the distance factor, which is squared just to reduce its effects on the attraction probability. For a given region *r*, trade coefficients matrices, $\mathbf{A}^{lr}$, are derived as follows: $\mathbf{A}^{lr} = \hat{\mathbf{p}}^{lr} \mathbf{A}^{cr}$, where $\mathbf{p}^{lr} = \left(p_1^{lr}, p_2^{lr}, \ldots, p_s^{lr} \right)$.

The two stages described above are repeated recursively as many times as the number of regions under study. The result is a rough version of a 6-sector-by-1,288-European-region I-O table.

Finally, stage 3 provides the insertion and the use of all the superior data available in order to increase the overall reliability of the model and application of balancing techniques so as to reconcile discrepancies within the multiregional I-O table. Specifically, with reference to intermediate I-O flows, intra-regional and interregional flows within countries are constrained to national domestic flows (differences between total flows and import flows from national I-O tables). Interregional flows between different countries are constrained to sectoral shares of intra-EU import flows. [3]

As for other I-O quadrants, available sectoral data on value added at a regional level (labour income and other value added) are inserted within the rough table as superior data. Sectoral data of all regions of a given country are however constrained to the sectoral value added available at a national level (taken from the national I-O table) in order to assure consistency with national I-O tables. Net taxes on products (necessary for calculating GDP) and other primary inputs are estimated by applying sectoral value

[3] More precisely, estimated imports of regions of country *A* of product *i* from country *B* are adjusted by multiplying estimated imports by the ratio between the share of imports of product *i* from country *B* and the sum of estimated imports of product *i* from all the regions of country *B*. The share of imports of product *i* from country *B* is obtained by multiplying intra-EU import flows of country *A* of product *i* (sum of intra-EU imports of product *i* from all sectors of country *A* from the national import I-O table) by the percentage of official imports of country *A* of product *i* from country *B* relative to total official imports of country *A* of product i from all countries). Intra-EU imports of product *i* of country *A* are derived by multiplying total imports of country *A* of product *i* by percentages of total intra-EU imports of product *i* (from supply tables) on total imports of product *i* (from supply tables).

added ratios to national values. Primary inputs other than value added of all regions of a given country are then constrained to the difference between national output and the sum of estimated intermediate costs and value added. Sectoral outputs of each region are obtained summing intermediate costs and primary inputs. Household consumption at a regional sectoral level is estimated by multiplying regional sectoral value added by the ratio between national consumption and value added. The assumption is thus that the share of value added used for consumption is the same in all the regions of a given country. Other final demands are obtained by subtracting the sum of intermediate sales and household consumption from regional sectoral output.

2.5 Data

2.5.1 Supply and use tables

The starting point is represented by 2007 59-sector supply and use tables (NACE rev. 1.1) available at Eurostat for 27 European Member States.[4] The choice of this year is based on the consideration that these tables do not include policy effects generated by 2007-2013 CAP.[5] This is very important considering that our objective consists in analysing its distributional effects and comparing these results with different regional scenarios related to the next programming period. A further, but less important reason, is that the sectoral classification is consistent the employment data used. More recent tables, in fact, are constructed on the basis of an updated classification (NACE rev. 2.0)

Through a series of transformations, tables are converted into national industry-by-industry I-O tables evaluated at basic prices, which represent the basis for regionalisation. A representation by industry rather than products better responds to the objectives of this study, in particular the need to evaluate sectoral relationships and how policy effects distribute among industries. Moreover, basic prices rather than consumer prices best describe the underlying cost structure of industries, considering that the use of trade and transport services are clearly separated from the use of goods. This is important in analyses where production technology plays a central role (Timmer, 2012).

Since uses are expressed in market prices, it is necessary to convert them into basic prices, by removing net taxes on products and trade and transport margins from uses, and reallocating them into a specific row of primary inputs and trade and transport sectors, respectively. Column totals of net taxes come from domestic flows table (that is generally available for a less recent year) while row totals come from supply table. Column totals are constrained to the sum of row totals by multiplying column totals by the ratio between the sum of row totals and the sum of column totals. Net taxes on sectoral and final uses are obtained by multiplying the adjusted column totals of net taxes by the ratio between domestic flows and column totals of domestic flows. Then net taxes on sectoral and final uses are balanced by using an optimisation technique

[4] The Eurostat database also collects national symmetric I-O tables that have to be provided by countries every five years. However, the problem is that tables are based on a product-by-product representation. Since we decided to adopt an industry-by-industry representation, they could not be used directly. Therefore, we had to apply the entire procedure of derivation starting from supply and use tables.

[5] It is true that 2007 effects could be partly included. However, we could not take older tables since Romania and Bulgaria enter the EU only in 2007.

with column and row totals of net taxes as constraints. Trade and transport margins on uses are estimated by multiplying row totals of margins (which come from supply tables) by the ratio between uses and row totals of uses (including final uses). Net taxes and margins are thus subtracted from uses.

Secondary production of each industry, coming from supply tables, is reallocated across sectors by adopting the so-called “fixed product-sales structure” assumption, which states that each product has its own specific sales structure irrespective of the industry where it is produced (European Communities, 2008). Sales structure here refers to the proportions of the output of the product in which it is sold to the respective intermediate and final users. This assumption is most widely used, not only because it is more realistic than its alternatives, but also because it requires a relative simple mechanical procedure. Furthermore, it does not generate any negative values in the I-O table that would then require manual rebalancing. Technically, the procedure implies that, if a sector sells a secondary product, then the relevant flows are reallocated among sales of the sector that produces that product primarily on the basis of its shares of intermediate and final sales.

Then, the quadrant of final uses represented by household consumption and other final demands at basic prices are added to the resulting symmetric table of intermediate uses and sales. Output at basic prices equals the sum of intermediate sales and final uses. We also added, as primary inputs, row vector of labour income (from use tables), row vector of other value added (obtained as a difference between value added from uses tables and labour income) and row vector of column totals of net taxes (coming from estimation procedure). Other primary inputs were obtained as a difference between output and sum of intermediate costs, value added and net taxes.

The result is a symmetric national 59-sector I-O table for every EU country, which is then aggregated into six sectors. The sectors considered are: agriculture (AGR), industry (IND), construction (COS), trade, transport, information and communication (COM), financial, real estate and business services (BUS), public administration and other public and private sectors (PUB). Table 2.1 reports the correspondence between the original 59 sectors and the aggregated sectors. Sector aggregation is motivated by a limited availability of employment data at a NUTS-3 level, which are necessary for applying regionalisation procedure, and by the fact that at a lower territorial level many sectors are missing. Aggregation is also motivated by computational feasibility: even after aggregation, still the final intersectoral flows matrix counts about 60 million of elements.

In addition to an I-O table of total flows (domestic and imports), a table of import flows is derived. Import flows (both intermediate and final) are first estimated by multiplying total flows by the ratio between import flows (which come from less recent tables) and uses (which refer to the same year as imports). Then column totals of import flows are constrained to the sum of row totals of import flows, coming from supply tables, by multiplying column totals by the ratio between the sum of row totals and the sum of column totals. Finally, import flows are balanced by using a minimisation technique and constrained to column and row totals, and total flows, imposing that import flows have to be lower or equal to total flows.

2.5.2 Supply and use tables: country specific situation

The reference year of supply and use tables is 2007. Import flows for the year 2007 are estimated using 2005 data on imports and uses. Column totals of net taxes are obtained from 2005 domestic flows tables.

Table 2.1 – Correspondence table between original 59-sector national supply and use tables (NACE rev. 1.1) and 6-sector national I-O tables

Aggregated Sectors	NACE rev 1.1 sectors
1. AGR	Products of agriculture, hunting and related services Products of forestry, logging and related services Fish and other fishing products; services incidental of fishing
2. IND	Coal and lignite; peat Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying Uranium and thorium ores Metal ores Other mining and quarrying products Food products and beverages Tobacco products Textiles Wearing apparel; furs Leather and leather products Wood and products of wood and cork (except furniture); articles of straw and plaiting materials Pulp, paper and paper products Printed matter and recorded media Coke, refined petroleum products and nuclear fuels Chemicals, chemical products and man-made fibres Rubber and plastic products Other non-metallic mineral products Basic metals Fabricated metal products, except machinery and equipment Machinery and equipment n.e.c. Office machinery and computers Electrical machinery and apparatus n.e.c. Radio, television and communication equipment and apparatus Medical, precision and optical instruments, watches and clocks Motor vehicles, trailers and semi-trailers Other transport equipment Furniture; other manufactured goods n.e.c. Secondary raw materials Electrical energy, gas, steam and hot water Collected and purified water, distribution services of water
3. COS	Construction work
4. COM	Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel Wholesale trade and commission trade services, except of motor vehicles and motorcycles Retail trade services, except of motor vehicles and motorcycles; repair services of personal and household goods Hotel and restaurant services Land transport; transport via pipeline services Water transport services Air transport services Supporting and auxiliary transport services; travel agency services Post and telecommunication services
5. BUS	Financial intermediation services, except insurance and pension funding services Insurance and pension funding services, except compulsory social security services Services auxiliary to financial intermediation Real estate services Renting services of machinery and equipment without operator and of personal and household goods Computer and related services Research and development services Other business services
6. PUB	Public administration and defence services; compulsory social security services Education services Health and social work services Sewage and refuse disposal services, sanitation and similar services Membership organisation services n.e.c. Recreational, cultural and sporting services Other services Private households with employed persons

Source: own elaborations on Eurostat data

For some countries (Portugal, Hungary, Bulgaria, Cyprus, Lithuania, Malta, Luxemburg, Holland and United Kingdom), different reference years were used owing to data availability. For Portugal, Hungary, Bulgaria the supply and uses tables used refer to 2005. For Malta, we use the available 2004 supply and use tables. For Lithuania, we use 2006 data on imports and uses to estimate 2007 import flows, and a 2006 domestic flow table for retrieving preliminary estimates of column totals of net taxes. The Netherlands is the only country for which 2007 data were available for supply, use, domestic and import tables.

For Bulgaria, Cyprus and Luxemburg, estimation of import flows and net taxes on products is made borrowing data from similar countries (Romania for Bulgaria, Ireland for Cyprus and Luxemburg). The identification of similar (or rather less different) countries was made through a multidimensional scaling procedure [6] applied to a selection of normalised (between 0 and 1) variables by country: sectoral employment shares, per-capita GDP (PPP), population, population density, imports shares and total employment. Data for the estimation of variables come from Eurostat. This procedure allowed graphical representation of countries based on the identification of coordinates of each country on a two-dimensional space (Figure 2.2). The explained dispersion is very high, being over 95%. This means that the derived structure of distances well reproduces differences between countries, each one represented by a set of economic variables. Using Euclidean distances between points (countries), it is possible to measure how a given country is far (different) from another one. It is found that Romania is closer to Bulgaria while both Cyprus is nearer to Ireland. Moreover, supply and uses tables for Luxemburg present confidential data. For their estimation, the following procedure is adopted. The sum of unknown column totals are derived by subtracting the sum of known column totals from total supply (uses). Unknown column totals are constrained to the sum of unknown column totals by multiplying the same column totals, borrowed from the Irish table, by the ratio between the sum of unknown column totals and the sum of borrowed column totals. Confidential flows are thus replaced with known flows borrowed from the Irish table. Finally, all flows are adjusted using a minimisation technique and constrained to column totals (of which some are estimated) and total rows. Confidential data about value added (in the use table) and imports (in the supply table) are derived with a similar procedure.

The problem of confidential data is also common to the supply table of United Kingdom. In this case, unknown flows are replaced with 2005 values. Then all flows are constrained to 2007 row and column totals using a non-linear optimisation technique.

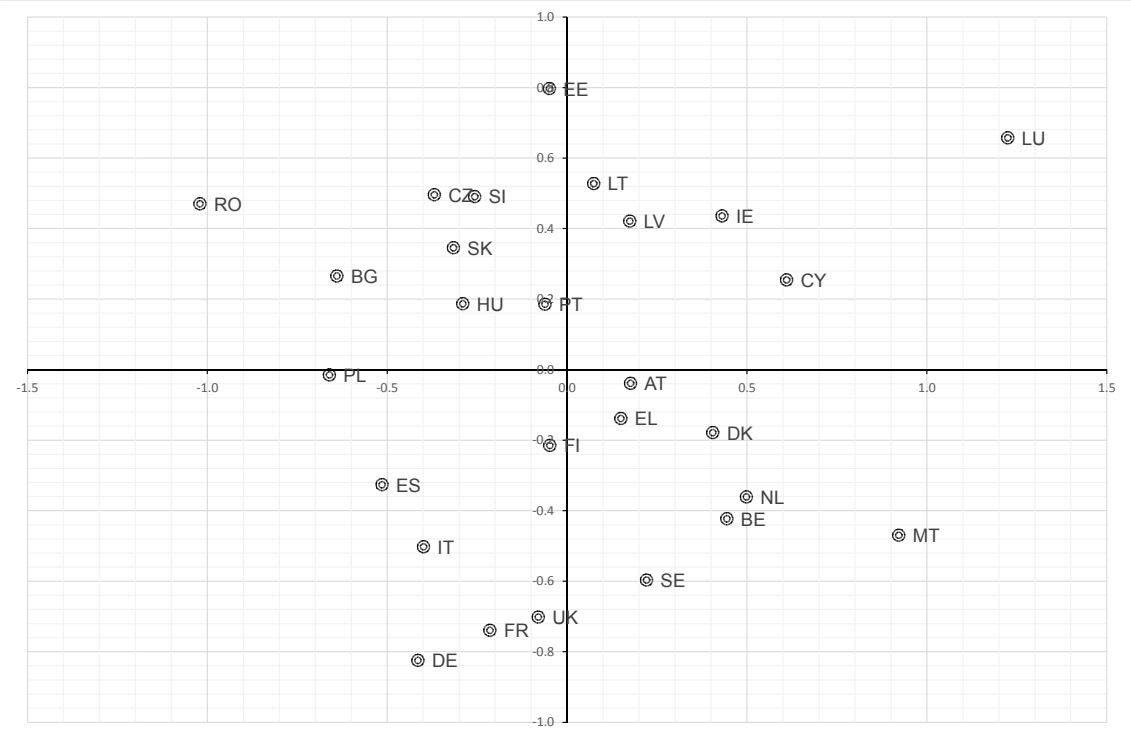
2.5.3 Employment and population data

To apply the AFLQ, 2007 employment data at NUTS-3 level from Eurostat are used. National employment data are obtained by summing regional data. Employment data are also used to apply the gravity model. The distance matrix between regions, necessary for the construction of the gravity model, is derived calculating geodesic distances between the most populated centres of each region. This approach differs

[6] This statistical procedure attempts to find a structure from a set of distance measures among objects. This operation is carried out assigning observations to specific positions within a reduced conceptual space, in order to make distances among points on the space correspond to specified dissimilarities as much as possible. In this way, it is possible to obtain a representation of least-squares of objects within the space, which mostly helps to under-stand data in a better way. The procedure was applied using the Software Package SPSS 22 (PROXSCAL procedure).

from the conventional use of the centre of gravity of regional polygons. The assumption is that the centre attracting most trade or from which most trade is originated is that which exhibits the highest level of population. The territorial unit used corresponds to the Local Administrative one at a level two, which mostly reflects the concept of municipality, though not in all countries. Population data at this territorial level come from Eurostat (2010 data) for most countries. For those for which Eurostat data are missing (France, Cyprus, Germany, Denmark, Spain, Italy, Lithuania, Portugal, Romania and United Kingdom), national census data are used. Finally, geographic coordinates of administrative units, necessary to calculate geodesic distances, were obtained by enquiring an online map service (Google Maps API) though an iterative algorithm. In Table 2.2, the ten most and least populated units are shown.

Figure 2.2 – Two-dimensional plot solution of Multidimensional Scaling procedure applied to a set of 2007 economic variables of 27 European Member States



Measures of Fit – S-Stress: 0.05; Explained dispersion: 0.95.

Source: own elaborations

2.5.4 Trade flows

The share of intra-EU imports distinguished by sector are derived by using information from supply tables, which provide data about total imports and intra-EU imports by sector. Sectoral shares are applied uniformly along the relevant rows of import tables to estimate intra-EU imports of a given product from each sector. This information is not available for some countries, specifically Bulgaria, Cyprus, Czech Republic, Estonia, Italy, Latvia, Lithuania, Luxemburg, Malta, Romania, Sweden and United Kingdom. For these countries, shares are derived using Eurostat trade data, which distinguish intra-EU from third-country imports. In particular for sectors AGR and IND, we use data about imports of products from the database "EU27 trade since 1998 by SITC" while for sectors COS, COM, BUS and PUB we collected data about debts for purchases of services from the "International trade in services (since 2004)" database. In Table 2.3, a correspondence table between sectors and data from Eurostat is shown.

Finally, sectoral shares of imports (and exports) between countries used as superior data for balancing interregional flows are calculated from the abovementioned Eurostat trade data.

Table 2.2 – Extreme (first and last ten) level-2 local administrative units in terms of population

Level-2 administrative unit	NUTS-3 region	Inhabitants
First ten		
Berlin	DE300 – Berlin	3,460,725
Madrid	ES300 – Madrid	3,198,645
Roma	ITE43 – Rome	2,617,175
Paris	FR101 – Paris	2,243,833
Bucureşti	RO321 - Bucuresti	1,883,425
Hamburg, Freie und Hansestadt	DE600 – Hamburg	1,786,448
Budapest	HU101 - Budapest	1,721,556
Warszawa	PL127 – Miasto Warszawa	1,714,446
Wien	AT130 – Wien	1,714,227
Barcelona	ES511 - Barcelona	1,611,013
Last ten		
Heathhall	UKM32 - Dumfries.&.Galloway	3,566
Ferindonald	UKM61 – Caithness & Sutherland and Ross & Cromarty	3,390
Tywyn	UKL12 - Gwynedd	3,272
Newtown Central	UKL24 – Powys	3,194
Llanfair-yn-Neubwll	UKL11 – Isle of Anglesey	3,155
Deutschkreutz	AT111 - Mittelburgenland	3,133
Batniavos seniūnija	LT002 - Kauno.apskritis	1,451
Nesting, Whiteness, Girlsta and Gott	UKM66 - Shetland.Islands	1,337
Papdale	UKM65 - Orkney.Islands	1,263
Barra and Vatersay	UKM64 – Eilean Siar (WesternIsles)	1,172

Source: own elaborations on Eurostat and national census

Table 2.3 – Correspondence table between I-O aggregated sectors and trade data

Aggregated Sectors	Trade Databases	Codes and description
1. AGR	EU27 trade since 1988 by SITC (Eurostat)	0 - Live animals other than animals of division 03; 02211 - Milk of a fat content, by weight, not exceeding 1% 02221 - Milk, in solid form, of a fat content, by weight, not exceeding 1.5% 034 - Fish, fresh (live or dead), chilled or frozen 054 - Vegetables, fresh, chilled, frozen or simply preserved (including dried leguminous vegetables); roots, tubers and other edible vegetable products, n.e.s., fresh or dried 057 - Fruit and nuts (not including oil nuts), fresh or dried 04 - Cereals and cereal preparations (other than 048)
2. IND	EU27 trade since 1988 by SITC (Eurostat)	01 - Meat and meat preparations 02 - Dairy products and birds' eggs (other than 02211 and 02221) 03 - Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof (other than 034) 048 - Cereal preparations and preparations of flour or starch of fruits or vegetables 05 - Vegetables and fruit (other than 054 and 057) 06 - Sugars, sugar preparations and honey 07 - Coffee, tea, cocoa, spices, and manufactures thereof 08 - Feeding stuff for animals (not including unmilled cereals) 09 - Miscellaneous edible products and preparations 1 - Beverages and tobacco 2 - Crude materials, inedible, except fuels 3 - Mineral fuels, lubricants and related materials 4 - Animal and vegetable oils, fats and waxes 5 - Chemicals and related products, n.e.s. 6 - Manufactured goods classified chiefly by material 7 - Machinery and transport equipment 8 - Miscellaneous manufactured articles 9 - Commodities and transactions not classified elsewhere in the SITC
3. COS	International trade in services (since 2004) (Eurostat)	249 - Current account, Services, Other services, Construction service
4. COM	International trade in services (since 2004) (Eurostat)	205 - Current account, Services, Transportation 236 - Current account, Services, Travel 245 - Current account, Services, Other services, Communications services 894 - Current account, Services, Memorandum items, Audiovisual transactions
5. BUS	International trade in services (since 2004) (Eurostat)	253 - Current account, Services, Other services, Insurance services 260 - Current account, Services, Other services, Financial services 262 - Current account, Services, Other services, Computer and information services 266 - Current account, Services, Other services, Royalties and license fees 268 - Current account, Services, Other services, Other business services
6. PUB	International trade in services (since 2004) (Eurostat)	291 - Current account, Services, Other services, Government services, n.i.e. 287 - Current account, Services, Other services, Personal, cultural and recreational services

Source: own elaborations on Eurostat data

2.5.5 The final multi-regional I-O table

Some descriptive information about the final structure of the multi-regional I-O table deriving from the procedure of construction described in sections above is reported in tables 2.4 and 2.5.

Table 2.4 – General overview about the multi-regional I-O table

Number of regions	1.288 (NUTS-3 level)
Number of regions by country	Austria (35); Belgium (44); Bulgaria (28); Cyprus (1); Czech Republic (14); Germany (429); Denmark (11); Estonia (5); Spain (50); Finland (20); France (96); Greece (51); Hungary (20); Ireland (8); Italy (107); Lithuania (10); Luxembourg (1); Latvia (6); Malta (2); Netherlands (40); Poland (66); Portugal (28); Romania (42); Sweden (21); Slovenia (12); Slovakia (8); United Kingdom (133)
Intermediate sectors (number and name)	6: Agriculture (AGR), Industry (IND), Construction (COS), Trade, transport, information and communication (COM), Financial, real estate and business services (BUS), Public administration and other public and private sectors (PUB)
Final demand sectors (number and type)	2: Household consumption, other final demands
Primary inputs (number and type)	4: Labour income, other value added, net product taxes, other primary inputs

Source: own elaborations on Eurostat data

3. Policy analysis

3.1 The 2007-2013 policy data

In order to assess effects induced by the past policy framework, we use data about actual payments under both CAP pillars from years 2007 to 2011 (Camaioni et al., 2013, 2014). They refer to payments received by single beneficiaries throughout the EU-27, on the basis of the declaration of the paying agencies. For assuring anonymity, data are provided at a NUTS 3 level.

Data about first pillar concerns European Agricultural Guarantee Fund (EAGF) payments and are distinguished into direct payments and market measures, while those concerning the second pillar, i.e. the rural development policy, concern payments under European Agricultural Fund for Rural Development (EAFRD) and are available by axis and measure. All measures and axes are here considered. Axis 1 includes measures that are finalised to improve the competitiveness of agricultural and forestry sectors. Axis 2 focuses on several environmental issues such as countryside management, climate change adaptation and mitigation, biodiversity, efficient use of natural resources and other green issues. Axis 3 aims to improve the quality of life in rural areas, encouraging diversification of the rural economy. Finally, Axis 4 (LEADER) horizontally implements all the other axes' measures and pursues the objective of strengthening bottom-up endogenous development forces. The adopted database also offers information about the national/regional co-financing that complements the EAFRD contribution.

Table 2.5 – Descriptive statistics about the multi-regional I-O table

Statistics (%)	Sectors						Regions
	AGR	IND	COS	COM	BUS	PUB	
Intermediate costs / output							
Average	35.9	40.3	52.9	51.2	32.6	28.7	39.9
Min	0	2.1	3.6	2.9	1.1	1.8	2.1
Max	92	88	85.6	87.8	81.3	72.1	80
Coefficient of variation	32.3	20.5	16	19.5	25.6	20.3	14.4
GDP / output							
Average	35.2	19.7	40.2	48.1	60.2	67.9	38.8
Min	3.9	4.1	10	11.2	15.1	27.2	12.1
Max	65.9	33.3	84.8	85.5	87.5	95.7	72.1
Coefficient of variation	29.3	19.4	17	16.8	13.1	9.6	16.6
Interregional imports / intermediate costs							
Average	67.3	77	72.8	74.1	72.7	73.9	74.4
Min	0	3.1	10.2	4	3.7	3.8	6.6
Max	98.4	97.2	95.5	96.2	95	95.8	93.9
Coefficient of variation	28.2	18	23	21.9	24.4	22	20.4
Local purchases / intermediate costs							
Average	32.4	23	27.2	25.9	27.3	26.1	25.6
Min	0	2.8	4.5	3.8	5	4.2	6.1
Max	99.7	96.9	89.8	96	96.3	96.2	93.4
Coefficient of variation	57.8	60.1	61.7	62.5	65.2	62.3	59.2
Intermediate sales / output							
Average	53.8	41.2	27.2	40.8	48.9	13.6	37.7
Min	0	1.1	1.6	1.8	1	0.6	1.3
Max*	560.1	261.3	131.3	174.9	274.8	56.8	155.1
Coefficient of variation	84.8	59.8	55.3	38.9	41.9	48.2	37
Final demand / output							
Average	46.2	58.8	72.8	59.2	51.1	86.4	62.3
Min**	-460.1	-161.3	-31.3	-74.9	-174.8	43.2	-55.1
Max	100	98.9	98.4	98.2	99	99.4	98.7
Coefficient of variation	99	42	20.7	26.9	40.1	7.6	22.3
Interregional exports / intermediate sales							
Average	68.4	75.8	65.7	69.6	69.8	67.5	71.6
Min	0	1.2	0.1	0.3	0.4	0.1	0.8
Max	98.6	97.4	96.6	96.6	96	96.1	95
Coefficient of variation	29.5	19.5	31.5	25.3	25.8	28.8	22
Local sales / intermediate sales							
Average	31.3	24.2	34.3	30.4	30.2	32.5	28.4
Min	0	2.6	3.4	3.4	4	3.9	5
Max	99.6	98.8	99.9	99.7	99.6	99.9	99.2
Coefficient of variation	63.6	61.2	60.2	57.7	59.6	60	55.4

* Values above one hundred percent are due to negative final demand induced by negative stock changes. This brings about output values that are lower than intermediate sales.

** Negative values are due to negative stock changes that are part of final demand.

Source: own elaborations on Eurostat data

3.2 Overview of 2014-2020 CAP reform and used data

On 20th of December 2013, the EU regulations of the new Common Agricultural Policy were published. They reflect the political agreement reached in June 2013 by the European Commission, the EU Council (Member States' Agriculture Ministers) and the European Parliament after a long negotiation started with the publication of the initial proposals by the Commission in October 2011. The regulations concern: market measures, direct payments, horizontal issues and rural development.

The main novelty of this CAP reform is represented by the introduction of a new direct payment system that from 2015 will replace the current Single Payment Scheme, (applied to the historical 15 European countries), and the Single Area Payment Scheme (applied to the 13 newest Member States).[7] The objectives are to better targeting support to certain actions, areas and beneficiaries, and to better distributing support among farmers, territories and Member States. This redistribution is achieved by reallocating direct payments among Member States (the so-called external convergence) and making support converge to a uniform level within Member States (the so-called internal convergence). In this system, the reference basis for calculating direct payments is represented by eligible hectares, rather than a historical or a hybrid basis as in the current system. Therefore, the use of the regional payment, that was optional in the previous period, is now generalised, bringing all agricultural land into the system.

With the intention of legitimising the support to farmers and better pursuing the objectives of the CAP, the new direct payment system is the combination of seven different kinds of payment:

- Basic payment. To receive this payment, farmers have firstly to respect minimum requirements in terms of area size and be active farmers. Moreover, they have to respect cross-compliance and observe three agricultural practices: crop diversification, maintenance of permanent grassland, creation of ecological focus areas. Alternatively, they could decide to observe equivalent practices.
- Redistributive payment. It is an extra (and optional, at the MS level) payment granted to the first eligible hectares of any farm. For receiving this payment, the same conditions as those of basic payment apply.
- Green payment. This is an additional payment granted to farmers adopting agricultural practices beneficial for the climate and the environment. In particular, farmers are expected to observe the three abovementioned agricultural practices or equivalent practices necessary for receiving basic payment.
- Payment for areas with natural constraints. This is an optional (at the MS level) payment targeted to farmers localised in areas with natural constraints.
- Payment for young farmers. This is an additional payment granted to all farmers who are 40 years old or younger and have been carrying out agricultural activity since no more than 5 years.

[7] However, Member States that applied in 2014 the Single Area Payment Scheme may decide to continue to use the current scheme until the end of 2020. This means that they will be exempted from being subject to rules about basic payments.

- Coupled payments. This is an optional (at the MS level) payment coupled to specific products particularly important for specific regions, in order to preserve levels of production.
- Small farmer scheme. This is an optional (at the MS level) simplified scheme for small farms replacing all the other payments.

Three of these payments are compulsory, i.e. basic payment, green payment and payment for young farmers, while the remaining are optional for MSs or can be also opted at a single farmer level (small farmer support scheme).

From a financial standpoint, resources are distributed as follows. The redistributive payment cannot receive no more than 30% of funds. The green payment receives a fixed percentage of 30%. The payment for young farmers cannot exceed 2%. The payment for areas with natural constraints absorbs a percentage up to 5%. The voluntary coupled support cannot exceed 8% or 13% in given cases. Exceptionally, it can be even higher than 13%. Moreover, a further 2% can be granted for protein crops. Finally, the small farmer scheme takes up to 10% of national ceilings. Funds for the basic payment can be obtained by difference. This payment oscillates between 18% and 68% of the national ceiling. It takes the highest percentage if optional payments are not activated (and supposing that payment for young farmers is fixed at its maximum level) while takes the lowest percentage in case the other payments (excluding small farmer support scheme) are fully granted.

Basic payments are subject to application of three alternative models of internal convergence towards a uniform payment per hectare in a given country or region. The first model consists of full and immediate convergence, meaning that since 2015 a uniform unit value of payment entitlements at national or regional levels will be applied. The second one is a form of full but gradual convergence. Specifically, Member States may decide to differentiate the value of entitlements between farmers but this value has to converge to a uniform one by 2019 within the national or regional territory by equal steps from 2015. The last one contemplates partial and gradual convergence and is similar to the mechanism of external convergence used to reduce differences between Member States in the allocation of total direct payments.[8]

In case MSs opt for a regional model of internal convergence, identification of regions can be made on the basis of different criteria: agronomic, economic, agricultural-potential-based or administrative criteria. This choice is left to MSs. It is evident that policy effects may be affected by the decisions that MSs will take about regional identification and distribution criteria.

With reference to market measures, the reform increases the degree of responsiveness and efficiency of market protection system by extending the application of the market disturbance clause to all commodities under the Common Market Organisation and introducing a special reserve for crises in agriculture. Another novelty

[8] According to this system, by 2019 entitlements having a value that is lower than 90% of average unitary value at a national or regional level should be increased by at least one third of the gap between 90% of average unitary value and initial values. Member States may decide to raise the threshold of 90% until 100%. This system implies that entitlements having a value higher than national or regional unitary value will be reduced to support convergence process. However, this reduction cannot be higher than 30%. The objective of this process of convergence is that, by 2019, there should not be entitlements having a lower value than 60% of national or regional unitary value. However, if this brings about reductions that are higher than the maximum decrease allowed (30%), the percentage of minimum value will be adjusted consequently.

is the expiration of the last remaining quota regime for sugar in 2017. The end to quotas is felt to be the only option for providing European sectors with a long-term perspective based on higher productivity. In fact, European Union exports are limited by WTO rules as long as quotas are in place. On the contrary, most developing countries enjoy unlimited duty-free access to the European Union market. Therefore, the removal of quotas should cut out the market distortions resulting from the different treatment of European and third-country products. Finally, the role of farmers in the food chain is strengthened by the provision of compulsory written contracts and contractual negotiations in the dairy market and by expanding rules related to producer organisations to cover all sectors.

As regards rural development, the relevant policy has been better integrated with other territorial development policies (European Structural and Investment Funds) by introducing a Common Strategic Framework and Partnership Agreements that involve all territorial stakeholders. The objective is to render EU policies more consistent with each other and with European strategic objectives, in addition to increase their overall effectiveness and efficiency. Moreover, to foster the achievement of objectives, an outcome-based approach based on the specification of critical milestones, performance reserve and the fulfillment of ex-ante conditionalities is introduced. A significant change is represented by the replacement of the axes characterising the past framework with priorities that are more consistent with the new challenges and objectives of the European Union, i.e: knowledge transfer and innovation in agriculture; competitiveness and viability; food chain organisation and risk management; eco-sustainability; efficiency and low-carbon-based and climate resilient economy; development of rural areas.

The number of second pillar's measures is reduced passing from over 40 to 24 measures in the interest of simplification. However, they are more targeted to specific objectives. In addition, their definition is more open therefore allowing Member States to include a wider list of tailored actions. Moreover, wider freedom of choice in managing resources among measures is left to MSs. In fact, they are not subject to limits that were specific to four axes. Limitations now take into consideration the amounts to be reserved to Leader programmes (5%) and the resources to assign to environmental and climate measures (30%).[9] Among measures, an important novelty is given by the introduction of a risk management tool based on support to farmers for insurance premiums and to mutual funds for compensating farmers for adverse climatic events, animal and plant diseases, pest infestations, environmental incidents and severe drops in income.

The data used for modelling the 2014-2020 programming period come from: a) the respective national appropriations of direct payments defined by Regulation (EU) No 1307/2013 and by Regulation (EU) No 1310/2013 that indicates transitional provisions for 2014; b) allocations at a national level for the same period of the EAFRD as established by Regulation (EU) No 1305/2013 (Table 3.1). With reference to market measures, 2014-2020 Multiannual Financial Framework provides the total allocation at

[9] Specifically, they are: investments in physical assets (art. 17 of Regulation EU no. 1305/2013); investments in forestry technologies and in processing, in mobilising and in the marketing of forestry products (art. 26); payments to areas facing natural or other specific constraints (artt. 31-32); Afforestation and creation of woodland (art. 22); establishment of agro-forestry systems (art. 23); Investments in improving the resilience and environmental value of forest ecosystems (art. 25); forest-environmental services and forest conservation (art. 34); agri-environment-climate (art. 28); organic farming (art. 29); Natura 2000 and Water framework directive payments (art. 30).

a European level for market measures that, together with the budget for direct payments, amount to about 313 € billion.

Table 3.1 – National allocations for 2014-2020 CAP payments (EAGF and EAFRD)

Country	Direct payments (net ceilings)		Rural development	
	€ billion	%	€ billion	%
Belgium	3.7	1.2	0.6	0.6
Bulgaria	5.3	1.8	2.3	2.5
Czech Republic	6.1	2.1	2.2	2.3
Denmark	6.3	2.1	0.6	0.7
Germany	35.6	12.1	8.2	8.6
Estonia	1.0	0.3	0.7	0.8
Ireland	8.5	2.9	2.2	2.3
Greece	14.0	5.1	4.2	4.4
Spain	34.1	11.7	8.3	8.7
France	52.5	17.8	9.9	10.4
Croatia	1.3	0.5	2.3	2.4
Italy	26.7	9.1	10.4	10.9
Cyprus	0.3	0.1	0.1	0.1
Latvia	1.7	0.6	1.0	1.0
Lithuania	3.2	1.1	1.6	1.7
Luxembourg	0.2	0.1	0.1	0.1
Hungary	8.9	3.0	3.5	3.6
Malta	0.0	0.0	0.1	0.1
Netherlands	5.3	1.8	0.6	0.6
Austria	4.8	1.6	3.9	4.1
Poland	21.1	7.2	10.9	11.5
Portugal	4.1	1.4	4.1	4.3
Romania	12.4	4.2	8.0	8.4
Slovenia	1.0	0.3	0.8	0.9
Slovakia	2.7	0.9	1.9	2.0
Finland	3.7	1.2	2.4	2.5
Sweden	4.9	1.7	1.7	1.8
United Kingdom	25.0	8.5	2.6	2.7
TOTAL	293.1	100.0	95.3	100.0

Source: Regulations (EU) No 1305/2013, No 1307/2013 and 1310/2013

3.3 Alternative policy scenarios

As already mentioned, policy effects across space may depend on how payments will be regionalised and funds for basic payments will be distributed across regions. Moreover, effects can also depend on the optional payments that will be activated at the national level. In fact, in relation to the different kinds of payments granted and their amount, the share to be allocated to basic payments varies accordingly. Therefore, alternative scenarios can be defined on the basis of these aspects. In order to take advantage of the high level of the territorial disaggregation available, we assume that all MSs opt for a regional model of internal convergence[10] and that regions will be identified on the basis of administrative borders (NUTS-3 level).

Concerning direct payments, two extreme scenarios are considered on the basis of shares allocated to payments: (a) 18% of net national ceilings to basic payments; 82% to the other components; (b) 68% of net national ceilings to basic payments; 32% to

[10] In this study, the kind of regional model of internal convergence adopted (full and immediate, full but gradual or partial and gradual model) does not make difference in that the analysis focuses on effects of different distribution criteria of funds and is carried out at a regional level rather than a farmer level.

the remaining components. Each scenario is then subdivided into three possible sub-scenarios according to the criterion adopted for the distribution of basic payments: (1) hectares or UAA; (2) agricultural value added; (3) historical payments. The first option gives more funds to regions where there is a higher presence of agricultural activity independently of the value generated. The second option awards agricultural activities that provide higher unit value (for instance olive groves, vineyards, fruits and vegetables rather than cereals and oilseeds). The last option is conservative and gives more funds to those who received more in the past. Regarding payments other than basic ones, for the sake of simplicity and considering that the UAA represents the general criterion for calculating DPs, we assume that these payments will be distributed in relation to hectares (UAA).

As for market measures and rural development policy, scenarios adopt a "historical model", meaning that regional distribution of funds is supposed to reflect the past one. Funds to market measures depend on the extent and the typology of agricultural activity. Therefore, it is legitimate to suppose that the characteristics of agriculture of a given region (and thus the relevant share of the funds for market measures) in relation to the others roughly remain the same. With regard to rural development, we expect that many of the past decisions will be reflected in the new policy since countries (regions) are likely to confirm most of the allocation decisions taken in the previous programming period.

A further scenario here considered concerns the transfer of all funds from first to second pillar. This scenario, though purely hypothetical, is consistent with one of the policy options originally put forward the Commission in its initial proposals, i.e. a deep CAP reform consisting in removing the distinction between pillars and moving all funds to rural development policy.

Table 3.2 provides a summary of the alternative policy scenarios here considered.

Table 3.2 – Alternative policy scenarios

Scenarios	Description
Scenario A	18% of net national ceilings to basic payments. 82% to other payments distributed on the basis of UAA. Rural development policy and market measures funds distributed nationally and then regionally on the basis of historical distribution.
Scenario A.1	Basic payments distributed on the basis of UAA. This means that all payments are distributed on the basis of UAA
Scenario A.2	Basic payments distributed on the basis of agricultural value added
Scenario A.3	Basic payments distributed on the basis of historical distribution
Scenario B	68% of net national ceilings to basic payments. 32% to other payments distributed on the basis of UAA. Rural development policy and market measures funds distributed nationally and then regionally on the basis of historical distribution.
Scenario B.1	Basic payments distributed on the basis of UAA. This means that all payments are distributed on the basis of UAA. It equals Scenario A.1 and could then be dropped.
Scenario B.2	Basic payments distributed on the basis of agricultural value added
Scenario B.3	Basic payments distributed on the basis of historical distribution
Scenario C	Only rural development policy meaning a transfer of funds (direct payments, market measures) from first to second pillar in addition to rural development policy funds. Total funds are distributed nationally and then regionally according to historical distribution related to rural development policy.

3.4 Including the CAP into the I-O model

This study focuses on the CAP payments over the 2007-2011 period and the next programming period (2014-2020). First pillar's payments are represented by direct payments and market measures while the second pillar is formed by a set of rural development measures. With reference to these latter payments, the analysis takes account of both European and national co-financing funds.

To model CAP payments within a multiregional demand-driven I-O model, it is necessary to convert policy funds into a regional vector of sectoral final demands. The allocation of payments among regions is known. What is unknown is the distribution of funds among sectors in each region, i.e., the sectors addressed by the policy. This implies the adoption of some assumptions. Here, we follow the approach developed in Bonfiglio et al. (2006).

Direct payments are monetary flows that are mostly decoupled from production. In other words, they are income that farmers receive independently from the activity carried out and the level of production. We assume that this additional income is used for consumption purposes, therefore, direct payments are allocated among sectors using local consumption ratios.[11]

Different from direct payments, market interventions are resources paid to farmers in relation to the extent of their agricultural activity (coupled to production). Thus, there is more direct relationship between agriculture and payments. Since the effect of measures coupled to production is to stimulate production growth, market interventions have been modelled as an increase in agricultural final demand.

Rural development measures can be distinguished into two broad categories: (a) measures supporting investments and purchases of services; (b) measures compensating costs. As far as measures (a) are concerned, we first identify the main sectors to which they are targeted, by experts' judgment and on the basis of existing rural development programmes. Then, funds are distributed using the shares of local inputs purchased by agriculture from the sectors involved, which can be retrieved from the multiregional I-O table. [12] Measures (b) are instead a form of payment given to

[11] In literature, alternative approaches have been formulated to model decoupled agricultural measures. A likely more appropriate choice could be that of modelling decoupled direct payments as an increase in household income (Rocchi et al., 2005). However, this approach could not be directly applied in this study owing to model and data limitations. In fact, it would require as many household accounts as the number of regions while the multi-regional I-O table we used has only one account. Therefore, we decided to adopt an approach that models direct payments as increases in consumption and better fits to the features of the I-O model employed. We are aware that there could be a part of income that is not being spent as consumption. In particular, this share can go to government, as payment of taxes, or can be used to increase savings. This means that resulting impact can be overestimated. However, government can transfer a part of taxes to households, who can decide to use transferred resources to support consumption. The government itself could use a part of taxes to purchase goods and services for the public administration. This can reduce the extent of overestimation. In any case, it should be reminded that the main objective of this paper is to analyse mechanisms of redistribution of effects rather than the extent of impacts. Therefore, possible overestimation should not affect conclusions, significantly. Estimating impacts more accurately, taking account of the relationships between main institutions and accounts operating in given social and economic space, requires more sophisticated models, such as general equilibrium models, which have, however, the disadvantage of being much more data and assumptions demanding, especially at a very high level of regional disaggregation, as is the level here analysed.

[12] Shares of farmers' purchases of capital goods among sectors (investment demand) are not known and could not therefore be used for allocating funds. However, this does mean that farmers' investment decisions are not taken account. In fact, purchases of machinery from industry bring about purchases of maintenance services from the same sector, whose amount depends on the level of the investments made.

farmers to support them in sustaining higher costs induced by the respect of environmental, quality, animal welfare and other specific constraints imposed by rural development policy. They are similar to direct payments and are therefore allocated in the same way. Table 3.3 shows the sectors involved by each measure of 2007-2013 rural development policy. Funds allocated to measures are then increased by national co-financing rates that differ across axes and countries. Table 3.4 shows the allocation of funds between pillars, while Table 3.5 shows the final results of sectoral distribution. They reveal that 76% of payments is used to finance market and direct payments against 24% devoted to rural development. At a sectoral level, most funds are concentrated in sectors IND, COM and BUS, which absorb 76% of expenditure. They are followed by AGR (13%), PUB (10%) and finally COS, with just 2%.

Table 3.3 – Sectoral attribution of 2007-2013 rural development policy measures

No.	Measure	AGR	IND	COS	COM	BUS	PUB
111	Vocational training and information actions				X		X
112	Setting up of young farmers	X	X	X	X	X	X
113	Early retirement	✓	✓	✓	✓	✓	✓
114	Use of advisory services					X	
115	Setting up of management, relief and advisory services					X	
121	Modernisation of agricultural holdings		X	X		X	
122	Improvement of the economic value of forests	X		X			
123	Adding value to agricultural and forestry products		X	X		X	
124	Cooperation for development of new products, processes and technologies in the agriculture and food sector and the forestry sector		X		X	X	
125	Infrastructure related to the development and adaptation of agriculture and forestry			X		X	
126	Restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention actions	✓	✓	✓	✓	✓	✓
131	Meeting standards based on Community legislation	✓	✓	✓	✓	✓	✓
132	Participation of farmers in food quality schemes	✓	✓	✓	✓	✓	✓
133	Information and promotion activities				X	X	
141	Semi-subsistence farming	✓	✓	✓	✓	✓	✓
142	Producer groups					X	
143	Provision of farm advisory and extension services in Bulgaria and Romania					X	
144	Holdings undergoing restructuring due to a reform of a common market organisation	✓	✓	✓	✓	✓	✓
211	Natural handicap payments to farmers in mountain areas	✓	✓	✓	✓	✓	✓
212	Payments to farmers in areas with handicaps, other than mountain areas	✓	✓	✓	✓	✓	✓
213	Natura 2000 payments and payments linked to Directive 2000/60/EC (WFD)	✓	✓	✓	✓	✓	✓
214	Agri-environment payments	✓	✓	✓	✓	✓	✓
215	Animal welfare payments	✓	✓	✓	✓	✓	✓
216	Non-productive investments			X		X	
221	First afforestation of agricultural land	X				X	
222	First establishment of agroforestry systems on agricultural land	X				X	
223	First afforestation of non-agricultural land	X				X	
224	Natura 2000 payments	✓	✓	✓	✓	✓	✓
225	Forest-environment payments	✓	✓	✓	✓	✓	✓
226	Restoring forestry potential and introducing prevention actions	X	X	X	X	X	
227	Non-productive investments			X		X	
311	Diversification into non-agricultural activities		X	X	X	X	
312	Business creation and development		X	X		X	
313	Encouragement of tourism activities			X	X	X	
321	Basic services for the economy and rural population		X	X	X		X
322	Village renewal and development			X			
323	Conservation and upgrading of the rural heritage			X		X	
331	Training and information						X
341	Skills acquisition, animation and implementation of local development strategies				X	X	X
411	Implementing local development strategies. Competitiveness	X	X	X	X	X	X
412	Implementing local development strategies. Environment/land management	X	X	X	X	X	
413	Implementing local development strategies. Quality of life/diversification		X	X	X	X	X
421	Implementing cooperation projects				X	X	
431	Running the local action group, acquiring skills and animating the territory as referred to in article 59				X	X	X
511	Technical assistance					X	
611	Complement to direct payment	✓	✓	✓	✓	✓	✓

Note: symbol X is used for measures supporting investments and purchase of services while symbol ✓ is used for measures compensating higher costs or forms of direct payments.

Source: own elaborations

With reference to the next programming period, we can only analyse ex-ante budgeted allocations since evidently data on payments are not yet available. Cross-country allocation of direct payments from 2014 to 2020 is already defined within the reform process. The allocation within countries is however still unknown since the decision is left to single MSs. This is particularly true for basic payments that are subject to the application of the regional model. Therefore, the within countries distribution among regions depends on the adopted scenario.

Table 3.4 - Distribution of CAP funds by scenario and pillar (%)

Scenarios	First Pillar	Second Pillar
Baseline (CAP payments 2007-2011)	76.3	23.7
Scenario (a) (18% of basic payments)	62.6	37.4
Scenario (b) (68% of basic payments)	62.6	37.4
Scenario (c) (First to Second Pillar)	-	100.0

Source: own elaborations

Table 3.5 - Sectoral distribution of CAP funds by scenario (in %)

Scenarios	AGR	IND	COS	COM	BUS	PUB	TOT
Baseline (CAP payments 2007-2013)	12.5	33.3	1.9	25.3	17.2	9.7	100.0
Scenario (a) (18% of basic payments)							
Scenario 1 (UAA)	12.2	37.1	1.4	24.3	16.0	9.1	100.0
Scenario 2 (VA)	11.8	36.7	1.4	24.6	16.5	9.0	100.0
Scenario 3 (Historical)	12.1	37.1	1.4	24.3	16.0	9.1	100.0
Scenario (b) (68% of basic payments)							
Scenario 1 (UAA)	12.2	37.1	1.4	24.3	16.0	9.1	100.0
Scenario 2 (VA)	10.9	35.7	1.3	25.3	18.0	8.8	100.0
Scenario 3 (Historical)	10.9	35.7	1.3	25.3	18.0	8.8	100.0
Scenario (c) (First to Second Pillar)	12.6	43.2	2.0	19.1	15.9	7.2	100.0

Source: own elaborations

Funds about market measures are not allocated nationally. Total amount can be however estimated by subtracting national ceilings of DPs from total first pillar budget that appears in the 2014-2020 Multiannual Financial Framework. Then, funds can be allocated, first, nationally and, then, regionally applying shares of 2007-2011 payments.

On the contrary, national distribution of funds for rural development policy is known. What is uncertain is its territorial and sectoral distribution. Regional allocation can be made on the basis of historical payments. Allocation among sectors is more problematic since policy is significantly changed by introducing priorities rather than axes and changing the framework of the measures. In this respect, we assume that sectoral distribution reflects past decisions. In fact, it is likely that countries (regions) will confirm most of the distributional decisions taken in the previous programming period. As we did with the previous policy framework, we first distinguish measures into those supporting investments and services and those helping farmers in sustaining higher costs. We also identify the sectors involved by the new measures based on evaluation of single measures and experts' judgment (Table 3.6). Then, we apply a

correspondence between past and new measures, by associating the oldest ones with similar new measures (Table 3.7). In the case of new measures, such as income stabilisation tools and those in favour of organic farms, we do not find a correspondence with past measures; therefore, we decided to associate measures compensating higher costs with only one category. Using regional historical payments allocated to old measures, we first derive shares of available funds, to be allocated to new measures, between the two types of measures. Similarly, payments to the other measures associated with specific new measures were used to calculate portions of available funds to be allocated to new measures. Funds were then balanced to respect the constraints: 30% to environmental and climate measures; 5% to Leader programmes. Finally, they were increased by national co-financing rates.

The total amount of expenditure estimated for the period 2014-2020 varies according to the scenario considered (Table 3.4). In both variants (a) and (b), funds are more equally distributed between pillars thanks to co-financing: first pillar takes 63% leaving a remaining 37% to rural development policy. Sectoral distribution of funds does not differ very much either with respect to 2007-2013 period or across the 2014-2020 scenarios (Table 3.5). However, a higher concentration of funds in the IND sector can be observed and this is particularly evident in the most radical scenario (scenario c).

Table 3.6 – Sectoral attribution of 2014-2020 rural development policy measures

Art.	Measure	AGR	IND	COS	COM	BUS	PUB
14	Knowledge transfer and information actions				X	X	X
15	Advisory services, farm management and farm relief services					X	
16	Quality schemes for agricultural products and foodstuffs	✓	✓	✓	✓	✓	✓
17	Investments in physical assets		X	X		X	
18	Restoring agricultural potential damaged by natural disasters and catastrophic events and introduction of appropriate prevention actions	✓	✓	✓	✓	✓	✓
19	Farm and business development	X	X	X	X	X	X
20	Basic services and village renewal in rural areas		X	X	X	X	X
22	Afforestation and creation of woodland	X				X	
23	Establishment of agro-forestry systems	X				X	
24	Prevention and restoration of damage to forests from forest fires and natural disasters and catastrophic events	X	X	X	X	X	
25	Investments in improving the resilience and environmental value of forest ecosystems			X		X	
26	Investments in forestry technologies and in processing, in mobilising and in the marketing of forestry products	X	X	X	X		
27	Setting up of producer groups and organisations					X	
28	Agri-environment-climate	✓	✓	✓	✓	✓	✓
29	Organic farming	✓	✓	✓	✓	✓	✓
30	Natura 2000 and Water framework directive payments	✓	✓	✓	✓	✓	✓
31-32	Payments to areas facing natural or other specific constraints	✓	✓	✓	✓	✓	✓
33	Animal welfare	✓	✓	✓	✓	✓	✓
34	Forest-environmental services and forest conservation	✓	✓	✓	✓	✓	✓
35	Co-operation				X	X	
37	Crop, animal and plant insurance	✓	✓	✓	✓	✓	✓
38	Mutual funds for adverse climatic events, animal and plant diseases, pest infestations and environmental incidents	✓	✓	✓	✓	✓	✓
39	Income stabilisation tool	✓	✓	✓	✓	✓	✓
42-44	Leader Local Development	X	X	X	X	X	X

Note: symbol X is used for measures supporting investments and purchase of services while symbol ✓ is used for measures compensating higher costs or forms of direct payments.

Table 3.7 – Correspondence table between 2007-2013 and 2014-2020 rural development policy measures

2007-2013 Rural development Policy No.	Measure	2014-2020 RDP Measure Articles
111	Vocational training and information actions	14
112	Setting up of young farmers	19
113	Early retirement	✓
114	Use of advisory services	15
115	Setting up of management, relief and advisory services	15
121	Modernisation of agricultural holdings	17
122	Improvement of the economic value of forests	26
123	Adding value to agricultural and forestry products	26
124	Cooperation for development of new products, processes and technologies in the agriculture and food sector and the forestry sector	26
125	Infrastructure related to the development and adaptation of agriculture and forestry	17
126	Restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention actions	✓
131	Meeting standards based on Community legislation	✓
132	Participation of farmers in food quality schemes	✓
133	Information and promotion activities	14
141	Semi-subsistence farming	✓
142	Producer groups	27
143	Provision of farm advisory and extension services in Bulgaria and Romania	15
144	Holdings undergoing restructuring due to a reform of a common market organisation	✓
211	Natural handicap payments to farmers in mountain areas	✓
212	Payments to farmers in areas with handicaps, other than mountain areas	✓
213	Natura 2000 payments and payments linked to Directive 2000/60/EC (WFD)	✓
214	Agri-environment payments	✓
215	Animal welfare payments	✓
216	Non-productive investments	25
221	First afforestation of agricultural land	22
222	First establishment of agroforestry systems on agricultural land	23
223	First afforestation of non-agricultural land	22
224	Natura 2000 payments	✓
225	Forest-environment payments	✓
226	Restoring forestry potential and introducing prevention actions	24
227	Non-productive investments	25
311	Diversification into non-agricultural activities	20
312	Business creation and development	20
313	Encouragement of tourism activities	20
321	Basic services for the economy and rural population	20
322	Village renewal and development	20
323	Conservation and upgrading of the rural heritage	20
331	Training and information	14
341	Skills acquisition, animation and implementation of local development strategies	42-44
411	Implementing local development strategies. Competitiveness	42-44
412	Implementing local development strategies. Environment/land management	42-44
413	Implementing local development strategies. Quality of life/diversification	42-44
421	Implementing cooperation projects	35
431	Running the local action group, acquiring skills and animating the territory as referred to in article 59	42-44
511	Technical assistance	-
611	Complement to direct payment	✓

Note: symbol ✓ refers to measures compensating higher costs or forms of direct payments. Technical assistance is not a specific measure within the new RDP; therefore, it was not considered.

4. Results

4.1 Economy-wide effects: an EU perspective

This section analyses the level of economic integration within regions (i.e. across sectors) and between regions across the EU space as emerges from the 2007 1.288 European NUTS-3 regions I-O model described in the previous sections. Figures 4.1 and 4.2 provide picture representation of the average degree of sectoral integration of each regional economy. Sectoral integration is measured by calculating backward and

forward linkages indices at a regional level described in section 2.3. In Table 4.1 the extreme (first and the last ten) regions in terms of these linkage indices are shown.

The blue scale used in figures refers to regions with indices that are higher than unity while red scale identifies regions having indices that are lower than unity. The higher the indices (the more intense the colour), the higher the level of backward/forward indices, the more the region is a key one in fostering European growth in terms of production. The lower the indices (the less intense the colour), the lower the level of backward/forward indices, the lesser important the region in promoting the growth.

As can be noticed, in UK, Czech Republic, Latvia and in particular France most regions are able to activate industries backwardly, through the purchase of inputs, to an extent that is above European average. A high level of backward integration is also present in South Sweden, North Finland, South Spain and South Italy. Also in Germany, there is significant presence of highly integrated regions.

The analysis of forward linkages leads to different findings. We can observe a polarization towards some regional contexts that generally correspond to the most urbanised and developed regions. These regions have sectors that provide inputs to the others to an above-average level. They are as important as regions with higher backward linkages since production of importing regions depends on their outputs. However, it is also true that the growth in regions having higher forward linkages significantly depends on the growth of importing regions.

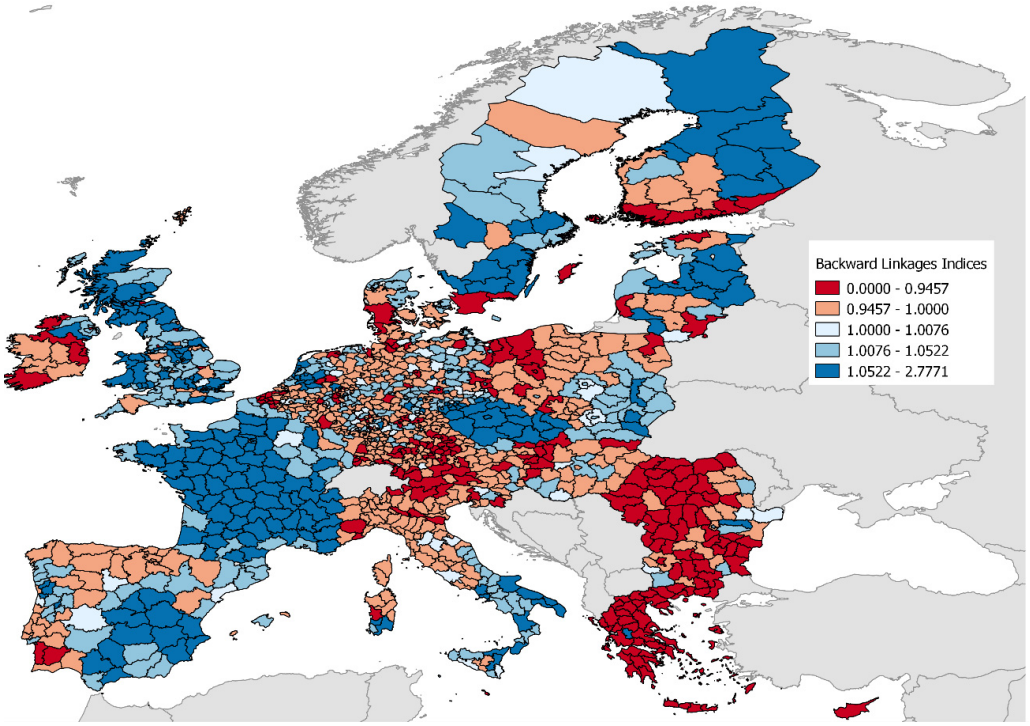
As already said, the knowledge of the level of integration can be crucial for policy makers since it helps to identify those regions that can stimulate growth to a larger extent as a consequence of a territorially targeted policy. It is also important for understanding how the effects of a given policy are going to distribute across space. This aspect, with reference to the CAP and following the policy analysis depicted in the previous section, is investigated in next sections.

4.2 Past policy framework (the baseline)

This section illustrates empirical results deriving from the application of the I-O model to 2007-2011 CAP payments. For better interpreting results, regions are aggregated into groups using conventional criteria. In particular, based on the share of the rural population (in other words, those living in rural grid cells of 1 km² each), the NUTS 3 regions are classified into the following three groups: predominantly urban region (the rural population accounts for less than 20% of the total population); intermediate region (the rural population accounts for a share between 20% and 50% of the total population); predominantly rural region (the rural population accounts for 50% or more of the total population).

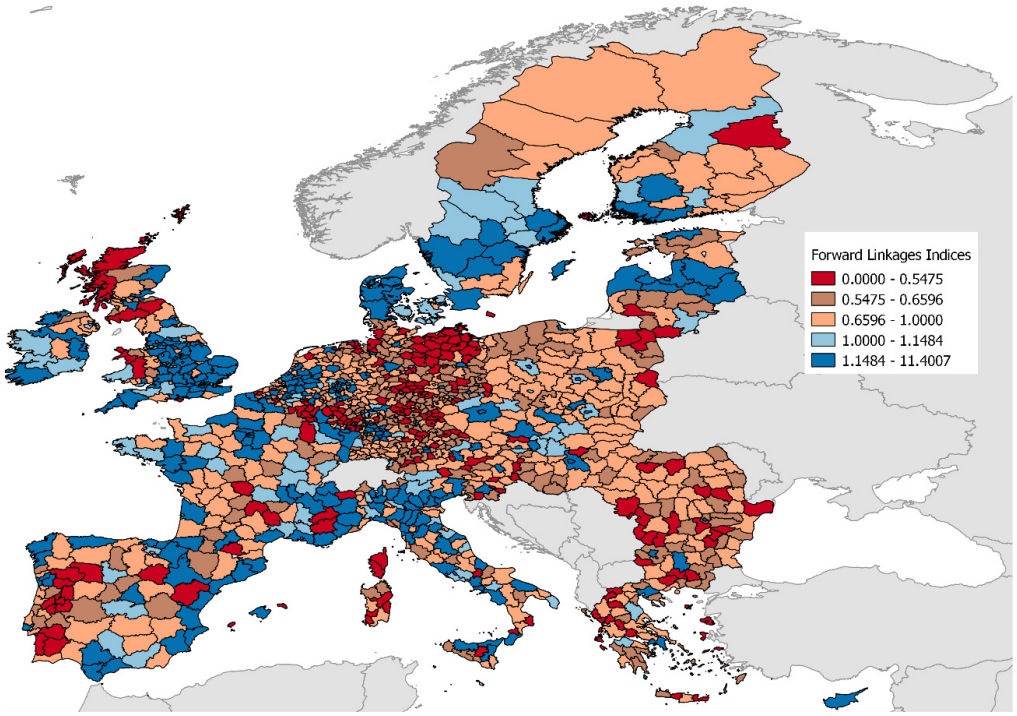
Regions are also regrouped using objectives of structural funds. Convergence regions are those that belong to NUTS-level-2 regions whose gross domestic product (GDP) per inhabitant (measured in purchasing power parities) is less than 75% of the EU-25 average. Among convergence regions, we also include phasing-out regions, which are those regions with a GDP per capita that is more than 75% of the EU-25 average but less than 75% of the EU-15 average. Competitiveness regions are all the other regions. Among these latter we also include phasing-in regions, which are regions with a GDP per capita of less than 75% of the EU-15 average (in the period 2000–2006) but more than 75% of the EU-15 average (in the period 2007–2013).

Figure 4.1 – Regional backward linkages indices (BLI)



Source: own elaborations

Figure 4.2 – Regional forward linkages indices (FLI)



Source: own elaborations

Table 4.1 – Extreme (first and last ten) NUTS-3 regions in terms of backward and forward linkages indices

Regions	Backward linkages indices	Regions	Forward linkages indices
First ten		**First ten**	
SE - Västra Götalands län	2.777	EL - Attiki	11.401
SE - Kronobergs län	1.838	FR - Paris	11.057
NL - Zuidwest-Gelderland	1.610	IT - Milano	10.831
IT - Cagliari	1.555	ES - Madrid	9.587
FI - Kainuu	1.329	ES - Barcelona	8.137
FI - Pohjois-Karjala	1.299	SE - Stockholms län	8.031
FI - Pohjois-Savo	1.298	FR - Hauts-de-Seine	7.933
SE - Kalmar län	1.297	LV - Riga	6.617
FI - Etelä-Savo	1.282	IT - Roma	6.487
UK - Blackpool	1.278	DE - Berlin	5.682
Last ten		**Last ten**	
EL - Dodekanisos	0.751	DE - Hoyerswerda, Kreisfreie Stadt	0.429
EL - Korinthia	0.750	PT - Serra da Estrela	0.423
EL - Chalkidiki	0.731	EL - Evrytania	0.421
UK - Belfast	0.727	IT - Ogliastra	0.419
EL - Florina	0.725	PT - Pinhal Interior Sul	0.418
EL - Kyklades	0.722	AT - Lungau	0.416
EL - Chios	0.709	MT - Gozo and Comino	0.415
EL - Kefallinia	0.662	UK - Shetland Islands	0.406
IT - Oristano	0.633	UK - Orkney Islands	0.404
SE - Gotlands län	0.415	UK - Eilean Siar (Western Isles)	0.400

Source: own elaborations

Table 4.2 reports the distribution of CAP payments among these groups of regions. As can be seen, most expenditure concentrate in rural and intermediate regions with about 90% of total. Each inhabitant residing in rural territories received more than 1 thousand €, against about 170 € for urban population. This is widely expected being consistent with the characteristics of policy.

In terms of policy effects, 100 € of expenditure generated about 70 € of GDP, thanks to all sectoral and spatial linkages across the European economic space (Table 4.3). Over 50% of effects are due to interregional spillover effects. These are effects going to regions that were not directly targeted by policy; therefore, they are effects that are not taken into consideration in defining policy allocation.

Analysing the regions distinguished by level of rurality, it results that as the degree of urbanization rises, the share of extra-local effects increases reaching the highest value in urban regions with 55% of total effects. In spite of fund distribution that is in favour of rural and intermediate regions, GDP effects are more equally distributed and slightly more marked in urban regions. This is a result of their exports towards rural regions, which adds to the effects generated by direct intervention of policy. In urban regions more than 80% of total effects are in fact due to spillover effects or rather imports of other regions. The ratio between effects and payments is therefore particularly high in urban regions. It indicates that, due to their level of economic integration, the effect in urban regions doubles the original expenditure.

It can be also noticed that most payments are absorbed by competitiveness rather than convergence regions. The former, which represent the most developed ones, received

66% of expenditure and captured 82% of total extra-local effects. Moreover they absorb 75% of total effects generated by the CAP. This depends on their exports to less developed regions, which explain 60% of GDP effects, in addition to a higher concentration of funds in these regions. Definitively, competitiveness regions are those which benefited from the CAP to a larger extent, with about 80 € of GDP generated by 100 € of expenditure.

Comparing ex-ante with ex-post GDP, it can be observed that the contribution of rural and convergence regions to total GDP increased by 0.26 and 0.18%, respectively. In other words, the differences between regions slightly decreased and this occurred in spite of unbalanced policy distribution in favour of more developed regions. The reason for this can be found in the sensitivity of economy to shocks (in this case, injection of policy funds), which is evidently higher in less developed regions.

With reference to employment, we can notice that policy potentially activated 4.6 million of labour units (Table 4.4). This variation has not to be considered as new employment, although it could be partially. It should be better interpreted as that quantity of work that is necessary to sustain a given increase in output. This can lead to new employment, absorption of unemployment or employment of underemployed.

Table 4.2 – 2007-2011 CAP Payments distinguished by regional group

Groups	First Pillar			Second Pillar			Total		
	Billion €	%	Per capita €	Billion €	%	Per capita €	Billion €	%	Per capita €
Rural	104.8	49.8	894.7	35.8	54.7	305.5	140.6	51.0	1200.1
Intermediate	79.1	37.6	451.7	22.5	34.5	128.6	101.7	36.9	580.2
Urban	26.4	12.6	132.3	7.1	10.8	35.4	33.5	12.1	167.8
Convergence	68.8	32.7	511.9	26.3	40.2	195.4	95.1	34.5	707.4
Competitiviness	141.6	67.3	395.9	39.1	59.8	109.4	180.7	65.5	505.3
Total	210.4	100.0	427.6	65.4	100.0	132.9	275.7	100.0	560.5

Source: own elaborations

Table 4.3 – Effects in terms of GDP activated by 2007-2011 CAP Payments per regional group

Groups	Effects (billion €)	%	Effects / Payments	% Extra-local effects on total	% Extra-local effects	% GDP (2007)	Diff. % GDP
Rural	63.5	32.4	0.45	26.3	15.8	16.9	0.26
Intermediate	63.9	32.6	0.63	48.9	29.5	31.6	0.02
Urban	68.8	35.1	2.05	84.3	54.7	51.6	-0.28
Convergence	49.7	25.3	0.52	38.5	18.0	14.8	0.18
Competitiviness	146.5	74.7	0.81	59.3	82.0	85.2	-0.18
Total	196.2	100.0	0.71	54.0	100.0	100.0	0.00

Source: own elaborations

Table 4.4 – Effects in terms of employment produced by 2007-2011 CAP Payments per regional group

Groups	Effects (mio units)	%	Effects / Payments (units per mio €)	% Extra-local effects on total	% Extra-local effects	% Units (2007)	Diff. % units
Rural	1.8	39.8	13.1	24.6	21.5	21.7	0.37
Intermediate	1.6	34.0	15.5	43.6	32.6	34.6	-0.01
Urban	1.2	26.2	36.3	79.6	45.9	43.8	-0.36
Convergence	1.8	38.7	18.9	34.8	29.7	24.5	0.29
Competitiviness	2.8	61.3	15.7	52.2	70.3	75.5	-0.29
Total	4.6	100.0	16.8	45.4	100.0	100.0	0.00

Source: own elaborations

Several considerations made for GDP are confirmed. Firstly, about a half of employment effects are extra-local. Secondly, urban and competitiveness regions absorb most spillover effects. Finally, the former are those which relatively benefit more from the CAP while the latter concentrate most effects due to a higher concentration of funds in these regions. There are however specific results. One is that most effects concentrate on rural and intermediate regions (74%) rather than being distributed uniformly. Moreover, convergence regions benefit relatively more from the CAP: per each million € of expenditure, the potential stimulus to employment amounts to about 19 labour units, against 16 labour units in competitiveness regions. Finally, looking at ex-ante and ex-post situations, stronger reduction in differences among regions can be observed. These more positive results in terms of employment can be justified by higher employment multipliers (and so lower employment productivity) that characterise less developed regions. More simply, to produce the same output, less developed regions needs to employ more labour units. This explains wider effects in terms of employment.

Expenditure and effects can be also analysed by pillar. Considerations made on the whole CAP expenditure are mostly valid also at the pillar level. One of the main differences is that, in the case of the first pillar, distribution of funds is more unbalanced in favour of more developed regions (Table 4.2). In particular, the share of funds to competiveness regions is 67% against 60% in the case of second pillar.

A further difference, which is also a consequence of fund allocation, is that the distribution of GDP effects related to first pillar is more evidently in favour of urban and competiveness regions (Table 4.5). On the contrary, effects of second pillar concentrate more clearly on convergence regions but also on rural regions, which however maintain their less important position in comparison with competitiveness regions. Importantly, relative policy effects generated by second pillar are more intense than those associated with the first one. For instance, in the case of first pillar, 70% of expenditure is converted into GDP while rural development is able to generate a higher share, equivalent to 77% of policy funds. The reason for this can be found in the

features of rural development policy, which gives funds to wider and more diversified investments involving a plurality of operators and activities. Also in terms of employment, urban and competitiveness regions receive more benefits from first pillar while rural and convergence regions are favoured to a larger extent by the second one, which, in addition, reveals to be more effective with about 22 labour units produced by every € million against 15 labour units generated by first pillar (Table 4.6).

Table 4.5 – Effects in terms of GDP produced by Pillars of 2007-2011 CAP Payments per regional group

Groups	Effects (billion €)	%	Effects / Payments	% Extra-local effects on total	% Extra-local effects
First Pillar					
Rural	45.9	31.5	0.44	26.7	15.6
Intermediate	48.2	33.1	0.61	47.9	29.5
Urban	51.5	35.3	1.95	83.6	54.9
Convergence	34.7	23.8	0.50	39.9	17.7
Competitiviness	110.9	76.2	0.78	58.2	82.3
Total	145.6	100.0	0.69	53.8	100.0
Second Pillar					
Rural	17.6	34.8	0.49	25.5	16.2
Intermediate	15.7	31.0	0.70	52.2	29.6
Urban	17.3	34.3	2.45	86.3	54.2
Convergence	15.0	29.6	0.57	35.2	19.1
Competitiviness	35.6	70.4	0.91	62.8	80.9
Total	50.6	100.0	0.77	54.6	100.0

Source: own elaborations

I-O methodology has also the advantage of allowing an analysis of sectoral distribution of effects. Table 4.7 shows this distribution with reference to local effects, which are the sum of internal and interregional feedback effects. An evident result is that most effects tend to concentrate in the tertiary sectors, in particular, in the sector PUB. In front of a share of expenditure, which is about 10%, the captured GDP effects by this sector amount to over 70%, while the employment share is even higher reaching about 85%. A further sector that benefits from policy to a significant extent is BUS. In this case, starting from a share of expenditure equalling 16%, the effects absorbed amount to 26% in terms of GDP and 11% with reference to employment. These two sectors, to which we could also add the sector COM, although with much lower GDP and employment shares, capture 98% of total effects. Residual effects concentrate in sectors IND, COS and finally AGR, in spite of an aggregated share of expenditure that is little lower than 48%. The ratios between shares of effects and expenditure highlight this significant process of redistribution. As can be seen, allocation of 1% of total expenditure to the PUB sector generates an increase, in the same sector, which is 7% of total GDP and 9% of total employment while the same share of expenditure allocated to the AGR sector only produces an increase that is 0.009% of total GDP and 0.026% of total employment. However, from calculation of ratios some aspects deserve

to be mentioned. Firstly, the construction sector presents an index of absorption that is higher than that of the COM sector. Therefore, in relative terms, the sectors that capture most effects are PUB, BUS and COS. Secondly, the distance between the PUB sector and all the others is by far more marked.

The same pattern of sectoral distribution can be observed also at a regional level.

These results in terms of sectoral distribution depend particularly on higher average multipliers and linkages that characterise tertiary sectors in comparison with primary and secondary sectors. They are also a consequence of the inclusion of induced effects, through the endogenization in the model of the household sector whose expenditure is largely oriented to the purchase of services (especially education, health and other personal services, falling within the PUB sector). Despite possible "artificial" effects induced by the assumptions underlying the model and the high level of aggregation imposed by data availability, the lesson that can be drawn from this analysis is that the intensity of linkages among productive sectors and between the latter and the institutional ones, as well as the different level of development associated to sectors can lead to (re-)distributive effects that significantly differ from the initial policy expectations and allocation.

Table 4.6 – Effects in terms of employment produced by Pillars of 2007-2011 CAP Payments per regional group

Groups	Effects (mio units)	%	Effects / Payments (units per mio €)	% Extra-local effects on total	% Extra-local effects
First Pillar					
Rural	1.2	37.9	11.6	26.8	21.2
Intermediate	1.1	34.5	14.0	44.9	32.5
Urban	0.9	27.6	33.6	80.2	46.3
Convergence	1.2	36.0	16.8	38.6	29.0
Competitiviness	2.1	64.0	14.6	52.9	71.0
Total	3.2	100.0	15.3	47.8	100.0
Second Pillar					
Rural	0.6	44.1	17.5	20.3	22.3
Intermediate	0.5	32.7	20.7	40.3	32.8
Urban	0.3	23.2	46.6	77.8	44.9
Convergence	0.6	45.0	24.4	28.0	31.3
Competitiviness	0.8	55.0	20.0	50.2	68.7
Total	1.4	100.0	21.7	40.2	100.0

Source: own elaborations

It is also interesting to map these policy effects and, in particular, the spillover effects. Figure 4.3 shows territorial distribution of these effects in terms of GDP for the period 2007-2011, while Figure 4.4 reports the same distribution with reference to employment. Spillover effects are divided by local effects and multiplied by 100, obtaining a ratio that expresses the importance of interregional effects in relation to

those generated by local expenditure. The higher this ratio, the higher the relative benefits produced by interregional relationships, the lower the need to receive public subsidies. Therefore the territorial map of this ratio could help policy makers to localise where additional and unexpected effects are produced and thus reallocate funds among regions in relation to policy objectives.

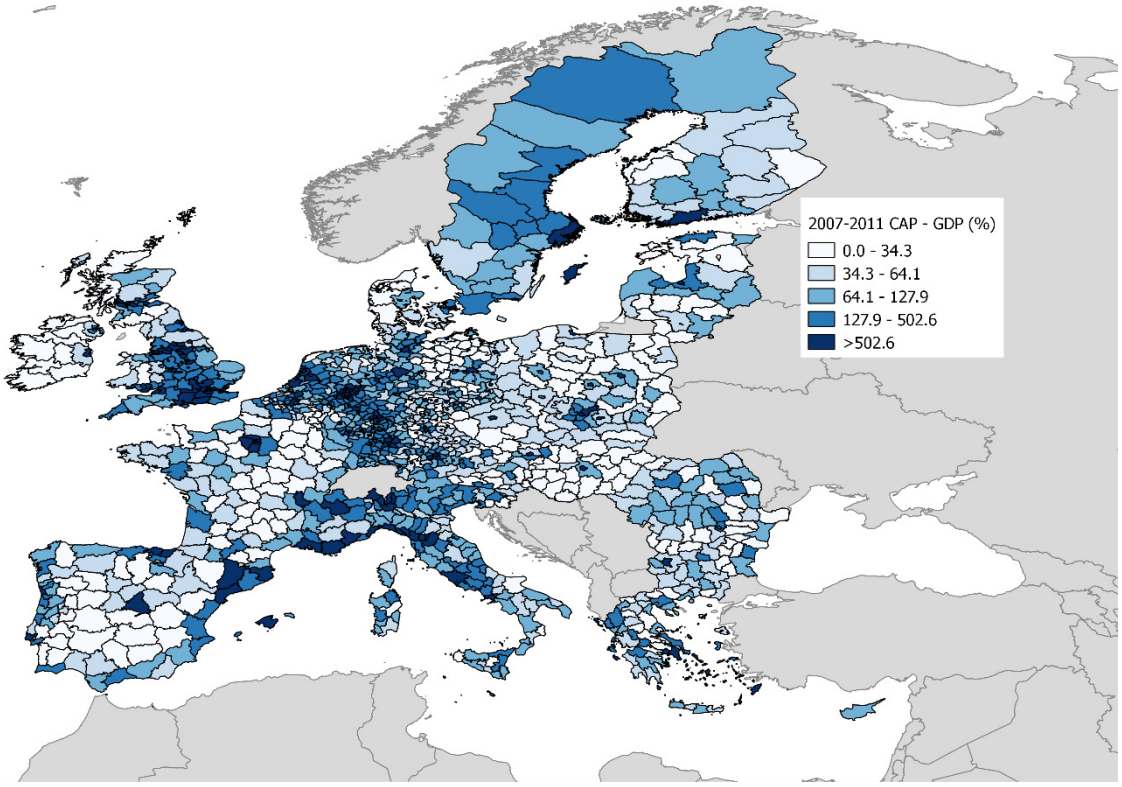
Table 4.7 – Sectoral effects at a local level produced by 2007-2011 CAP Payments per regional group

Sectors	Degree of rurality			Objective		Total
	Rural	Intermediate	Urban	Convergence	Competitiviness	
AGR						
% EXP (a)	12.1	12.0	15.5	14.6	11.3	12.5
% GDP (b)	0.13	0.10	0.07	0.16	0.09	0.11
% EMP (c)	0.37	0.29	0.18	0.35	0.30	0.32
(b/a)	0.011	0.008	0.005	0.011	0.008	0.009
(c/a)	0.031	0.024	0.012	0.024	0.027	0.026
IND						
% EXP (a)	34.5	33.1	29.2	30.6	34.8	33.3
% GDP (b)	0.85	0.98	1.16	0.95	0.93	0.93
% EMP (c)	0.97	1.12	1.15	1.12	0.97	1.04
(b/a)	0.025	0.030	0.040	0.031	0.027	0.028
(c/a)	0.028	0.034	0.039	0.037	0.028	0.031
COS						
% EXP (a)	2.0	1.8	1.5	2.5	1.6	1.9
% GDP (b)	0.48	0.46	0.60	0.56	0.45	0.49
% EMP (c)	0.57	0.58	0.73	0.70	0.50	0.59
(b/a)	0.237	0.248	0.393	0.225	0.283	0.256
(c/a)	0.283	0.316	0.479	0.281	0.316	0.312
COM						
% EXP (a)	25.5	25.2	24.7	28.0	23.9	25.3
% GDP (b)	1.41	1.62	2.60	1.91	1.48	1.62
% EMP (c)	2.01	2.35	2.94	2.49	1.99	2.22
(b/a)	0.055	0.064	0.105	0.068	0.062	0.064
(c/a)	0.079	0.093	0.119	0.089	0.083	0.088
BUS						
% EXP (a)	15.8	18.2	20.6	14.4	18.7	17.2
% GDP (b)	24.29	25.93	34.12	30.03	24.03	26.06
% EMP (c)	10.39	11.26	17.08	12.15	10.67	11.36
(b/a)	1.541	1.428	1.654	2.091	1.282	1.512
(c/a)	0.659	0.620	0.828	0.846	0.569	0.659
PUB						
% EXP (a)	10.2	9.6	8.5	10.0	9.6	9.7
% GDP (b)	72.85	70.91	61.44	66.40	73.03	70.78
% EMP (c)	85.69	84.39	77.91	83.20	85.56	84.47
(b/a)	7.175	7.407	7.241	6.672	7.588	7.269
(c/a)	8.439	8.814	9.182	8.359	8.891	8.675

Source: own elaborations

As can be noticed, regions with higher ratios spillover-local effects tend to be concentrated in the Western Europe, particularly South England, The Netherlands, Belgium, Western Germany, Southern France, Southern Spain and Central-Northern Italy. This distribution is consistent with that of regional forward linkages indices. This is widely expected since regions with higher spillover effects should be generally more developed economies providing inputs to less self-sufficient and thus less developed regions, or rather those having higher forward linkages.[13]

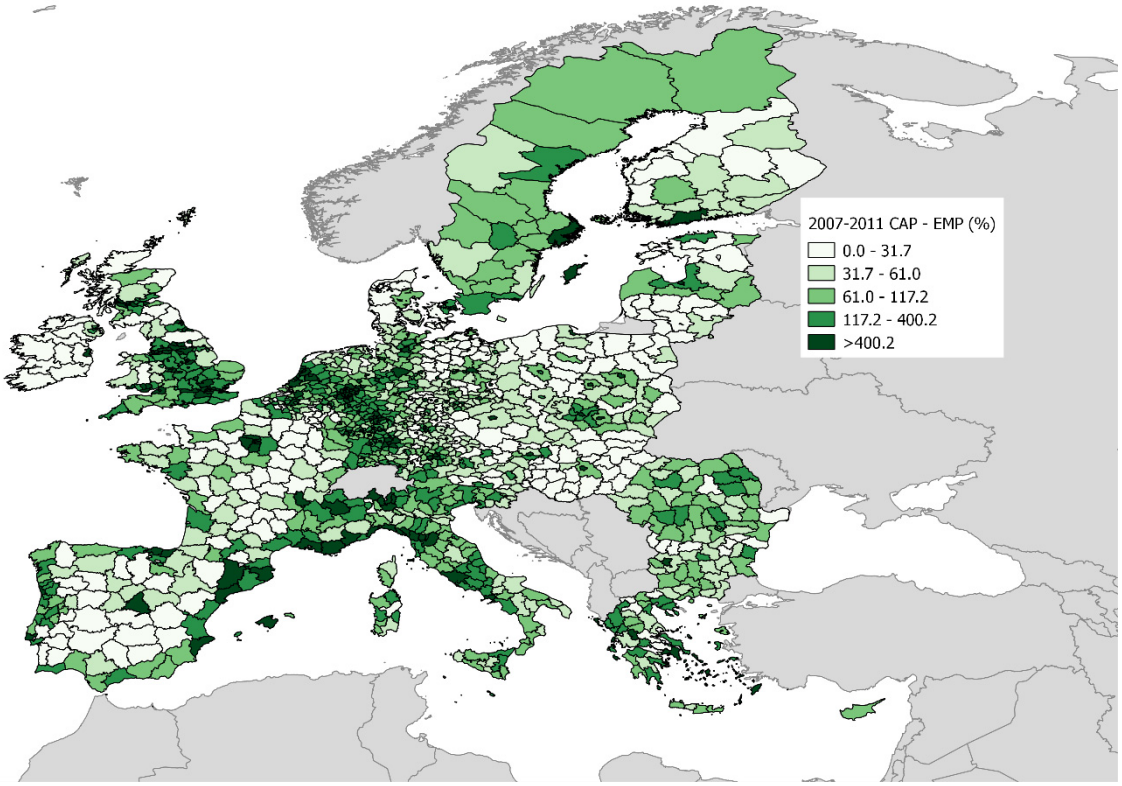
Figure 4.3 – Territorial distribution of ratios spillover-local effects in terms of GDP produced by 2007-2011 CAP Payments



Source: own elaborations

[13] The Pearson's correlation coefficient calculated on two sets of regional data, represented by spillover-local effects ratios and forward linkages indices, respectively, is positive but quite small (around 0.10). It therefore confirms the existence of a positive but weak relationship between the two variables. This depends on the fact that spillover-local effects ratios is not only affected by the intensity of forward linkages but also by localisation and distribution of expenditure. In fact, a given region may benefit from higher spillover effects than another region that has higher forward linkages but is surrounded by less dependent regions and/or regions that receive lower policy funds and thus need lower imports to satisfy final demand increases.

Figure 4.4 – Territorial distribution of ratios spillover-local effects in terms of employment produced by 2007-2011 CAP Payments



Source: own elaborations

4.3 Results under the alternative policy scenarios

In this section, we analyse the same distributional consequences across European regions under the alternative policy scenarios related to the 2014-2020 CAP reform. As regards expenditure, its relative distribution among regions varies according to the scenario considered (see Tables A.1.1, A.1.2 and A.1.3 in the appendix). However, differences are not particularly marked. This is also true if we compare radical scenario, consisting in transferring all funds to second pillar, with those modelling direct payments. What can be noticed is that a radical scenario would favour convergence regions to a larger extent.

Comparing scenarios based on alternative assumptions about direct payments, it results that rural and convergence regions are favoured by distribution criteria based on eligible hectares and, secondarily, on historical payments, while they are penalised by a criterion based on agricultural value added. This criterion, in fact, favours urban and competitiveness regions, to an extent that depends on the share assigned to basic payments: a higher share brings about higher funds to those regions.

Figure 4.5 shows how regional distribution of expenditure changes in correspondence with alternative hypotheses. Scenarios assuming the application of criteria based on

eligible hectares (a.1) and historical payments (a.3, b.3) bring about a more intense redistribution of funds towards Eastern European regions. This is true also in the case of a radical scenario. On the contrary, a criterion based on agricultural value added (a.2, b.2) generates more concentration.

In comparison with past policy framework[14], policy effectiveness associated with alternative scenarios and measured as a ratio between effects and expenditure is slightly higher in terms of both GDP and employment (Tables 4.8 and 4.9). Under scenarios based on different assumptions about direct payments we have an increase of 1-5 € per every 100 € of expenditure in relation to GDP and a positive variation regarding employment of 3.4-4.6 labour units per € million. In the case of a radical policy change, meaning the transfer of all funds to rural development policy, this increase would be more marked registering a variation of 16 € about GDP and an increase of 7.6 labour units.

The differences in terms of policy effects between scenarios based on alternative assumptions about direct payments are very small. This means that the criteria of regional distribution that will be adopted at a national level are not going to affect significantly final policy effects. More marked differences can be observed comparing a scenario based on the use of agricultural value added with the others. If Member States decide to distribute direct payments on the basis of value added, policy effects will be smaller as well as the effects in terms of reduction of regional disparities, measured by the coefficient of variation. Criteria based on agricultural area and historical situations instead produce higher effects and a more balanced distribution of GDP and employment. The reason is that regions with higher agricultural value added are also those that are more developed and thus less dependent on the other regions (lower interregional effects) and with lower growth multipliers.

Comparing the historical with the area-based criterion, it results that the latter would generate slightly higher policy effects in terms of balancing differences. This is because a criteria based on agricultural area would also favour regions that historically received a lower amount of money, so enlarging the set of beneficiaries and spatial relationships.

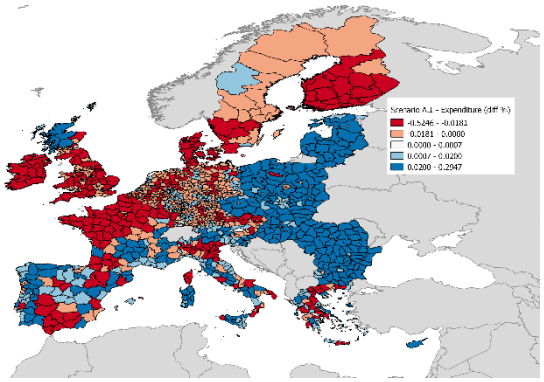
As it is logical to expect, the attribution of a higher percentage of funds to basic payments renders these effects and the differences observed more marked.

Definitively, if the primary objective at a European level is to reduce regional disparities (also producing significant effects), MSs should adopt a criterion based on eligible hectares rather than value added or historical payments. However, if they decide to adopt one of the two last criteria mentioned, then a historical distribution is to be preferred. Moreover, in this case, they should dedicate a share of national ceilings to basic payments lower than the upper limit.

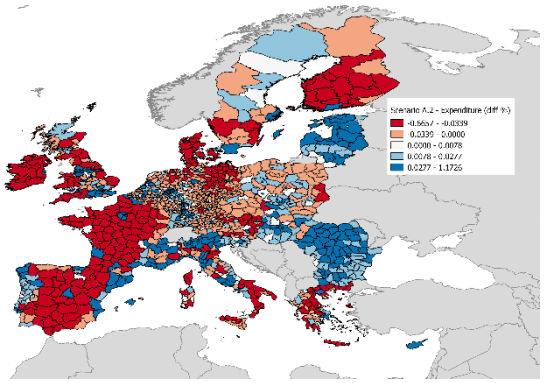
[14] It has to be reminded that any comparison with past policy framework cannot be considered conclusive since data about past policy framework concern payments, rather than allocations used in alternative and future scenarios, and are not complete since they refer to a limited period, i.e. 2007-2011.

Figure 4.5 – Territorial distribution of regional expenditure shares associated with alternative 2014-2020 CAP policy scenarios. Differences in comparison with 2007-2011 CAP shares

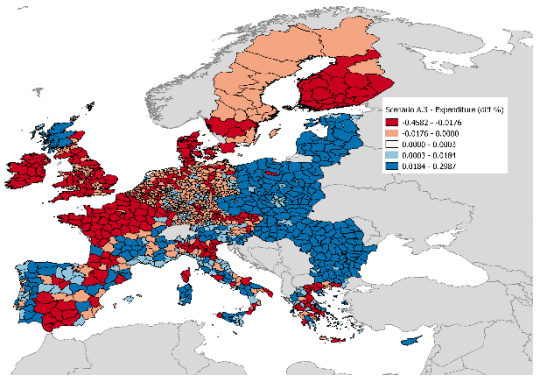
Scenario A.1



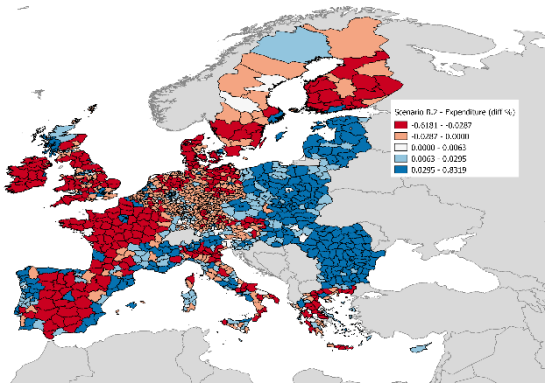
Scenario A.2



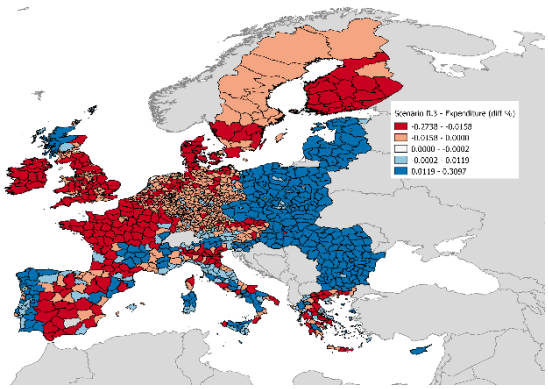
Scenario A.3



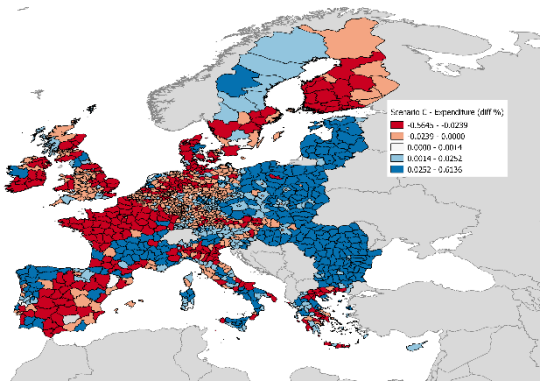
Scenario B.2



Scenario B.3



Scenario C



Scenario A: 18% to basic payments; Scenario B: 68% to basic payments. Scenario 1: UAA; Scenario 2: VA; Scenario 3: historical; Scenario C: all funds to rural development policy

Source: own elaborations

Table 4.8 - Effects in terms of GDP produced by 2014-2020 CAP per scenario

Scenario	Effects / Expenditure (€)	% Extra-local effects	CV*
Scenario (a)			
(18% of basic payments)			
Scenario 1 (UAA)	0.76	53.85	1.6338
Scenario 2 (VA)	0.75	53.70	1.6354
Scenario 3 (Historical)	0.76	53.83	1.6339
Scenario (b)			
(68% of basic payments)			
Scenario 1 (UAA)	0.76	53.85	1.6338
Scenario 2 (VA)	0.72	53.25	1.6399
Scenario 3 (Historical)	0.76	53.80	1.6341
Scenario (c) (First to Second Pillar)	0.87	53.87	1.6323

*Coefficient of variation calculated as a ratio between standard deviation and average of regional GDP/employment (2007 GDP/employment plus effects produced by scenarios)

Source: own elaborations

Table 4.9 - Effects in terms of employment produced by 2014-2020 CAP per scenario

Scenario	Effects / Expenditure (units per mio €)	% Extra-local effects	CV*
Scenario (a)			
(18% of basic payments)			
Scenario 1 (UAA)	21.45	39.72	1.2902
Scenario 2 (VA)	21.13	39.65	1.2922
Scenario 3 (Historical)	21.45	39.72	1.2903
Scenario (b)			
(68% of basic payments)			
Scenario 1 (UAA)	21.45	39.72	1.2902
Scenario 2 (VA)	20.22	39.44	1.2980
Scenario 3 (Historical)	21.43	39.73	1.2907
Scenario (c) (First to Second Pillar)	24.43	39.85	1.2886

*Coefficient of variation calculated as a ratio between standard deviation and average of regional GDP/employment (2007 GDP/employment plus effects produced by scenarios)

Source: own elaborations

On the contrary, a deep change of the CAP would have effects that are more significant. The dismantlement of pillars and the transfer of all funds to rural development policy would increase policy effectiveness. Moreover, there would be higher and positive effects on reduction of regional disparities.

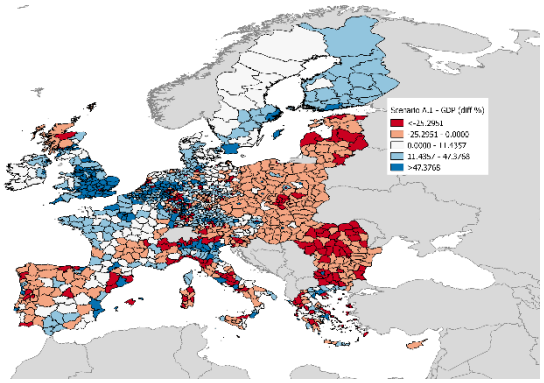
The intensity of spillover effects in relation to total effects does not change significantly in the different scenarios in comparison with the past policy framework. However, we can note lower shares associated with all alternative scenarios, which are more marked in the case of employment. This means that policy effects are more due to local expenditure and thus to internal linkages than interregional relationships. A reason could be a more spread distribution of funds. This brings about an increase in total effects and a consequent reduction in the share of extra-local effects.

Figures 4.6 and 4.7 show territorial distribution of percentage differences between spillover effects in relation to local effects, calculated under alternative scenarios, and those associated with the past policy framework (the baseline). As can be noticed, all scenarios lead to a reinforcement of spillover effects in the Western European regions having already high relative effects. This is particularly evident in scenarios allocating direct payments on the basis of agricultural value added. In Eastern Europe, we note a decrease in this ratio that is more marked in scenarios based on the use of eligible hectares and historical payments to distribute funds.

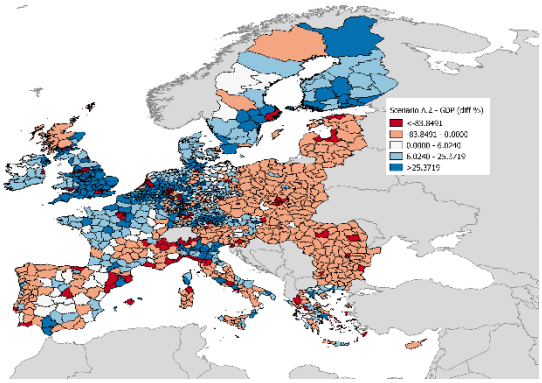
The analysis can be decomposed by pillar (Tables 4.10, 4.11, 4.12, 4.13). Observations made at a general level are confirmed since scenarios based on direct payments do not affect distribution of rural development policy. As already seen with regard to past policy framework, rural development policy is more effective than first pillar and is able to reduce disparities to a higher extent. An interesting result is that in the case of a radical change, policy effectiveness would be lower than in the other scenarios, focusing only on the second pillar. This is because, under the extreme scenario, all available resources in terms of direct payments, market measures and rural development policy would go to regions in the form of single policy. This implies that countries (and so regions) with higher allocation of funds, which correspond to the most developed ones, would receive more resources. Being more developed, they are less dependent commercially and show lower margins of growth. The consequence is that policy effects are more attenuated. However, the contribution to reduction of regional differences is more marked since less developed regions would receive more funds for development.

Figure 4.6 – Territorial distribution of ratios spillover-local effects in terms of GDP produced by alternative 2014-2020 CAP policy scenarios. Differences in comparison with 2007-2011 CAP ratios

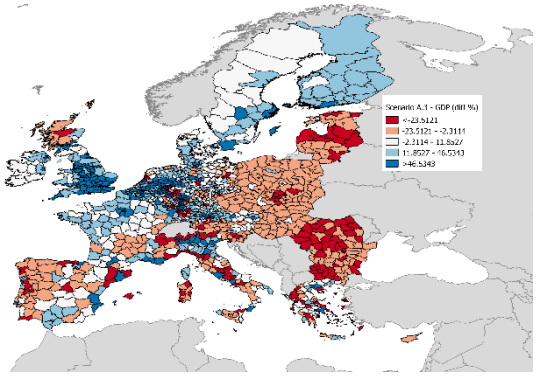
Scenario A.1



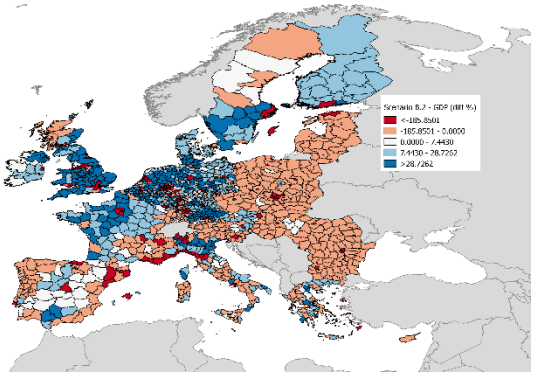
Scenario A.2



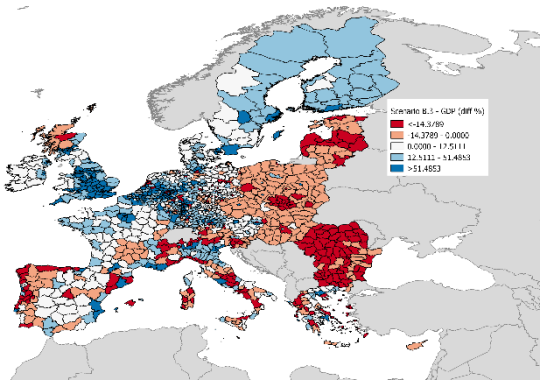
Scenario A.3



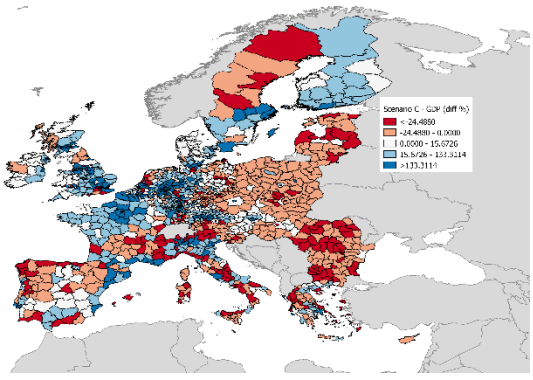
Scenario B.2



Scenario B.3



Scenario C

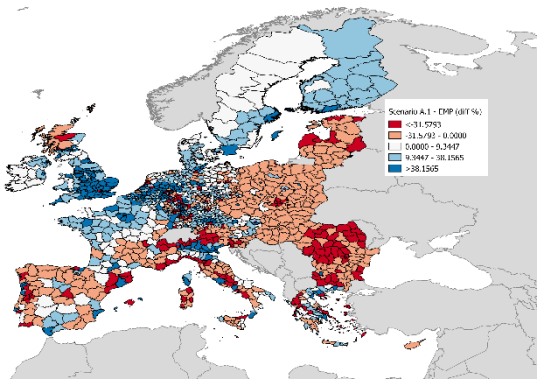


Scenario A: 18% to basic payments; Scenario B: 68% to basic payments. Scenario 1: UAA; Scenario 2: VA; Scenario 3: historical; Scenario C: all funds to rural development policy

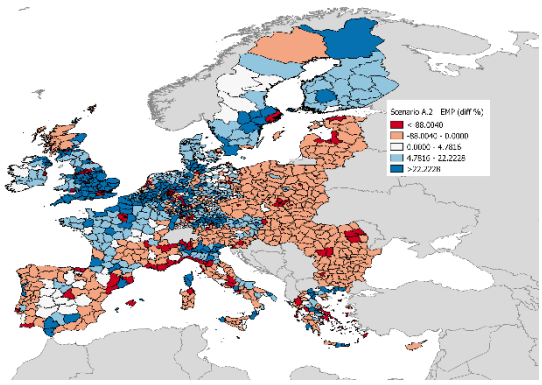
Source: own elaborations

Figure 4.7 – Territorial distribution of ratios spillover-local effects in terms of employment produced by alternative 2014-2020 CAP policy scenarios. Differences in comparison with 2007-2001 CAP ratios

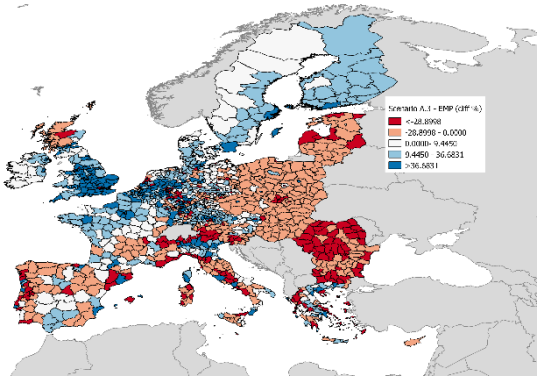
Scenario A.1



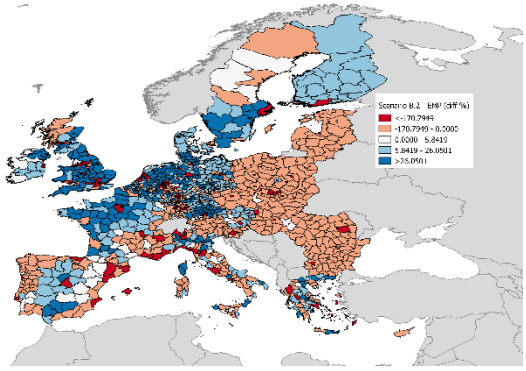
Scenario A.2



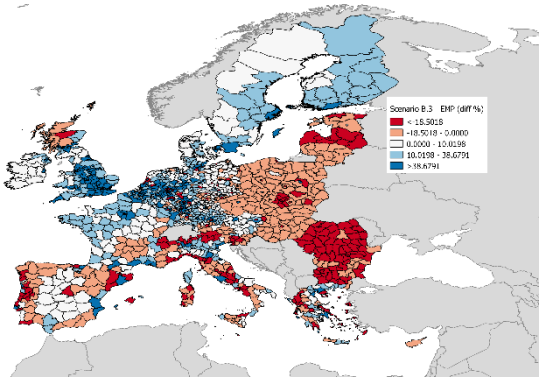
Scenario A.3



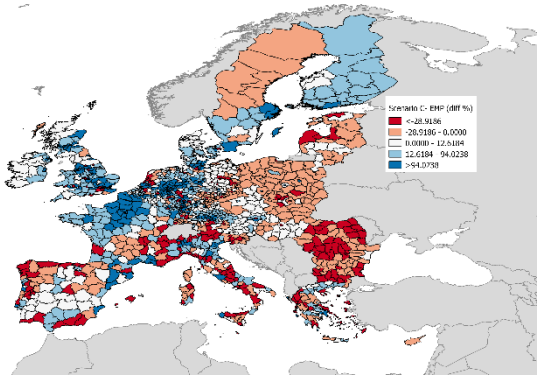
Scenario B.2



Scenario B.3



Scenario C



Scenario A: 18% to basic payments; Scenario B: 68% to basic payments. Scenario 1: UAA; Scenario 2: VA; Scenario 3: historical; Scenario C: all funds to rural development policy

Source: own elaborations

Table 4.10 - Effects in terms of GDP produced by first pillar of 2014-2020 CAP per scenario

Scenario	Effects / Expenditure (€)	% Extra-local effects	CV*
Scenario (a)			
(18% of basic payments)			
Scenario 1 (UAA)	0.69	54.22	1.6455
Scenario 2 (VA)	0.67	53.96	1.6472
Scenario 3 (Historical)	0.69	54.19	1.6456
Scenario (b)			
(68% of basic payments)			
Scenario 1 (UAA)	0.69	54.22	1.6455
Scenario 2 (VA)	0.63	53.16	1.6518
Scenario 3 (Historical)	0.69	54.13	1.6459

*Coefficient of variation calculated as a ratio between standard deviation and average of regional GDP/employment (2007 GDP/employment plus effects produced by scenarios)

Source: own elaborations

Table 4.11 - Effects in terms of employment produced by first pillar of 2014-2020 CAP per scenario

Scenario	Effects / Expenditure (units per € million)	% Extra-local effects	CV*
Scenario (a)			
(18% of basic payments)			
Scenario 1 (UAA)	18.11	42.22	1.3036
Scenario 2 (VA)	17.58	42.16	1.3058
Scenario 3 (Historical)	18.10	42.23	1.3038
Scenario (b)			
(68% of basic payments)			
Scenario 1 (UAA)	18.11	42.22	1.3036
Scenario 2 (VA)	16.13	41.97	1.3118
Scenario 3 (Historical)	18.07	42.24	1.3042

*Coefficient of variation at a regional level calculated as a ratio between standard deviation and average of regional GDP/employment (2007 GDP/employment plus effects produced by scenarios)

Source: own elaborations

Table 4.12 - Effects in terms of GDP produced by second pillar of 2014-2020 CAP per scenario

Scenario	Effects / Expenditure (€)	% Extra-local effects	CV*
Scenario (a) (18% of basic payments)	0.875	53.36	1.6465
Scenario (b) (68% of basic payments)	0.875	53.36	1.6465
Scenario (c) (First to Second Pillar)	0.868	53.87	1.6323

**Coefficient of variation at a regional level calculated as a ratio between standard deviation and average of regional GDP/employment (2007 GDP/employment plus effects produced by scenarios)

Source: own elaborations

Table 4.13 - Effects in terms of employment produced by second pillar of 2014-2020 CAP per scenario

Scenario	Effects / Expenditure (units per mio €)	% Extra-local effects	CV*
Scenario (a) (18% of basic payments)	27.059	36.93	1.3045
Scenario (b) (68% of basic payments)	27.059	36.93	1.3045
Scenario (c) (First to Second Pillar)	24.425	39.85	1.2886

*Coefficient of variation at a regional level calculated as a ratio between standard deviation and average of regional GDP/employment (2007 GDP/employment plus effects produced by scenarios)

Source: own elaborations

An analysis carried out per regional group reveals that rural regions are favoured in terms of both GDP and employment by scenarios based on direct payments calculated using agricultural area and, secondarily, historical criteria (see sections A.2 and A.3 in appendix). In fact, the application of a criterion based on eligible hectare generates, compared with the past policy framework, an increase of 1.8 and 3.9% in the proportions of GDP and employment effects captured by rural regions, respectively. This makes so that the share of absorbed GDP effects becomes slightly higher than that relevant to urban regions.

The historical criterion, in the hypothesis of the lowest share of funds to basic payments, produces increases of 1.7 and 3.8% about GDP and employment, respectively. These increases are evidently lower in the case of higher shares to basic payments passing to 1.5 and 3.5% since the share distributed on the basis of agricultural area is lower.

In the case of distribution of direct payments based on agricultural value added, rural regions continue to be favoured registering a share of GDP and employment effects that are, respectively, 0.8 and 2.7% higher than those registered in the past policy. However, this is true only in the case where only 18% of funds are devoted to basic payments. In fact, in cases where the highest share of funds is apportioned to basic

payments, we note that rural regions are penalised while urban regions receive higher relative benefits consisting in increases of 3% in terms of GDP and 0.4% with reference to employment. The reason is that among urban regions there are realities where more industrialised and rich agriculture localise. These regions would therefore be favoured by distribution based on value added. Under this scenario, the contribution to reduction of regional disparities is therefore lower.

A further and interesting result is that convergence regions are favoured by all scenarios about direct payments. It thus results that competitiveness regions are always penalised. This is less evident under the hypothesis of a distribution of direct payments based on value added.

A drastic reformulation of policy in direction to rural development would favour rural regions to levels that are included between those extreme produced by scenarios based on direct payments. In fact, rural regions would see their GDP and employment effects increase by 1.4 and 3.1%, respectively. Convergence regions, on the contrary, would be favoured to a larger extent, concentrating effects that are 4.5 and 2.6% higher than those registered under the past policy framework, relevant to GDP and employment, respectively. Moreover, a radical scenario would provide higher contribution to reduction of differences both between rural and urban regions and between convergence and competitiveness regions.

From a sectoral point of view, the general considerations made for the past policy framework remain valid. In particular, in spite of uniform distribution of expenditure between, on the one hand, primary and secondary sectors, and on the other hand, tertiary sectors, in all scenarios, the latter capture about 98% of GDP and employment effects (Table 4.14). Therefore, there is a strong redistribution of effects from primary and secondary sectors to those producing services, especially the PUB sector. This process of redistribution is slightly more marked in the case of a radical scenario.

Focusing on agriculture, the scenario, which would attribute resources to this sector to a larger extent, is the one based on higher share of basic payments distributed using historical criteria (+0.8%). Other scenarios that favour agriculture, though to a limited extent, are the one based on agricultural area and the radical scenario. On the contrary, a scenario based on value added and on the largest share to basic payments would penalise agriculture with a decrease of 3.4% since, in this case, funds would come to more developed regions where consumption and investment preferences are more oriented to sectors other than agriculture. In terms of distribution of effects, once again the scenario based on historical payments overcomes the others, producing the largest increase in the sectoral share with reference to both GDP and employment.

Table 4.14 – Sectoral effects at local level produced by alternative policy scenarios

Sectors	Scenario (a) (18% of basic payments)			Scenario (b) (68% of basic payments)		Scenario (c) (First to Second Pillar)
	A1	A2	A3	B2	B3	
AGR						
% EXP (a)	12.2	11.8	12.1	10.9	12.1	12.6
% GDP (b)	0.13	0.13	0.13	0.12	0.13	0.13
% EMP (c)	0.45	0.45	0.45	0.43	0.45	0.46
(b/a)	0.011	0.011	0.011	0.011	0.011	0.010
(c/a)	0.037	0.038	0.037	0.039	0.037	0.036
IND						
% EXP (a)	37.1	36.7	37.1	35.7	37.1	43.2
% GDP (b)	1.03	1.04	1.03	1.08	1.04	1.00
% EMP (c)	1.24	1.25	1.24	1.26	1.25	1.22
(b/a)	0.028	0.028	0.028	0.030	0.028	0.023
(c/a)	0.034	0.034	0.034	0.035	0.034	0.028
COS						
% EXP (a)	1.4	1.4	1.4	1.3	1.4	2.0
% GDP (b)	0.48	0.48	0.48	0.49	0.48	0.46
% EMP (c)	0.57	0.57	0.57	0.57	0.57	0.55
(b/a)	0.350	0.354	0.350	0.367	0.352	0.237
(c/a)	0.418	0.422	0.419	0.432	0.420	0.282
COM						
% EXP (a)	24.3	24.6	24.3	25.3	24.3	19.1
% GDP (b)	1.74	1.79	1.74	1.91	1.75	1.72
% EMP (c)	2.29	2.31	2.29	2.37	2.30	2.24
(b/a)	0.072	0.073	0.072	0.076	0.072	0.090
(c/a)	0.094	0.094	0.094	0.094	0.095	0.117
BUS						
% EXP (a)	16.0	16.5	16.0	18.0	16.0	15.9
% GDP (b)	23.70	23.45	23.69	22.73	23.67	21.74
% EMP (c)	9.08	9.00	9.08	8.76	9.09	8.34
(b/a)	1.486	1.422	1.484	1.263	1.479	1.364
(c/a)	0.569	0.545	0.569	0.487	0.568	0.523
PUB						
% EXP (a)	9.1	9.0	9.1	8.8	9.1	7.2
% GDP (b)	72.92	73.11	72.92	73.66	72.92	74.95
% EMP (c)	86.36	86.42	86.36	86.60	86.34	87.19
(b/a)	7.987	8.081	7.995	8.355	8.016	10.396
(c/a)	9.460	9.553	9.468	9.822	9.491	12.094

Source: own elaborations

5. Concluding remarks

This paper analyses the economy-wide effects, in terms of GDP and employment, induced, at the European level, by the 2007-2011 CAP payments and by the possible future scenarios concerning the next programming period (2014-2020). A multiregional closed I-O approach applied at a NUTS-3 level is adopted. Particular attention focuses on the (re-)distributive effects produced by spatial and sectoral relationships. In defining regional policy, the knowledge of spillover effects (i.e. benefits for regions that export goods and services to regions directly involved by policy), is particularly strategic in that it can assist policy makers in better calibrating allocation of funds among regions and evaluating distribution of final policy effects more correctly. With reference to the next programming period, three main scenarios are analysed. Two are based on different and extreme shares of funds apportioned to basic payments. They are in turn divided into sub-scenarios based on three different criteria of regional distribution of funds devoted to basic payments: utilized agricultural area, agricultural value added and historical payments. A third scenario assumes the suppression of the actual framework based on two pillars and the transfer of all available funds to rural development policy.

From a methodological point of view, this analysis relies on well-known assumptions of I-O methodology, which should be taken into account in interpreting results. In spite of possible and resulting limitations, this study introduces several novelties. First of all, it represents, to our best knowledge, the first attempt to develop an I-O model at this high level of regional disaggregation and, thus, implying a great statistical and computational effort. This model allows both estimation of policy effects and representation of the level of backward and forward integration of NUTS-3 region on the European space. Through the endogenisation of the household sector, relationships between productive and institutional (household) sectors are also modelled allowing the capture of the so-called induced effects, which add to those commonly estimated by I-O models, i.e. direct and indirect effects. The inclusion and the measurement of induced effects also allows the projection of the analysis to a longer time horizon. A further novelty is the construction of a geodesic distance matrix between regions, necessary for the estimation of import flows, which uses coordinates of more populated centres in each region rather than the centre of gravity of the regional polygons as is usually being done. This requires the collection of European population data at an appropriate administrative units level and the identification of geographic coordinates of the most populated centres enquiring online map services through automated algorithms.

From a regional and policy standpoint, some conclusions and recommendations emerge from this study. A first consideration concerns distributive effects associated with policy. Owing to its main finalities and structure, CAP expenditure (both first and second pillar) is mostly allocated to rural regions. Also the new CAP attributes more resources to these regions under any policy scenario. Nevertheless, the analysis shows that distribution of final effects does not follow the same patterns. Surprisingly, in the past policy framework and in most future scenarios, it is urban regions those attracting higher GDP effects. The reason for this relates to (re-)distributive effects induced by the existence of intersectoral and interregional linkages. The need to sustain local production activated by expenditure leads regions to import goods and services from other regions. Imports are generally larger in smaller and less developed regions, while spillover effects tend to be larger in more integrated and developed

regions. This process of redistribution can be clearly ascertained also at a sectoral level. In fact, in spite of an allocation of funds in favour of primary and secondary sectors, final effects are mostly absorbed by tertiary sectors. This depends on their higher average multipliers and linkages. They are also a consequence of the inclusion in the model of the household sector whose expenditure is largely oriented to the purchase of services.

From the comparison of alternative scenarios regarding the next programming period, it turns out that the criteria of regional distribution of funds allocated to basic payments, which will be adopted at a national level, do not affect significantly final policy effects. In any case, the best choice would be a criterion based on eligible hectares, which is the principle on which the new CAP is based, since it produces higher effects and more balanced distribution of GDP and employment among all regions. Moreover, this criterion would be more favourable for rural regions which would be able to capture a higher share of total effects in comparison with past policy framework.

On the contrary, the dismantlement of pillars and the transfer of funds to rural development policy would be more effective leading to higher contribution to reduction in differences between rural and urban regions. These higher and positive effects depend on characteristics of rural development policy, which finances a variety of sectors and activities on the basis of more targeted and tailored objectives than first pillar does.

Finally, redistribution of funds provided by the new CAP in favour of poorer European countries (the so-called process of external convergence) will evidently produce a decrease in the resources attributed to richer regions. This redistribution will be much more marked in the cases where MSs will decide to adopt criteria of internal convergence based on agricultural area rather than historical distributions or agricultural value added. However, the analysis of spillover effects highlighted that the regions penalised by this process will continue benefiting from policy indirectly thanks to their exports to the regions receiving higher shares of funds compared to the past. Moreover, these benefits could be relatively higher since exporting regions are asked to satisfy higher demands coming from less developed regions. In other words, the loss of benefits produced by a reduction in funds could be compensated by an increase in spillover effects. Therefore, the policy decision to redistribute funds not only is fair from an equity point of view but can also produce economic advantages for the regions directly penalised by a fund reallocation.

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Appendix

A.1. 2014-2020 CAP Expenditure per regional group, pillar and scenario

Table A.1.1 – 2014-2020 CAP expenditure distinguished by regional group, pillar and scenario (scenario a)

Groups by scenario	First Pillar			Second Pillar			Total		
	Billion €	%	Per capita €	Billion €	%	Per capita €	Billion €	%	Per capita €
Scenario a (18% of basic payments)									
Scenario a.1 (UAA)									
Rural	164.8	52.9	1406.7	105.2	56.5	897.7	270.0	54.3	2304.3
Intermediate	113.4	36.4	647.1	62.6	33.7	357.4	176.0	35.4	1004.4
Urban	33.1	10.6	165.9	18.3	9.8	91.4	51.4	10.3	257.4
Convergence	106.8	34.3	794.3	86.2	46.3	641.3	193.0	38.8	1435.7
Competitiviness	204.5	65.7	572.0	99.8	53.7	279.2	304.3	61.2	851.1
Total	311.3	100.0	632.7	186.0	100.0	378.1	497.3	100.0	1010.8
Scenario a.2 (VA)									
Rural	147.7	47.4	1260.6	105.2	56.5	897.7	252.8	50.8	2158.3
Intermediate	110.7	35.6	631.9	62.6	33.7	357.4	173.3	34.8	989.2
Urban	52.9	17.0	265.0	18.3	9.8	91.4	71.2	14.3	356.4
Convergence	102.0	32.8	758.8	86.2	46.3	641.3	188.2	37.8	1400.2
Competitiviness	209.3	67.2	585.3	99.8	53.7	279.2	309.1	62.2	864.5
Total	311.3	100.0	632.7	186.0	100.0	378.1	497.3	100.0	1010.8
Scenario a.3 (Historical)									
Rural	163.5	52.5	1395.9	105.2	56.5	897.7	268.7	54.0	2293.6
Intermediate	113.9	36.6	650.4	62.6	33.7	357.4	176.6	35.5	1007.7
Urban	33.8	10.9	169.4	18.3	9.8	91.4	52.1	10.5	260.8
Convergence	107.4	34.5	798.9	86.2	46.3	641.3	193.6	38.9	1440.2
Competitiviness	203.9	65.5	570.3	99.8	53.7	279.2	303.7	61.1	849.4
Total	311.3	100.0	632.7	186.0	100.0	378.1	497.3	100.0	1010.8

Source: own elaborations

Table A.1.2 – 2007-2011 CAP expenditure distinguished by regional group, pillar and scenario (scenario b)

Groups by scenario	First Pillar			Second Pillar			Total		
	Billion €	%	Per capita €	Billion €	%	Per capita €	Billion €	%	Per capita €
Scenario b (68% of basic payments)									
Scenario b.1 (UAA)									
Rural	164.8	52.9	1406.7	105.2	56.5	897.7	270.0	54.3	2304.3
Intermediate	113.4	36.4	647.1	62.6	33.7	357.4	176.0	35.4	1004.4
Urban	33.1	10.6	165.9	18.3	9.8	91.4	51.4	10.3	257.4
Convergence	106.8	34.3	794.3	86.2	46.3	641.3	193.0	38.8	1435.7
Competitiviness	204.5	65.7	572.0	99.8	53.7	279.2	304.3	61.2	851.1
Total	311.3	100.0	632.7	186.0	100.0	378.1	497.3	100.0	1010.8
Scenario b.2 (VA)									
Rural	100.2	32.2	854.9	105.2	56.5	897.7	205.3	41.3	1752.6
Intermediate	103.3	33.2	589.6	62.6	33.7	357.4	165.9	33.4	947.0
Urban	107.8	34.6	540.1	18.3	9.8	91.4	126.1	25.4	631.6
Convergence	88.7	28.5	660.3	86.2	46.3	641.3	174.9	35.2	1301.6
Competitiviness	222.5	71.5	622.4	99.8	53.7	279.2	322.4	64.8	901.5
Total	311.3	100.0	632.7	186.0	100.0	378.1	497.3	100.0	1010.8
Scenario b.3 (Historical)									
Rural	160.0	51.4	1366.0	105.2	56.5	897.7	265.2	53.3	2263.6
Intermediate	115.5	37.1	659.5	62.6	33.7	357.4	178.2	35.8	1016.9
Urban	35.7	11.5	178.9	18.3	9.8	91.4	54.0	10.9	270.3
Convergence	109.1	35.0	811.4	86.2	46.3	641.3	195.3	39.3	1452.7
Competitiviness	202.2	65.0	565.5	99.8	53.7	279.2	302.1	60.7	844.7
Total	311.3	100.0	632.7	186.0	100.0	378.1	497.3	100.0	1010.8

Source: own elaborations

Table A.1.3 – 2007-2011 CAP expenditure distinguished by regional group (scenario c)

Groups	Billion €	%	Per capita €
Rural	266.0	53.5	2270.8
Intermediate	176.7	35.5	1008.6
Urban	54.6	11.0	273.4
Convergence	204.8	41.2	1523.5
Competitiviness	292.5	58.8	818.1
Total	497.3	100.0	1010.8

Source: own elaborations

A.2. GDP Effects produced by 2014-2020 CAP scenarios per regional group

Table A.2.1 - Effects in terms of GDP produced by 2014-2020 CAP per regional group (scenario a)

Groups by scenario	Effects (billion €)	%	Effects / Expenditure	% Extra-local effects on total	% Extra-local effects	Diff. % GDP
Scenario a (18% of basic payments)						
Scenario a.1 (UAA)						
Rural	129.3	34.2	0.48	25.3	16.1	0.56
Intermediate	120.1	31.7	0.68	50.2	29.6	0.01
Urban	128.9	34.1	2.51	85.9	54.3	-0.56
Convergence	108.7	28.7	0.56	35.2	18.8	0.45
Competitiviness	269.5	71.3	0.89	61.3	81.2	-0.45
Total	378.2	100.0	0.76	53.8	100.0	0.00
Scenario a.2 (VA)						
Rural	123.6	33.2	0.49	26.0	16.0	0.52
Intermediate	118.4	31.8	0.68	50.0	29.6	0.01
Urban	130.8	35.1	1.84	83.2	54.4	-0.52
Convergence	106.3	28.5	0.56	35.4	18.8	0.44
Competitiviness	266.4	71.5	0.86	61.0	81.2	-0.44
Total	372.7	100.0	0.75	53.7	100.0	0.00
Scenario a.3 (Historical)						
Rural	129.0	34.1	0.48	25.4	16.1	0.52
Intermediate	120.3	31.8	0.68	50.1	29.6	0.01
Urban	129.0	34.1	2.48	85.8	54.3	-0.52
Convergence	108.8	28.8	0.56	35.2	18.8	0.44
Competitiviness	269.5	71.2	0.89	61.3	81.2	-0.44
Total	378.3	100.0	0.76	53.8	100.0	0.00

Source: own elaborations

Table A.2.2 - Effects in terms of GDP produced by 2014-2020 CAP per regional group (scenario b)

Groups by scenario	Effects (billion €)	%	Effects / Expenditure	% Extra-local effects on total	% Extra-local effects	Diff. % GDP
Scenario b (68% of basic payments)						
Scenario b.1 (UAA)						
Rural	129.3	34.2	0.48	25.3	16.1	0.56
Intermediate	120.1	31.7	0.68	50.2	29.6	0.01
Urban	128.9	34.1	2.51	85.9	54.3	-0.56
Convergence	108.7	28.7	0.56	35.2	18.8	0.45
Competitiviness	269.5	71.3	0.89	61.3	81.2	-0.45
Total	378.2	100.0	0.76	53.8	100.0	0.00
Scenario b.2 (VA)						
Rural	107.8	30.1	0.53	28.3	16.0	0.41
Intermediate	113.6	31.8	0.69	49.6	29.6	0.01
Urban	136.1	38.1	1.08	76.1	54.4	-0.41
Convergence	99.8	27.9	0.57	35.7	18.7	0.40
Competitiviness	257.8	72.1	0.80	60.0	81.3	-0.40
Total	357.5	100.0	0.72	53.2	100.0	0.00
Scenario b.3 (Historical)						
Rural	128.2	33.9	0.48	25.5	16.1	0.41
Intermediate	120.8	31.9	0.68	49.9	29.6	0.01
Urban	129.4	34.2	2.40	85.5	54.3	-0.41
Convergence	109.1	28.8	0.56	35.2	18.8	0.40
Competitiviness	269.3	71.2	0.89	61.3	81.2	-0.40
Total	378.4	100.0	0.76	53.8	100.0	0.00

Source: own elaborations

Table A.2.3 - Effects in terms of GDP produced by 2014-2020 CAP per regional group (scenario c)

Groups by scenario	Effects (billion €)	%	Effects / Expenditure	% Extra-local effects on total	% Extra-local effects	Diff. % GDP
Rural	146.0	33.8	0.55	25.7	16.2	0.62
Intermediate	137.1	31.8	0.78	50.4	29.7	0.01
Urban	148.6	34.4	2.72	84.7	54.1	-0.63
Convergence	128.7	29.8	0.63	34.4	19.1	0.55
Competitiviness	303.1	70.2	1.04	62.1	80.9	-0.55
Total	431.8	100.0	0.87	53.9	100.0	0.00

Source: own elaborations

A.3. GDP Effects produced by 2014-2020 CAP First Pillar scenarios per regional group

Table A.3.1 - Effects in terms of GDP produced by 2014-2020 First Pillar CAP per regional group (scenario a)

Groups by scenario	Effects (billion €)	%	Effects / Expenditure	% Extra-local effects on total	% Extra-local effects	Diff. % GDP
Scenario a (18% of basic payments)						
Scenario a.1 (UAA)						
Rural	71.6	33.2	0.43	25.8	15.8	0.30
Intermediate	69.5	32.3	0.61	49.4	29.4	0.01
Urban	74.4	34.5	2.24	86.0	54.8	-0.32
Convergence	55.2	25.6	0.52	38.2	18.0	0.20
Competitiviness	160.2	74.4	0.78	59.7	82.0	-0.20
Total	215.5	100.0	0.69	54.2	100.0	0.00
Scenario a.2 (VA)						
Rural	65.9	31.4	0.45	27.1	15.8	0.26
Intermediate	67.8	32.3	0.61	49.1	29.4	0.01
Urban	76.3	36.3	1.44	81.4	54.8	-0.28
Convergence	52.9	25.2	0.52	38.6	18.0	0.19
Competitiviness	157.1	74.8	0.75	59.1	82.0	-0.19
Total	210.0	100.0	0.67	54.0	100.0	0.00
Scenario a.3 (Historical)						
Rural	71.3	33.1	0.44	25.9	15.8	0.30
Intermediate	69.7	32.3	0.61	49.3	29.4	0.01
Urban	74.5	34.6	2.20	85.9	54.8	-0.32
Convergence	55.3	25.7	0.52	38.1	18.1	0.20
Competitiviness	160.2	74.3	0.79	59.7	81.9	-0.20
Total	215.5	100.0	0.69	54.2	100.0	0.00

Source: own elaborations

Table A.3.2 - Effects in terms of GDP produced by 2014-2020 First Pillar CAP per regional group (scenario b)

Groups by scenario	Effects (billion €)	%	Effects / Expenditure	% Extra-local effects on total	% Extra-local effects	Diff. % GDP
Scenario b (68% of basic payments)						
Scenario b.1 (UAA)						
Rural	71.6	33.2	0.4	25.8	15.8	0.30
Intermediate	69.5	32.3	0.6	49.4	29.4	0.01
Urban	74.4	34.5	2.2	86.0	54.8	-0.32
Convergence	55.2	25.6	0.5	38.2	18.0	0.20
Competitiviness	160.2	74.4	0.8	59.7	82.0	-0.20
Total	215.5	100.0	0.7	54.2	100.0	0.00
Scenario b.2 (VA)						
Rural	50.1	25.7	0.5	32.4	15.7	0.15
Intermediate	63.1	32.4	0.6	48.2	29.4	0.01
Urban	81.6	41.9	0.8	69.7	55.0	-0.16
Convergence	46.3	23.8	0.5	39.8	17.8	0.15
Competitiviness	148.5	76.2	0.7	57.3	82.2	-0.15
Total	194.8	100.0	0.6	53.2	100.0	0.00
Scenario b.3 (Historical)						
Rural	70.5	32.7	0.4	26.2	15.8	0.29
Intermediate	70.3	32.6	0.6	48.9	29.4	0.02
Urban	74.9	34.7	2.1	85.4	54.8	-0.31
Convergence	55.6	25.8	0.5	38.0	18.1	0.2
Competitiviness	160.0	74.2	0.8	59.7	81.9	-0.2
Total	215.6	100.0	0.7	54.1	100.0	0.0

Source: own elaborations

A.4. GDP Effects produced by 2014-2020 CAP Second Pillar scenarios per regional group

Table A.4.1 - Effects in terms of GDP produced by 2014-2020 Second Pillar CAP per regional group

Groups by scenario	Effects (billion €)	%	Effects / Expenditure	% Extra-local effects on total	% Extra-local effects	Diff. % GDP
Scenarios (a) (b)						
Rural	57.7	35.4	0.5	24.7	16.4	0.26
Intermediate	50.6	31.1	0.8	51.2	29.8	-0.01
Urban	54.5	33.5	3.0	85.7	53.8	-0.26
Convergence	53.5	32.8	0.6	32.2	19.8	0.26
Competitiviness	109.3	67.2	1.1	63.7	80.2	-0.26
Total	162.8	100.0	0.9	53.4	100.0	0.00
Scenario (c)						
Rural	146.0	33.8	0.5	25.7	16.2	0.62
Intermediate	137.1	31.8	0.8	50.4	29.7	0.01
Urban	148.6	34.4	2.7	84.7	54.1	-0.63
Convergence	128.7	29.8	0.6	34.4	19.1	0.55
Competitiviness	303.1	70.2	1.0	62.1	80.9	-0.55
Total	431.8	100.0	0.9	53.9	100.0	0.00

Source: own elaborations

A.5. Employment effects produced by 2014-2020 CAP scenarios per regional group

Table A.5.1 - Effects in terms of employment produced by 2014-2020 CAP per regional group (scenario a)

Groups by scenario	Effects (mio units)	%	Effects / Expenditure (units per € mio)	% Extra-local effects on total	% Extra-local effects	Diff. % emp
Scenario a (18% of basic payments)						
Scenario a.1 (UAA)						
Rural	4.7	43.7	17.3	20.3	22.3	1.01
Intermediate	3.6	33.7	20.4	38.9	33.0	-0.04
Urban	2.4	22.6	46.9	78.5	44.7	-0.97
Convergence	4.4	41.1	22.7	29.3	30.3	0.76
Competitiviness	6.3	58.9	20.7	47.0	69.7	-0.76
Total	10.7	100.0	21.5	39.7	100.0	0.00
Scenario a.2 (VA)						
Rural	4.5	42.5	17.7	20.8	22.3	0.94
Intermediate	3.6	33.8	20.5	38.7	33.0	-0.03
Urban	2.5	23.6	34.9	75.0	44.7	-0.91
Convergence	4.3	40.8	22.8	29.4	30.3	0.74
Competitiviness	6.2	59.2	20.1	46.7	69.7	-0.74
Total	10.5	100.0	21.1	39.7	100.0	0.00
Scenario a.3 (Historical)						
Rural	4.7	43.6	17.3	20.3	22.3	1.01
Intermediate	3.6	33.7	20.4	38.9	33.0	-0.04
Urban	2.4	22.6	46.4	78.3	44.7	-0.97
Convergence	4.4	41.1	22.6	29.3	30.3	0.76
Competitiviness	6.3	58.9	20.7	47.0	69.7	-0.76
Total	10.7	100.0	21.4	39.7	100.0	0.00

Source: own elaborations

Table A.5.2 - Effects in terms of employment produced by 2014-2020 CAP per regional group (scenario b)

Groups by scenario	Effects (mio units)	%	Effects / Expenditure (units per € mio)	% Extra-local effects on total	% Extra-local effects	Diff. % emp
Scenario b (68% of basic payments)						
Scenario b.1 (UAA)						
Rural	2.4	42.3	14.5	21.8	21.9	0.51
Intermediate	1.9	34.1	17.0	40.5	32.7	-0.01
Urban	1.3	23.5	40.1	81.4	45.4	-0.50
Convergence	2.2	38.7	20.4	32.2	29.5	0.35
Competitiviness	3.5	61.3	16.9	48.6	70.5	-0.35
Total	5.6	100.0	18.1	42.2	100.0	0.00
Scenario b.2 (VA)						
Rural	1.7	32.9	16.5	27.7	21.7	0.25
Intermediate	1.8	35.2	17.1	38.9	32.6	0.02
Urban	1.6	31.8	14.8	60.2	45.7	-0.26
Convergence	1.8	36.4	20.6	33.7	29.2	0.26
Competitiviness	3.2	63.6	14.4	46.7	70.8	-0.26
Total	5.0	100.0	16.1	42.0	100.0	0.00
Scenario b.3 (Historical)						
Rural	2.3	41.6	14.6	22.2	21.9	0.49
Intermediate	1.9	34.5	16.8	40.1	32.7	0.00
Urban	1.3	23.9	37.6	80.2	45.4	-0.49
Convergence	2.2	38.9	20.0	32.1	29.5	0.36
Competitiviness	3.4	61.1	17.0	48.7	70.5	-0.36
Total	5.6	100.0	18.1	42.2	100.0	0.00

Source: own elaborations

Table A.5.3 - Effects in terms of employment produced by 2014-2020 CAP per regional group (scenario c)

Groups by scenario	Effects (mio units)	%	Effects / Expenditure (units per € mio)	% Extra-local effects on total	% Extra-local effects	Diff. % emp
Rural	5.2	42.9	19.6	20.8	22.3	1.10
Intermediate	4.1	33.9	23.3	39.0	33.2	-0.04
Urban	2.8	23.2	51.7	76.4	44.5	-1.07
Convergence	5.0	41.3	24.5	29.4	30.4	0.88
Competitiviness	7.1	58.7	24.4	47.2	69.6	-0.88
Total	12.1	100.0	24.4	39.8	100.0	0.00

Source: own elaborations

A.6. Employment effects produced by 2014-2020 CAP First Pillar scenarios per regional group

Table A.6.1 - Effects in terms of employment produced by 2014-2020 First Pillar CAP per regional group (scenario a)

Groups by scenario	Effects (mio units)	%	Effects / Expenditure (units per € mio)	% Extra-local effects on total	% Extra-local effects	Diff. % emp
Scenario a (18% of basic payments)						
Scenario a.1 (UAA)						
Rural	2.4	42.3	14.5	21.8	21.9	0.51
Intermediate	1.9	34.1	17.0	40.5	32.7	-0.01
Urban	1.3	23.5	40.1	81.4	45.4	-0.50
Convergence	2.2	38.7	20.4	32.2	29.5	0.35
Competitiviness	3.5	61.3	16.9	48.6	70.5	-0.35
Total	5.6	100.0	18.1	42.2	100.0	0.00
Scenario a.2 (VA)						
Rural	2.2	40.1	14.8	23.0	21.9	0.44
Intermediate	1.9	34.4	17.0	40.1	32.7	0.00
Urban	1.4	25.6	26.4	75.0	45.5	-0.44
Convergence	2.1	38.1	20.5	32.5	29.4	0.33
Competitiviness	3.4	61.9	16.2	48.1	70.6	-0.33
Total	5.5	100.0	17.6	42.2	100.0	0.00
Scenario a.3 (Historical)						
Rural	2.4	42.1	14.5	21.9	21.9	0.51
Intermediate	1.9	34.2	16.9	40.4	32.7	-0.01
Urban	1.3	23.6	39.4	81.1	45.4	-0.50
Convergence	2.2	38.7	20.3	32.2	29.5	0.35
Competitiviness	3.5	61.3	16.9	48.6	70.5	-0.35
Total	5.6	100.0	18.1	42.2	100.0	0.00

Source: own elaborations

Table A.6.2 - Effects in terms of employment produced by 2014-2020 First Pillar per regional group (scenario b)

Groups by scenario	Effects (mio units)	%	Effects / Expenditure (units per € mio)	% Extra-local effects on total	% Extra-local effects	Diff. % emp
Scenario b (68% of basic payments)						
Scenario b.1 (UAA)						
Rural	2.3	45.3	21.7	18.6	22.8	0.5
Intermediate	1.7	33.2	26.7	37.2	33.4	0.0
Urban	1.1	21.5	59.4	75.0	43.7	-0.5
Convergence	2.2	43.7	25.5	26.5	31.4	0.4
Competitiviness	2.8	56.3	28.4	45.0	68.6	-0.4
Total	5.0	100.0	27.1	36.9	100.0	0.0
Scenario b.2 (VA)						
Rural	2.3	45.3	21.7	18.6	22.8	0.5
Intermediate	1.7	33.2	26.7	37.2	33.4	0.0
Urban	1.1	21.5	59.4	75.0	43.7	-0.5
Convergence	2.2	43.7	25.5	26.5	31.4	0.4
Competitiviness	2.8	56.3	28.4	45.0	68.6	-0.4
	0.0	0.0	0.0	0.0	0.0	0.0
Total	5.0	100.0	27.1	36.9	100.0	0.0
Scenario b.3 (Historical)						
Rural	2.3	45.3	21.7	18.6	22.8	0.5
Intermediate	1.7	33.2	26.7	37.2	33.4	0.0
Urban	1.1	21.5	59.4	75.0	43.7	-0.5
Convergence	2.2	43.7	25.5	26.5	31.4	0.4
Competitiviness	2.8	56.3	28.4	45.0	68.6	-0.4
Total	5.0	100.0	27.1	36.9	100.0	0.0

Source: own elaborations

A.7. Employment effects produced by 2014-2020 CAP Second Pillar scenarios per regional group

Table A.7.1 - Effects in terms of employment produced by 2014-2020 CAP per regional group

Groups by scenario	Effects (mio units)	%	Effects / Expenditure (units per € mio)	% Extra-local effects on total	% Extra-local effects	Diff. % emp
Scenarios (a) (b)						
Rural	2.3	45.3	21.7	18.6	22.8	0.52
Intermediate	1.7	33.2	26.7	37.2	33.4	-0.03
Urban	1.1	21.5	59.4	75.0	43.7	-0.49
Convergence	2.2	43.7	25.5	26.5	31.4	0.43
Competitiviness	2.8	56.3	28.4	45.0	68.6	-0.43
Total	5.0	100.0	27.1	36.9	100.0	0.00
Scenario (c)						
Rural	5.2	42.9	19.6	20.8	22.3	1.10
Intermediate	4.1	33.9	23.3	39.0	33.2	-0.04
Urban	2.8	23.2	51.7	76.4	44.5	-1.07
Convergence	5.0	41.3	24.5	29.4	30.4	0.88
Competitiviness	7.1	58.7	24.4	47.2	69.6	-0.88
Total	12.1	100.0	24.4	39.8	100.0	0.00

Source: own elaborations

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 34 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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	Goethe University Frankfurt	GUF	Germany
	ICLEI - Local Governments for Sustainability	ICLEI	Germany
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