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Distribution and re-distribution of CAP expenditure throughout the EU

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Abstract

This paper is aimed at assessing distribution of Common Agricultural Policy (CAP) expenditure through the European Union (EU) space. Firstly, spatial distribution of past CAP expenditure is analysed, specifically 2007-2011 payments. Both overall expenditure and disentangled measures are investigated; major territorial patterns through the EU-27 are highlighted as well. Secondly, spatial distribution of future expenditure, according to latest 2014-2020 CAP reform, is analysed. In particular, we assess re-distributional effects connected with spatial spillovers that are due to regional economic integration. Assessment is made through the adoption of a multiregional I-O model. The analysis is carried out at a very high level of disaggregation, i.e. NUTS 3 level throughout the EU-27. Furthermore, a specific focus is devoted to rural-urban relationships.

Keywords: common agricultural policy, regional integration, urban-rural relationships, multiregional I-O model

1. INTRODUCTION

This paper focuses on the spatial (re-)distribution of Common Agricultural Policy (CAP) expenditure throughout the EU-27.

Firstly, the allocation of European Union (EU) funds throughout the EU space is considered. A detailed analysis of the allocation of CAP expenditure is provided, by considering ex-post expenditures collected at a maximum level of disaggregation (i.e., NUTS 3 level) in years 2007-2011. Actually, CAP effects on single beneficiaries can be identified from a territorial (i.e., geographical) point of view: although the ex-ante spatial allocation of such a policy is usually defined at either national or regional territorial level, ex-post expenditure may be analysed even at local level. Furthermore, the CAP is a transversal policy, including agricultural measures as well as rural interventions and environmental measures. Furthermore, the allocation of CAP expenditure throughout the EU space is considered by focusing on some expenditure intensity indices (e.g., CAP expenditures per hectare of utilised agricultural area). Shedding light on the spatial allocation of EU expenditure does not represent a brand new research question in literature. What is rather new in this analysis is the highest level of territorial disaggregation (NUTS 3 level) and coverage (EU-27) as well as the nature of the expenditure data under study (i.e., total real payments as registered ex post by the EU bureaus). Furthermore, the paper tries assessing to what extent the CAP is a 'rural' policy across the EU space. According to a territorial approach, the presence of a 'rural' effect in the allocation of CAP expenditure at NUTS 3 level is tested. This is a very central question in order to verify the territorial coherence of the CAP as well as its effectiveness.

Secondly, in addition to the analysis of past spatial allocation of CAP funds, the paper analyses the evolutionary patterns of disparities across the EU space, especially those related to aforementioned rural and peripheral/remote regions. In this respect, the attention is concentrated on the distributive and redistributive effect of EU policies in particular when targeted to these territories. 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. Through apposite extensions, I-O analysis 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 support and implementation.[1] This paper is organised as follows. Section 2 focuses on past distribution of CAP expenditures (years 2007-2011) at NUTS 3 level, by highlighting major territorial patterns through the EU space. The section also focuses on the existence of a rural effect in the allocation of

[1] 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 intersectoral and spatial relationships. On the basis of alternative policy scenarios, this analysis also is aimed at verifying how effects may depend on specific policy choices concerning the 2014-2020 programming period.

expenditure. Section 3 illustrates methodology and data used to analyse redistributive effects across sectors and space of CAP expenditures. Moreover, it describes alternative policy scenarios and how the CAP has been modelled within I-O methodology. Section 4 concludes the paper, suggesting some possible policy implications.

2. "CAP AND THE REGIONS": THE SPATIAL DISTRIBUTION OF PILLAR 1 AND 2 EXPENDITURE

CAP expenditure shows imbalanced distribution throughout the EU, as already pointed out in literature (see, for instance, Shucksmith et al., 2005 and Crescenzi et al., 2011). Accordingly, the paper provides direct evidence about such a spatial allocation, by focusing on a more disaggregated territorial level (i.e., NUTS 3 level according to NUTS 2006 classification) and covering the whole set of EU-27 Member States. In particular, we take into account overall CAP expenditure as well as its disentangled measures. Actually, we consider Pillar 1's expenditures (i.e., Direct Payments and Market Intervention measures) as financed by EAGF as well as Pillar 2's expenditures financed by EAFRD. Finally, rural development policy is disentangled among its thematic axes (Axis 1: improving the competitiveness of the agricultural and forestry sector; Axis 2: improving the environment and the countryside; Axis 3 improving the quality of life in rural areas and encouraging diversification of the rural economy).

When referring to the aforementioned policies, the availability of detailed territorial data is rather poor (Shucksmith et al., 2005). Actually, no information on CAP real expenditure at regional level is available: just data at national level are usually provided by DG Agriculture.[2] Conversely, just data referring either to the ex-ante allocation of funds or to the reconstruction of the real expenditure based on some sample observations (e.g., FADN data[3]) are available at regional level. Also data on real ex-post expenditure are available. However, they are not collected in any comprehensive dataset, covering all EU-27 Members States. In this analysis, the source of data is European Commission (DG Agriculture). We consider CAP actual expenditures, referring to 2007-2013 programming period (only 2007-2011 payments are considered). In particular, we focus on both EAGF and EAFRD expenditure[4], for the whole set of EU-27 Member States. Expenditure data refer to single payments received by beneficiaries, on the basis of the declaration of paying agencies. In order to keep their anonymity, data are provided at NUTS 3 level. Please note that data aggregation at NUTS 3 level poses some critical issues, as pointed out in Camaioni et al. (2014). Moving from overall CAP expenditure at NUTS 3 level, it is possible to disaggregate expenditure

[2] The implementation of Pillar 1 expenditure is annually reported by DG Agriculture in "Agriculture in the European Union. Statistical and Economic Information Report". However, this Report just shows expenditure implementation at national level. The latest report currently refers to year 2012 and it is available at the following link: http://ec.europa.eu/agriculture/statistics/agricultural/2012/pdf/full-report_en.pdf (link accessed on November 19, 2013). In a similar way, Rural Development implementations are shown by EU member States and by single measures in "Rural Development in the EU. Statistical and Economic Information Report". Latest available figures refer to year 2012: http://ec.europa.eu/agriculture/statistics/rural-development/2012/full-text_en.pdf (link accessed on November 19, 2013).

[3] FADN (Farm Accountancy Data Network) database collects data on average CAP expenditure at both national and NUTS 2 level. Referring to Pillar Two, data disentangled by measures are available as well. Nevertheless, data are never available for current programming period, always referring to the previous one.

[4] In this section, national co-funding for RDP expenditure is not considered.

among Pillars and measures as well. As already stressed, CAP comprises agricultural, rural and environmental policies, thus each single measure may have different aims and distinct territorial impacts throughout the EU-27, as well.

Referring to Pillar 1 expenditures (EAGF), both Direct Payment (DP) and Market Interventions measures can be considered. Such a breakdown sheds new light on potentially different territorial impacts characterising each measure. This is true even though both types of intervention largely refer to agricultural policies: actually, cross-compliance links DP to environmental issues as well. It can be noticed that agricultural policies still play a predominant role within the CAP budget, notwithstanding "modulation" (i.e., the reduction of DP for individual farmers, in order to finance Pillar 2 measures).

Conversely, Pillar 2 Expenditures cover many types of measures, mostly aimed at promoting rural development. As for CAP Pillar 1, the database is constituted by the aggregation at NUTS 3 level of overall EAFRD expenditures at measure level (years 2007-2011). Due to the greater variety of measures characterising Pillar 2 activities, the analysis of expenditure breakdown is significant. In the database, RDP expenditure are organised by EAFRD budget codes that have been analysed in order to identify the measure name on the basis of the budget codes. Then, data on specific measures have been aggregated into axes, following Council Regulation 1698/2006. Such a breakdown has major effects on the analysis of EU policies as well. Actually, territorial impacts of Axes largely differ according to their respective objectives. Axis 1 is aimed at improving the competitiveness of the agricultural and forestry sector, while Axis 3 focuses on improving the quality of life in rural areas and encouraging diversification of the rural economy. The former has a stronger sector-based dimension; the latter focuses on regional and territorial issues. Conversely, Axis 2 focuses on environmental issues: countryside management, climate change adaptation and mitigation, biodiversity, efficient use of natural resources and other green issues. Although environmental effects from Axis 2 measures could not be spatially bounded within NUTS 3 regions, these expenditures are here considered in order to analyse EU environmental policies from a territorial perspective.

According to this framework, major EU policies on agricultural, rural and environmental issues are likely to show different spatial patterns. In particular, owing to major socio-economic and environmental differences, this spatial allocation is expected to be territorially imbalanced. In this section, the focus is on CAP expenditure, as it is easier to identify its beneficiaries than beneficiaries for other EU policies. After having described CAP expenditures' territorial allocation, it is possible to show to what extent CAP is "rural", i.e. to what extent its funds are spent in rural EU regions.

Such a research question is not new. For example, Shucksmith et al. (2005) and Crescenzi et al. (2011) focused on CAP expenditure allocation, throughout the EU space. However, those works have, at the most, considered NUTS 2 level and they usually limited their attention to the EU-15. Therefore, current analysis shows some innovative elements. In particular, both a higher level of

territorial disaggregation (NUTS 3 level) and a broader coverage of the analysis (EU-27) are provided.

Nevertheless, as already mentioned before, an important issue has to do with the appropriateness of such territorial scale for policy analysis. Actually, it can be argued that NUTS 3 territorial scale might not be appropriate for this kind of policy analysis, that is to say, for investigating the distribution of policies whose ex-ante allocation decisions are taken at a higher territorial and institutional level (e.g., EU, NUTS 0 or NUTS 1 level). Conversely, this is the main reason why working at NUTS 3 level with real expenditure data may offer greater insight than previous works, representing an important advancement in the field of study. Actually, real expenditure is observable just ex-post at NUTS 3 level. Thus, observed expenditure does not only depend on top-down (i.e. political) allocation decisions but also on the bottom-up capacity of single regions to attract and really use those funds. Therefore, policy evaluation does not only concern political decisions: it also has to do with the real implementation of policies across the EU space. With this implementation, the underlying higher-level political decision is only one of the factors involved. The other contribution is the capacity and the specific features of individual territories (NUTS 3 regions) which are likely to affect the expenditure they really receive.

Evidences about the spatial allocation of EU policy expenditure throughout the EU-27 are insightful. Overall CAP expenditure levels are not interesting as absolute values, since they depend on large variations in terms of total area at NUTS 3 level throughout the EU. In order to get rid of these distortions, specific indices, expressing CAP expenditure intensity, are computed. In particular, support intensity can be expressed by means of different dimensions. As the policies under study here largely deal with agricultural and rural issues, the following dimensions have been selected (Copus, 2010): agricultural area, agricultural labour force, gross value added from agricultural activities. Thus, the following expenditure intensity indices represent the basic units for the analysis[5]:

- Expenditure per hectare of utilised agricultural area (€/UAA).
- Expenditure per annual work unit employed in agriculture (€/AWU).
- Expenditure per thousand Euros of agricultural gross value added (€/.000 €).

Nevertheless, further caveats have to be pointed out. We already stressed that availability of NUTS 3 data on agriculture across Europe is rather poor (Shucksmith et al., 2005). Missing values affect Farm Structure Survey data on hectares of UAA and AWU employed in agriculture: among others, they mostly affected NUTS 3 observations throughout Germany, the UK and Austria[6].

Further remarks deal with the way CAP expenditure intensity is computed. Actually, when expressing the intensity of CAP support by means of specific agriculture-related variables, particularly high values may be observed in a few cases. Urban areas show small values for UAA,

[5] Main statistical source is Farm Structure Survey from Eurostat reporting data on utilised agricultural area (UAA) and agricultural annual work units (AWU) employed in agriculture at NUTS 3 level. Data are available for years 2000, 2003, 2005 and 2007: when available, latest figures are considered. Data on agricultural GVA come from Eurostat National and Regional Economic Accounts: due to the current economic crisis, heavily affecting the economic cycle, average Agricultural GVA value for years 2007 to 2010 is considered. Years 2007 to 2009 are used for Italy.

[6] Further detailed about the adopted methodology to replace missing values can be found in Camaioni et al. (2014).

AWU and agricultural GVA, although they account regions for a not negligible share of CAP beneficiaries. This situation implies "artificially" high levels of expenditure intensity. In order to get rid of distortive effects, those regions fulfilling at least one the following criteria: i) UAA ≤ 1000 ha.; ii) Agricultural AWU ≤ 10; iii) GVA from agriculture ≤ 100,000 € have been excluded from the analysis.. According to these criteria, 30 urban regions have been excluded.

Referring to the new sub-sample (1,258 observations), Table 1 shows descriptive statistics for CAP expenditure intensity in terms of land, labour and agricultural GVA, respectively. It shows mean and standard deviation as well as quartiles. A remarkable heterogeneity emerges. Firstly, overall picture significantly changes with the three indicators. Furthermore, such a heterogeneous distribution shows territorial patterns as well. Figure 1 shows total CAP expenditure intensity per utilised agricultural area (UAA). Regions in Eastern EU Member States (e.g., Romania and Bulgaria, the Baltic Countries and Poland) mostly belong to the lower quartile of the distribution, showing low expenditure intensity. CAP expenditure intensity is also well below the median in Scottish NUTS 3 regions as well as Northern Spain. Conversely, many urban regions and NUTS 3 regions in the Netherlands and in Belgium show the highest values of CAP expenditure per hectare of UAA throughout the EU. Moreover, many regions across Northern Italy and Greece belong to the fourth range of the distribution as well.

Nevertheless, the focus on overall CAP expenditures may be partially misleading: CAP comprises very different policies and measures, whose purposes are different. A thorough analysis of disaggregated expenditure highlights this issue: different measures might be affected by different territorial patterns. The territorial distribution of expenditures at NUTS 3 level is thus described by considering Direct Payment (DP) and Market Interventions (MI) measures within Pillar 1, whereas Pillar 2 expenditures are disentangled by axis (Axis 1, Axis 2, Axis 3).

When focusing on Pillar 1 expenditure, spatial distribution of DP intensity per hectare of UAA is shown in Figure 2a. Nevertheless, no matter which index is chosen, most supported regions are flatland areas throughout North-Western Europe. This is due to the types of agricultural activity taking place in those regions. Conversely, DP is in its lower quartile in Eastern EU regions as well as in area located in Southern Europe. Spatial allocation of MI measures intensity indices is much more scattered than DP one. Figure 2b shows expenditure intensity per hectare of UAA. Actually, whatever intensity index we consider, central and peripheral regions share the highest intensity values as well as the lowest ones. Therefore, it is hard to find a clear territorial pattern, here. Such a pattern, enhancing territorial concentration, can be explained by considering both the historical reforms and the current aims of those specific measures[7].

When focusing on Pillar 2 expenditure throughout the EU, its spatial distribution largely differs from Pillar 1 expenditure. Expenditure intensity per hectare of UAA is low in flatlands throughout Northern France and Spain. Scottish provinces and many Romanian NUTS 3 regions also belong to the first range of the distribution. Conversely, expenditure intensity is particularly

[7] Data confirm that most MI payments are paid to 'downstream' actors (e.g., dealers processors) located in cities.

high in most regions throughout Scandinavian and Eastern EU Member States (ranking in either third or fourth range of the distribution). From a broader perspective, it seems that those regions that are little supported in terms of Pillar 1 expenditure tend to be highly supported in terms of Rural Development expenditure and vice-versa (Camaioni et al., 2014).

Nevertheless, cross-compensation between pillars is just part of the story. When disentangling Pillar 2 single measures, expenditure from both Axis 1 and Axis 3 can be considered as rural measures whereas expenditure from Axis 2 tackles environmental issues. From a geographical perspective, some German city-regions as well as other national capital cities received the most intense support according to Axis 1 expenditure. Polish, Hungarian and Baltic NUTS 3 regions were highly supported as well in terms of €/UAA, in years 2007-2011. Conversely, the support from Axis 1 was less intense or even absent in Western Germany NUTS 3 regions as well as in many British, French and Italian NUTS 3 regions (Figure 3a). When considering the intensity of Axis 2 support per hectare of UAA, flatlands in Western Europe (from Spain to Denmark) as well as Scottish regions belong to the 1st range of the distribution, thus sharing the least intense support throughout the EU. Support is below EU average even in Romanian and Bulgarian regions. Conversely, mountain regions throughout the Alps, in Greece and in the Scandinavian Countries belong to the fourth range of the distribution: they actually show the most intense support when taking into account Axis 2 expenditure per hectare of UAA (Figure 3b). Lastly, by mapping the spatial quartile distribution of Axis 3 expenditure (Figure 3c), it is easy to notice that Axis 3 support is generally low in all Western EU regions: actually, in some of them the total amount of Axis 3 expenditure equals to zero (e.g., some Irish, Italian, Portuguese and Spanish regions). Conversely, support intensity is above the median value throughout the UK, Eastern Germany as well as the Scandinavian Countries. Referring to the set of regions belonging to Eastern Member States, the intensity of Axis 3 measures support is generally above the median value, thus belonging to either 3rd or 4th range of the distribution

According to this very mixed picture, distribution of CAP expenditure is scattered throughout the EU. Due to both structural and historical differences, EU regions benefit from this policy in very different ways: some areas are highly supported by Pillar 1 measures (e.g., agricultural regions in France, Belgium and Germany) while others show a stronger support from Rural Development Policy.

As already pointed out, a sort of compensatory effect (or substitution effect) between expenditures from two pillars turns out. Indeed, regions that are little supported in terms of Pillar 1 expenditure tend to be highly supported in terms of Rural Development expenditure and vice versa. When jointly analysing the spatial allocation of both Pillars of the CAP, territorial imbalances can be better highlighted. In particular, we consider here NUTS 3 regions where both Pillar 1 and Pillar 2 support per hectare of UAA is above (below) the EU-27 value[8]. Thus, taking the EU-27 value as a benchmark, each region can be positioned on a Cartesian plane where the x-axis refers to Pillar 1 support intensity and the y-axis to Pillar 2 support intensity. The origin of the plane (0,0) is positioned in the respective EU-27 values. This representation splits EU-27 NUTS regions into four groups (Camaioni et al., 2014):

- High-High cases (NUTS 3 regions where both pillars' support intensity is above the EU-27 average): top beneficiaries;
- Low-Low cases (NUTS 3 regions where both pillars' support intensity is below the respective EU-27 average): under supported regions;
- High-Low cases (NUTS 3 regions where Pillar 1's support intensity is above the EU-27 average, while Pillar 2's support intensity is below it): agriculture-oriented support;
- Low-High cases (NUTS 3 regions where Pillar 1's support intensity is below the EU-27 average, while Pillar 2's support intensity is above it): rural-oriented support.

According to this classification, Figure 4 maps the four groups of regions where support is expressed per hectare of UAA. High-High regions are mostly located in Eastern Germany, Southern Italy, Greece and Ireland. Many Western EU regions are High-Low cases while, conversely, NUTS 3 regions in Eastern Member States and in Scandinavia generally fall in the Low-High case. Lastly, 282 regions are Low-Low cases: areas of Scotland and Wales, the majority of Spain, Romania and Bulgaria and some Italian regions fall in this group. On the opposite, Low-Low regions represent 30% of total UAA.

Nevertheless, for more than a half of EU-27 NUTS 3 regions we observe a sort of substitutability between the two Pillars. In general, Western EU regions show Pillar 1's support above and Pillar 2's support below the EU-27 average. The opposite occurs in NUTS 3 regions across Eastern Member States as well as across Scandinavia.

In even more general terms, the impression is that, when mapping these results at the EU scale, large territorial imbalances occur as one major EU policy, the CAP, is a combination of alternative policies and measures often behaving, in their territorial allocation, as substitutes.

[8] With "EU-27 value", here it is meant the support intensity computed over the whole EU-27 (i.e., total EU-27 support divided by total EU-27 UAA).

3. Distributional and Re-distributional Effects of the CAP Reform: the methodology

The approach used to assess redistribution of policy effects is based on a multi-regional closed 6 sector I-O model of 1,288 European regions at 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 offers several advantages.

First of all, 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. Very shortly, 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 while 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. 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. 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. 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 a 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.

Finally, 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 high 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.

3.1. Regionalisation

The multiregional I-O model was constructed through a hybrid procedure of regionalisation, starting from national I-O tables (top-down approach). Regionalisation was 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 adopted 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). 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. 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.

Some descriptive information about the final structure of the multi-regional I-O table is reported in Table 2. More details can be found in Bonfiglio et al. (2014).

3.2. Data

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.[9] The choice of this year is based on the consideration that these tables do not include policy effects generated by 2007-2013 CAP.[10] 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

[9] 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.

[10] 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.

further, but less important reason, is that the sectoral classification is consistent with 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[11], national industry-by-industry 59-sector I-O tables (as well as tables of import flows) evaluated at basic prices were derived from supply and use tables. A representation by industry rather than products better responds to the objectives of this study, in particular to 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).

The national I-O tables were 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).[12]

To apply the AFLQ, 2007 employment data at NUTS-3 level from Eurostat were used. National employment data were obtained by summing regional data. Employment data were also used to apply the gravity model. The distance matrix between regions, necessary for the construction of the gravity model, was derived calculating geodesic distances between the most populated centres of each region. This approach differs 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) and recent national census. Finally, geographic coordinates of administrative units, necessary to calculate geodesic distances, were obtained by enquiring an online map service though an iterative algorithm.

Both supply tables and Eurostat trade data, specifically "EU27 trade since 1998 by SITC" and "International trade in services (since 2004)" databases, were used to derive national shares of intra-EU imports distinguished by sector and sectoral shares of imports (and exports) between countries used as superior data for balancing interregional flows.

[11] Transformations include: conversion of market prices 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; reallocation of secondary production of each industry across sectors by adopting the so-called "fixed product-sales structure" assumption (European Communities, 2008); addition of quadrants of final uses and primary inputs to symmetric tables of intermediate uses and sales.

[12] 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, the final intersectoral flows matrix counts about 60 million of elements.

4. POLICY ANALYSIS

4.1. Short overview of 2014-2020 CAP reform and data used

On 20th of December 2013, the EU regulations of the new CAP 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. Here below, we only report main changes that are relevant to objectives of this analysis.

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 schemes. 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.

With the intention of legitimising the support to farmers and better pursuing the objectives of the CAP, the new direct payment system introduces six kinds of payment: basic payment, redistributive payments, green payment, payment for areas with natural constraints, payment for young farmers and coupled payments. There is also a small farmer scheme, which replaces 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 (in the case of small farmer scheme).

From a financial standpoint, resources to basic payment are derived by difference, after subtracting all the others. 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.

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.

As regards rural development policy, 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 measures is reduced passing from over 40 to 24 measures in the interest of simplification. Member States have now wider freedom of choice in managing resources among measures. 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%).

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. With reference to market measures, 2014-2020 Multiannual Financial Framework provides the total allocation at a European level for market measures that, together with the budget for direct payments, amount to about 313 € billion. As regards the previous programming period, we used data about actual payments under both CAP pillars from years 2007 to 2011, including national co-financing with reference to EAFRD contribution.

4.2. Modelling 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 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 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. These sub-scenarios correspond to criteria that favour the extent of agricultural activity, value of agricultural production and conservation of status quo, respectively.

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 (scenario c) 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 by 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 provides a summary of the alternative policy scenarios here considered.

To model CAP payments within a multiregional demand-driven I-O model, it was 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.[13] 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. Finally, 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 were distributed using the shares of local inputs purchased by agriculture from the sectors involved,

[13] 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 payments 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 a 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.

which can be retrieved from the multiregional I-O table.[14] Measures (b) are instead a form of payment given to 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.

With reference to the next programming period, we can only analyse ex-ante budgeted allocations since 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.[15] 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.

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. Then, we look for correspondence between past and new measures, by associating the oldest ones with similar new measures. In the case of new measures, such as income stabilisation tools and those in favour of organic farms, there is no 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 derived 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 applying national co-financing rates. The total amount of expenditure estimated for the period 2014-2020 varies according to the scenario considered. In both scenarios

[14] 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 into 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.

[15] At the time when this study was carried out (late 2014), the decisions of Member States about policy implementation were not fully known. Since then, further details have come out. Possible and future developments of this research could take account of these details in assessing redistributional effects induced by the 2014-2020 CAP.

(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.

5. RESULTS

5.1. 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 (urban-rural typologies from Eurostat). Regions are also regrouped using objectives of structural funds, i.e. convergence and competitiveness regions.[16]

Table 4 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 5). 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.

[16] 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).

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 6). 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.

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.

5.2. Results under the alternative policy scenarios

In this section, we analyse distributional effects across European regions under the alternative policy scenarios related to the 2014-2020 CAP reform.

Figure 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[17], 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 (Table 7). Under scenarios based on different assumptions about direct payments we have an increase in GDP of 1-5 € per every 100 € of expenditure and a positive employment variation 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.

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

[17] It has to be cleared 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.

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 6 and 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.

6. Concluding remarks

This paper has provided a thorough analysis on distribution of CAP expenditures throughout the EU, as well as 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).

Firstly, the analysis of the spatial allocation of CAP expenditure provides some insightful findings and raises important policy implications. Indeed, intensity of CAP support shows major territorial imbalances across the EU-27 space. These imbalances mainly refer to both urban-rural dichotomy and long-term cross-country differences. Thus, the distribution of CAP support across the EU27 shows a more complex than expected geography at EU level. In particular, when focusing on this "geography", EU CAP seems less "rural" than stated in its political intentions. Indeed, when computing support intensity indices, urban and central regions tend to be more supported than strongly rural and peripheral ones. Furthermore, CAP expenditures still show a larger concentration across flatlands in North-Western EU.

Thus, when considering results at a broad EU scale, a sort of substitution effect seems emerging, at least among pillars. Furthermore, the impression is that the large territorial imbalances of CAP are the direct consequence of the fact that it is a combination of alternative policies, showing very different aims.

More insightful results emerge when focusing on (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: UAA, 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 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.

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. 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.

AKNOWLEDGMENTS

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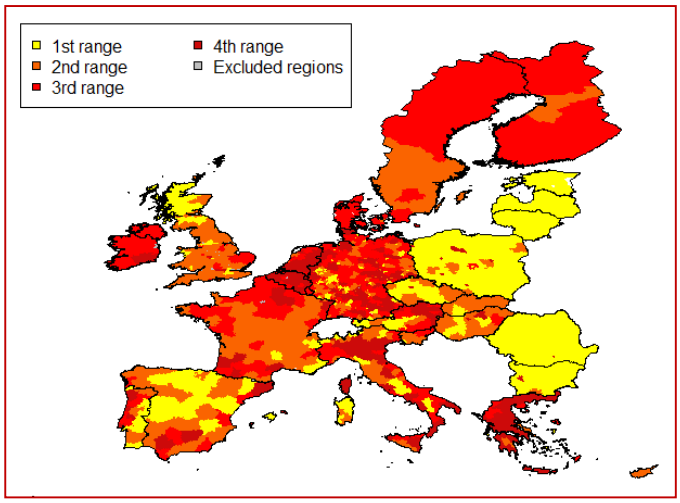
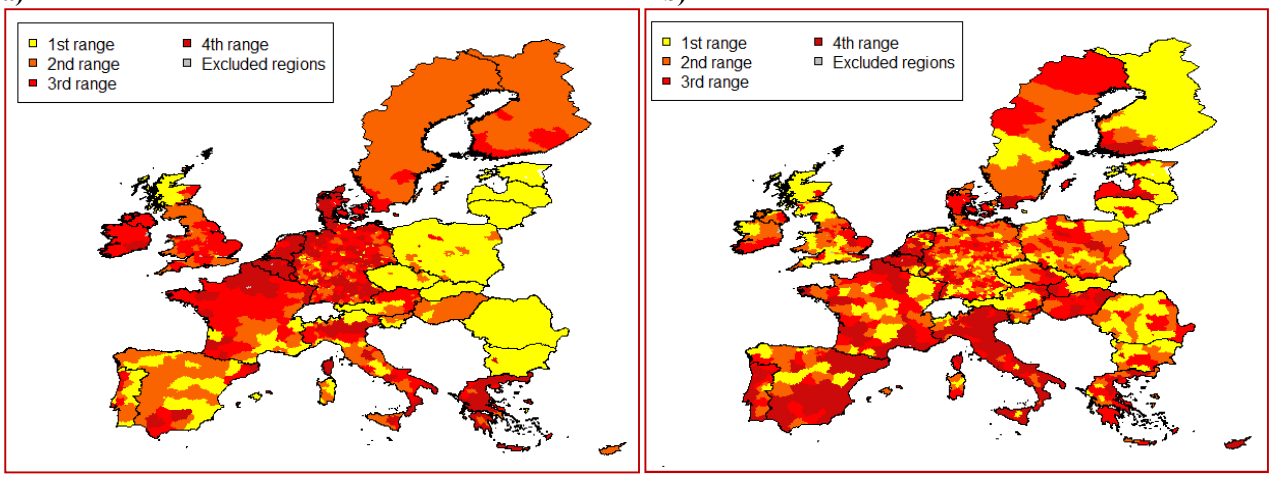
Figure 1: Spatial quartile distribution for CAP expenditure intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



Source: own elaborations

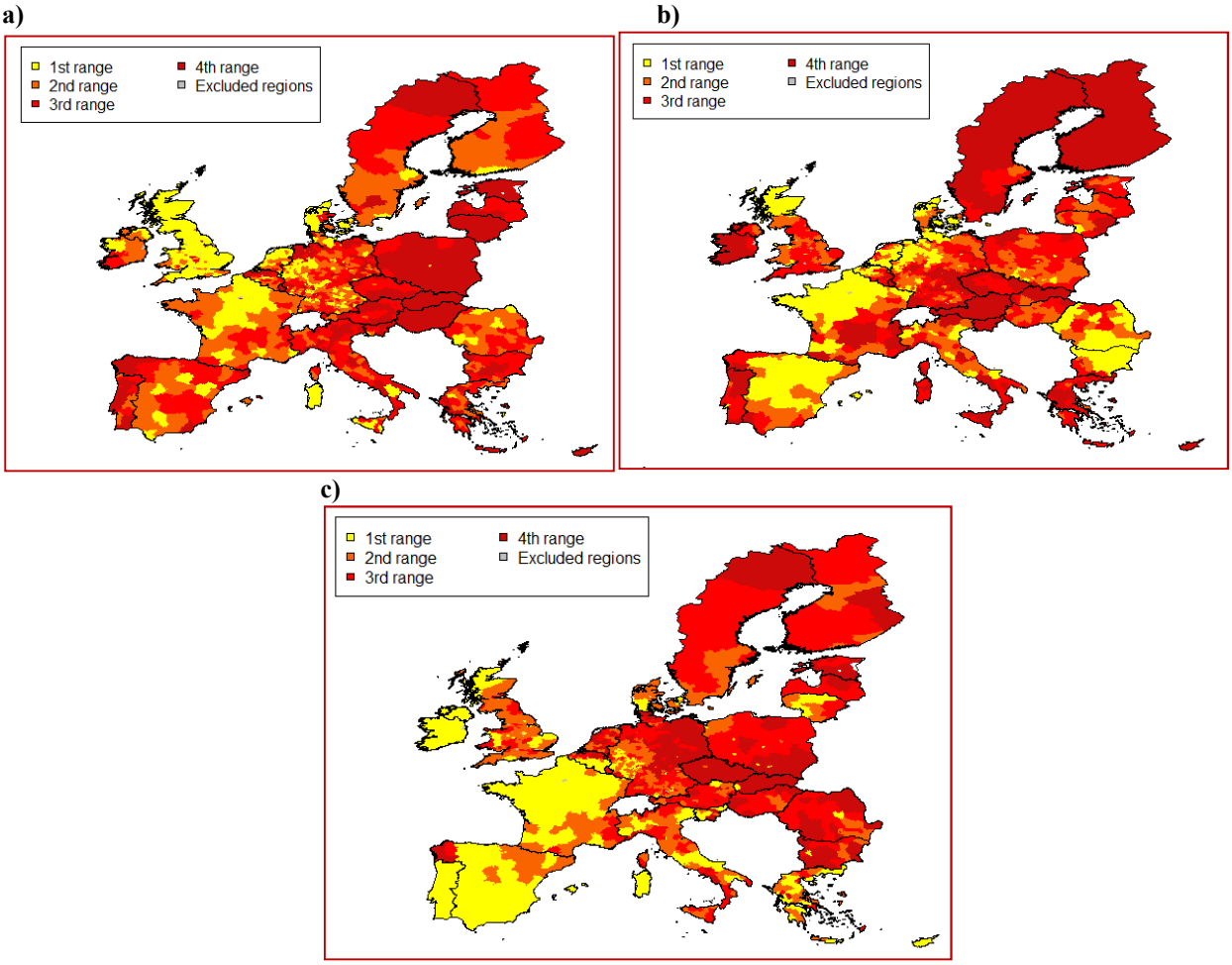
Figure 2: Spatial quartile distribution for Direct Payments (a) and Market Interventions (b) intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)

a) **b)**



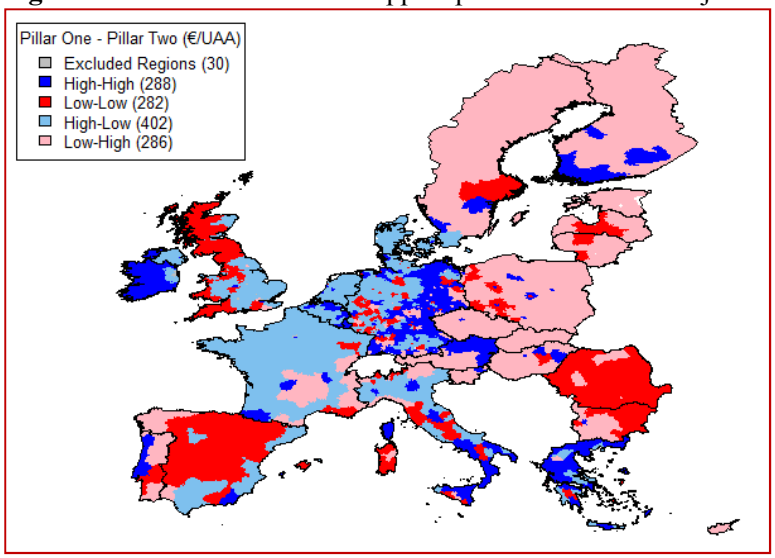
Source: own elaborations

Figure 3. Spatial quartile distribution for Axis 1 (a), Axis 2 (b) and Axis 3 (c) intensity per hectare of UAA (€/UAA) at NUTS 3 level (2007-2011 values)



Source: own elaboration

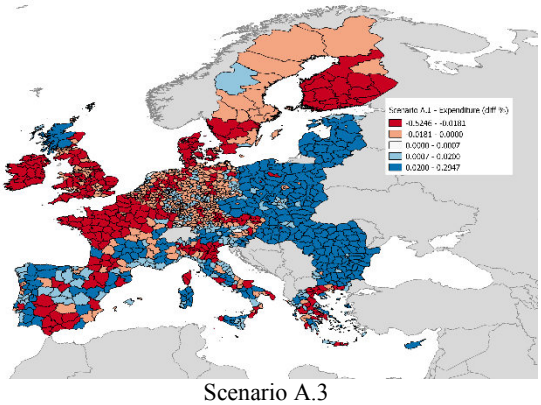
Figure 4: Pillar 1 and Pillar 2 support per hectare of UAA: joint analysis



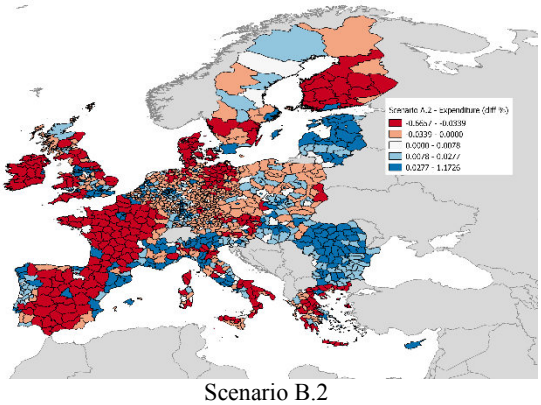
Source: own elaborations

Figure 5: Territorial distribution of regional expenditure shares associated with alternative 2014-2020 CAP policy scenarios. Differences in comparison with 2007-2011 CAP shares

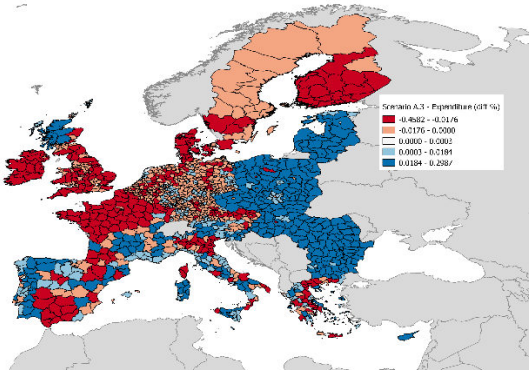
Scenario A.1



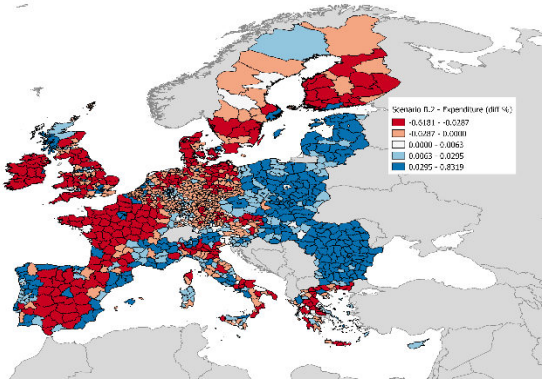
Scenario A.2



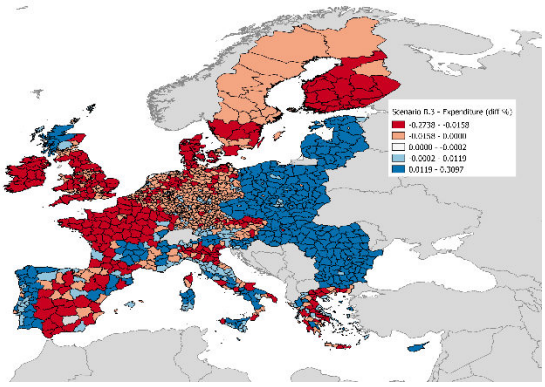
Scenario A.3



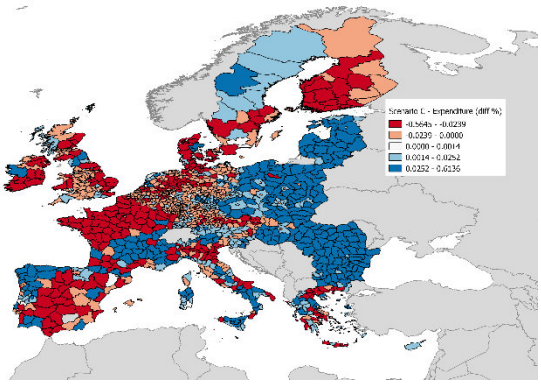
Scenario B.2



Scenario B.3

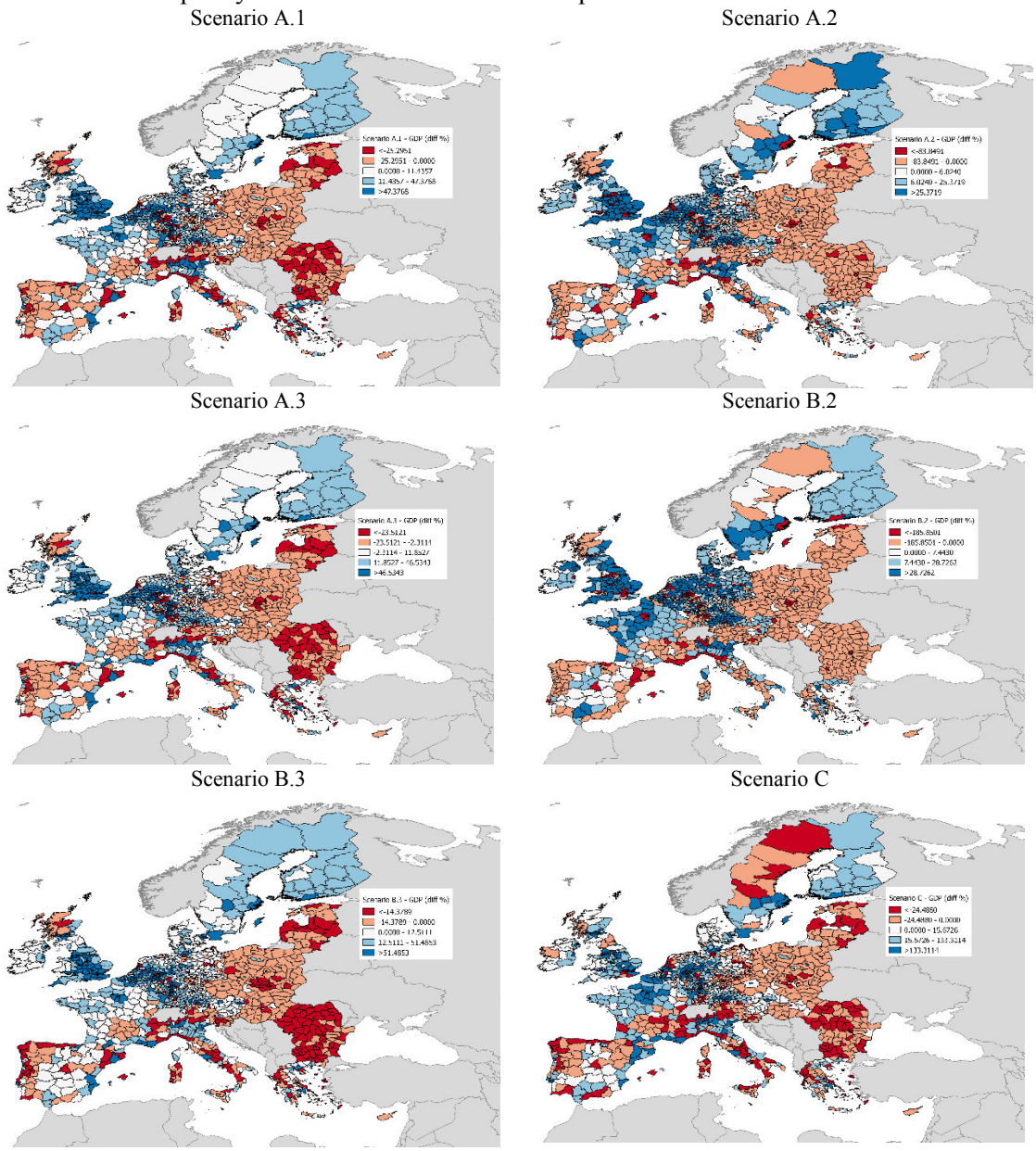


Scenario C



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

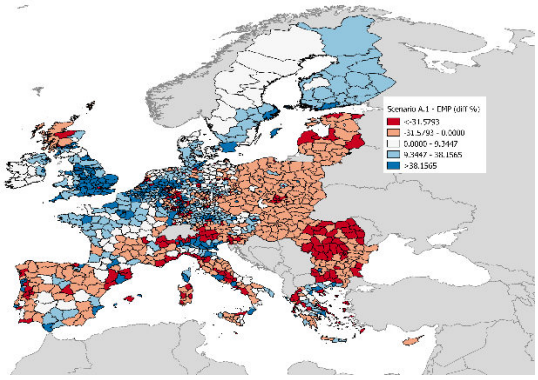
Figure 6: Territorial distribution of ratios spillover-local effects in terms of GDP produced by alternative 2014-2020 CAP policy scenarios. Differences in comparison with 2007-2011 CAP ratios



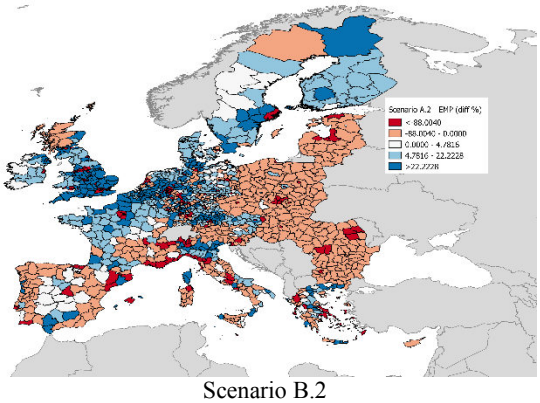
Scenario A: 18% to basic payments; Scenario B: 68% to basic payments. Scenario 1: UAA; Scenario 2: VA; Scenario 3: historical; Scenario C: all funds to rural development policy
Source: own elaborations

Figure 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

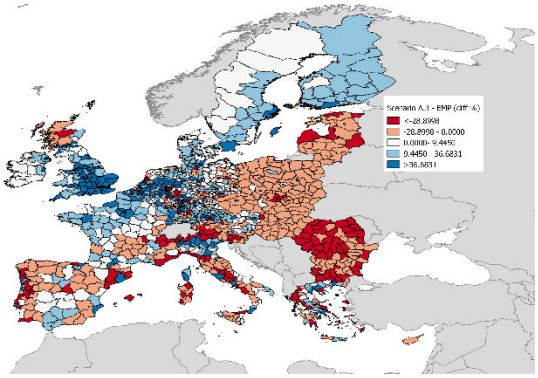
Scenario A.1



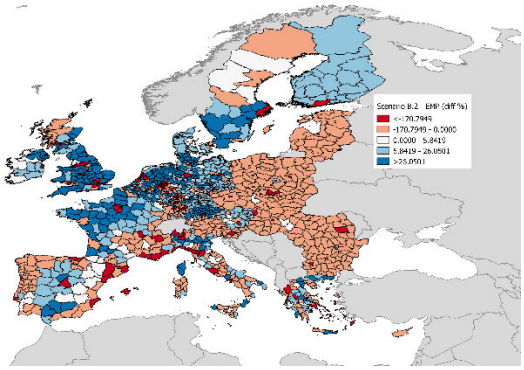
Scenario A.2



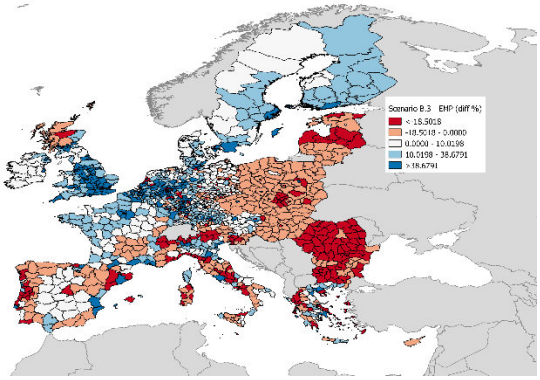
Scenario A.3



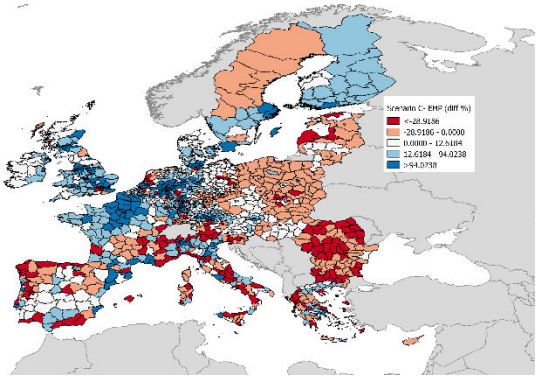
Scenario B.2



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 1. CAP expenditure intensity descriptive statistics, 2007-2011 (Total number of observations: 1258)

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

Source: Camaioni *et al.* (2014)

Table 2. 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

Table 3. 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.

Source: own elaborations

Table 4. 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

* National co-financing with reference to EAFRD contribution is also included
Source: own elaborations

Table 5. 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 6. 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

Table 7. Effects produced by 2014-2020 CAP per scenario

Scenario	GDP			Employment		
	Effects / Expenditure (€)	% Extra-local effects	CV*	Effects / Expenditure (units per mio €)	% Extra-local effects	CV*
Scenario (a) (18% of basic payments)						
Scenario 1 (UAA)	0.76	53.85	1.6338	21.45	39.72	1.2902
Scenario 2 (VA)	0.75	53.70	1.6354	21.13	39.65	1.2922
Scenario 3 (Historical)	0.76	53.83	1.6339	21.45	39.72	1.2903
Scenario (b) (68% of basic payments)						
Scenario 1 (UAA)	0.76	53.85	1.6338	21.45	39.72	1.2902
Scenario 2 (VA)	0.72	53.25	1.6399	20.22	39.44	1.2980
Scenario 3 (Historical)	0.76	53.80	1.6341	21.43	39.73	1.2907
Scenario (c) (First to Second Pillar)	0.87	53.87	1.6323	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