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In tandem for cohesion?: synergies and conflicts between regional and agricultural policies of the European Union

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Abstract

The paper analyzes the financial allocations from the Regional, Rural Development and Agricultural policies of the European Union in order to assess their territorial coordination and synergies with the objective of territorial cohesion. Regression analysis is used to uncover the link between funds and territorial disadvantage for the 1994-2013 period. The analysis reveals that both coordination and compatibility with territorial cohesion have not always improved in response to major policy reforms. The territorial 'vocation' of overall Community spending is weakly linked to its distribution among different policies, but it crucially depends upon appropriate 'place-based' allocation mechanisms .

JEL classifications: C24, O18, R11, R58

Keywords: European Union, European Policies, Regions, Regional Policy, Rural Development, Common Agricultural Policy.

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1. Introduction

An equitable territorial distribution of the benefits of the integration process is a founding principle of all European Union (EU) policies (article 175 of the European Union Treaty). As such, it has been strongly emphasised in many strategic programming documents. However, the objective of social and territorial cohesion within the Union cannot be wholly entrusted to cohesion policies in isolation (EESC 2007). From the debate on the composition of the EU budget 2014-2020 and its

Policies emerged a clear consensus on the need to harmonise *all* the different Community policies and ensure their compatibility with the objective of territorial cohesion. This consensus is part and parcel of the Union's overall growth and development strategy 'Europe 2020' (European Commission 2010a) and an essential component of its guidelines for reforming the single policies in line with this strategy: *5th Cohesion Report* (European Commission 2010) and Barca Report (Barca 2009) for regional policies; *The CAP Towards 2020*[1] for agricultural and rural development policies.

However, notwithstanding the explicit request by the EU policymakers for instruments able to perform a territorial-level assessment of the interrelations between policies of different nature and their correlation with territorial cohesion, a significant gap still exists in this area of academic literature. Although some contributions (either academic or more policy oriented in character) have tried to evaluate the impact of the EU's regional and agricultural policies on cohesion processes, their attention has alternated between one or the other policy area, overlooking their interactions (synergic or conflicting) and joint impact at the territorial level. This separation can be explained by the different disciplinary approaches of the scholars concerned (mainly agricultural economists for agricultural policies and regional economists/economic

geographers for regional policies, Kilkenny 2010) as well as by the division of responsibilities within Community bodies (DG AGRI and DG REGIO respectively) and the ministries of the single member states. As a result existing literature offers few analytical insights for understanding the relationships *between* policies and the possibilities of influencing territorial cohesion by modifying the *territorial allocation* and composition of overall Community spending in favour of instruments with a more markedly territorial vocation (European Commission, 2013b).

This work is an attempt to respond to the foregoing request and contribute towards the present debate on the future of Community policies after 2013, by undertaking a comprehensive systematic analysis of the EU's regional, agricultural and rural development policies, accounting, as they do, for almost 90% of total Community spending. The analysis is concentrated upon the result of the resource allocation process at the territorial level and looks at its spatial structure (territorial allocation). The objective is to explore the synergies between the different policy areas, in terms of the composition of expenditure and territorial coordination, and its coherence with the geography of structural disadvantage factors, upon whose elimination the capacity of any policy to promote territorial cohesion is premised.

2. 'Sectoral' and 'place-based' policies and territorial cohesion

While some policies may be considered 'space neutral' in terms of both their intent and outcomes– for example competition policies – others, albeit spatially neutral in their intent – as in the case of the Common Agricultural Policy (CAP) – exhibit a considerable spatial impact (Duhr et al. 2010). In particular, the territorial scope of the CAP was reinforced in its 2014-2020 reform that has completed the de-coupling of

financial support from agricultural output and directly linked financial resources to the surface of land maintained in good environmental and agricultural condition.

However, a rigid separation between *sectoral* and *place-based* approaches has long dominated the EU policies (and their analysis). This conceptual separation has lead different strands of literature to shed light on different aspects of the evolution of agricultural, rural development and regional policies of the European Union with limited systemic perspective. In other words, "research on the CAP (…) has mainly been 'nearshighted', ignoring the relationship and contribution of agricultural policy to the larger EU policy or EU integration" (Kuokkanen and Vihinen, 2006, p.18).

Only a few 'territorial' analyses of the EU agricultural policy have highlighted its potentially distortive impact on cohesion. The RICAP study (European Commission, 1981) was the first seminal work that examined the impact of CAP resources on the European NUTS1 regions in the preceding 20 year period and warned of a trend towards the polarisation of agricultural incomes generated by CAP spending, forewarning against its potentially perverse impact in terms of 'distributive equity'. It is precisely the lack of equity within the sector and across territories that was identified as one of the principal 'failures' of the CAP intervention model (Barbero *et* al. 1984; European Commission, 1985). However, the impact of successive changes in the organisation and financial structure of the CAP on the real territorial distribution of resources is not altogether clear. Tarditi and Zanias (2001) highlighted a recurrent problem of equitable distribution as between the beneficiaries of the policy which remained unchanged within the EU15 until 2006 (Velazquez, 2008). The ESPON study (2004), by using much more detailed spatial data than previous studies, revealed an anti-cohesion impact of CAP spending, which was only potentially mitigated by the then fledgling rural development measures (Shucksmith et al. 2005). The analyses by Bivand and Brundstad (2003) continued in the same direction and

using more sophisticated spatial econometric techniques highlighted the negative impact of CAP payments on economic convergence between the EU regions in the 1990s. Esposti (2007) with reference to the same time period also underlined how the enormous volume of CAP spending had no positive effect upon regional growth, although not constituting a 'counter-treatment' with respect to regional policies. Furthermore, with reference to the CAP trend foreseen after 2013, existing analyses concur in emphasising the risk of a fundamental conflict between the effects of agricultural intervention and the objectives of the cohesion policy (Bureau and Mahè, 2008, p. 5; Esposti 2008).

A growing awareness of first-pillar CAP's potentially perverse redistributive effects has supported the idea that this distortion originates in the 'disembedding of agriculture from the regional and local context' (Gallent et al. 2008, p. 108), which reinforces the concentration of the policy's benefits upon a few major producers situated in more economically dynamic rural areas. However, in this regard it is important to bear in mind that these studies make reference to the impact of the CAP before the progressive de-coupling of support from production introduced since 2003 by the so called Fischler Reform[2], that has probably (at least partially) mitigated this distortion. This is particularly true for the New Member States that benefit from CAP support mainly through the Single Area Payment Scheme - which is a flat rate per hectare completely decoupled from production and productivity – but also for those EU15 countries (e.g. Germany and Denmark) that adopted a regionalised or hybrid models of Single Payment Scheme. In addition, according to the CAP reform approved in June 2013, in the new programming period (2014-2020) two different mechanisms will support the geographical convergence in direct payments both between and within EU member states: a) the generalised reduction in the existing payment gaps among countries; b) the complete de-coupling of the CAP payment

within each country that will progressively close existing internal gaps in terms of direct payments to farmers belonging to the same member state (European Commission, 2011a and 2013b).

As a consequence, when looking at the post-2013 period the economic dynamism of EU rural areas cannot be determined exclusively by the modernisation of their agricultural structures: the growing diversification of economic activities calls for a response able to satisfy their needs with an increasingly territorial and 'place-based' approach (Saraceno, 2002). This awareness has also been enhanced with the recognition by the parts involved in the political debate of a need for greater integration between the various areas of Community policy (European Commission 1988). The 1996 Cork European Conference on rural development *Rural Europe – Future Perspectives* inaugurated a more systematic approach to agricultural policies by increasing the emphasis on rural development tools and trying to rationalise and reorganise all the instruments within a single 'second-pillar' CAP container. Unfortunately, the mere juxtaposition of a set of highly heterogeneous measures under the same label was the result of a political compromise, which put a new emphasis on the territorial approach, but implicitly accepted the predominance of sectoral measures within the framework of the EU rural development policy (De Filippis and Storti 2002). Not surprisingly, the evolution of this 'hybrid' policy from a sectoral towards a 'place-based' approach has been highly non-linear. While in Agenda 2000 (European Commission 1997), at least in Objective 1 regions, structural funds and rural development measures formed part of the same regional-level programming procedure, for the 2007-2013 financial period these interrelations have been cancelled, bringing rural development policies back within the framework of the CAP: "the most widespread concern is with the separation of the Rural Development

component of the Agriculture-Rural Fund (EARDF) from the whole of cohesion policy" (Barca 2009, p.162).

Having ascertained both the potentially anti-cohesion effects of CAP expenditure and the difficulty of transforming CAP funds from 'sectoral' interventions into more 'territorial' tools, the debate remains concentrated on the existence of real advantages - from the cohesion standpoint - of shifting resources towards measures that have an explicit place-based nature. The real contribution of the EU Regional Policy towards the cohesion process – i.e. an effective capacity to address the long-term factors of regional disadvantage – can certainly not be taken for granted in the light of the significant distortions that characterise its institutional development and implementation (Armstrong 2001; Armstrong and Taylor 2000). As concerns the impact of the EU's regional policy on the objective of economic and territorial cohesion, the empirical evidence is somewhat contradictory (Batchtler and Wren 2006; Martin and Tyler 2006; Wren 2005). Most of the existing studies, whether neoclassical in their approach (Boldrin and Canova 2001) or inspired by the perspective of the 'New Growth Theory' (Magrini 1999), or adopting the standpoint of the New Economic Geography (Martin 1999; Puga 2002), highlight the limited impact of the EU regional policies on the convergence process, and stress the fundamental distortion of market equilibria. Some more recent contributions, while agreeing upon the policy's limited impact on convergence, have proposed a more varied set of explanations for their findings: The distortions produced by Structural Funds on the localisation choices made by companies with the highest innovative potential (Midelfart-Knarvik and Overman 2002); the importance of the receptive capacity of beneficiary regions (Cappelen et al. 2003; Ederveen et al. 2006) and countries (Beugelsdijk and Eijffinger 2005); the role of lagged effects over time (Esposti and Bussoletti 2008) or the imbalanced distribution of funds across axes of

intervention (Rodriguez-Pose and Fratesi 2004). Mohl and Hagen (2010) reviewed at least 15 other quantitative studies, which with similar approaches to those discussed above reached altogether conflicting conclusions on the impact of cohesion policies.

In light of all this, a positive impact on territorial cohesion of changes in the composition of overall Community spending from sectoral interventions in favour of place-based policies - not only through an increase in the overall budget quota reserved to cohesion policies in but also through the incorporation in the same framework of other types of intervention such as Rural Development interventions - cannot be taken for granted. The existing literature on all these policy areas clearly demonstrates that their compatibility with territorial cohesion should be the subject of careful empirical evaluation overcoming the existing separation between *sectoral* and *place-based* approaches.

3. In tandem for cohesion? The empirical analysis of a complex relationship

The analytical separation between *sectoral* and *place-based* policies has made it difficult to undertake systemic comprehensive analyses of regional and agricultural policies, thus preventing not only the quantification of 'non-coordination costs' (Robert et al. 2001) but also the assessment of the real progress made towards coordination and impact on territorial cohesion as a result of changes in the allocation mechanisms and in the composition of Community spending (Batchtler and Polverari 2007).

First of all, existing studies – with differing methodologies – address the problem of evaluating the territorial impact of regional and agricultural policies by trying to identify an appropriate counterfactual ('What would have happened had the policy never been implemented?'). This problem becomes extremely important whenever a

simultaneous and comparative evaluation is attempted of the contribution made to the regional growth processes by policies extremely differentiated in terms of their nature and intrinsic objectives (such as the regional and agricultural policies). It is difficult to quantify the effects of very different policies that can manifest themselves in many different forms and through various mechanisms that imply not only different timescales before any effects become apparent, but also possible and differential 'collateral effects'. Furthermore, ex post impact analysis can only take place after a considerable lapse of time from the conclusion of the programming cycle. More recent studies refer to expenditure prior to 2000, thereby preventing policymakers from drawing any 'lessons' for the future - even provisional - from the experience of the two programming periods that followed on the heels of important reforms.

In order to overcome these difficulties, our analysis concentrates upon the spatial structure of the funds for Regional, Rural Development and Agricultural Policies in order to evaluate potential synergies and conflicts before their attendant measures are implemented. In other words, we are proposing an analysis of the a priori structure of policies rather than an attempt at evaluating their ex-post impact. Therefore, the analysis is concerned with the outcome of the resource allocation process at the territorial level so as to evaluate both the spatial structure and its coherence with the geography of factors of structural disadvantage, upon whose elimination the capacity of any policy to promote territorial cohesion depends.

In order to evaluate the a priori compatibility of Community fund allocation with territorial cohesion objectives, it is necessary – as asserted by the European Commission itself on the occasion of the successive reforms of regional policies – to analyse its degree of territorial concentration. The key assumption in this regard is that territorial concentration is a necessary condition in order to keep the effects of the policies within the areas subject to intervention by ring-fencing spillovers, as far as

possible, within the disadvantaged areas (Dall'Erba 2005) and, therefore, maximising the potential impacts of the policies themselves (Bondonio and Greenbaum 2006). In point of fact such 'external' effects represent an important component of the policy. "The benefits of the Structural Funds when viewed in isolation are modest, thus suggesting that the real long-term benefits depend upon the manner in which the disadvantaged economies react to the opportunities offered by the rest of the EU" (Dall'Erba 2005 p.197).

In the second place, the degree of compatibility of the three areas of Community policy with respect to the cohesion objectives can be evaluated in terms of the association between the actual allocation of financial resources and the regions' factors of structural disadvantage (Crescenzi 2009): this association is 'the measure' of a policy's capacity to allocate its resources where a concentration of disadvantage prevents regions from expressing their potential (Mairate 2006).

As a consequence, in the analysis of the regional allocation of Community funds for Regional Policies, Rural Development and agricultural policies, we will look at:

a) the potential inconsistencies/conflicts in the allocation of funds as between the various policies (composition of expenditure and territorial coordination);
b) the coherence between the various policies and the principle of territorial concentration (the spatial structure of spending);
c) the (potential) capacity of the policies to further the cohesion process through their association with factors of structural disadvantage (coherence with territorial cohesion).

The analysis of the spatial structure will be performed through the calculation of an autocorrelation index Moran's I (Cliff and Ord 1981) computed by means of a

normalised spatial weight matrix based on the inverse linear distance between the centroids of each region[3].

A permutation procedure (999 permutations) is performed in order to assign a pseudo significance to the statistic. If the I index values are greater (lower) than the expected value E(I) this will denote a positive (negative) autocorrelation.

To answer questions a) and c) the following regression model for panel data is specified:

$$y_{i,t} = \alpha + \mu_i + \tau_t + \beta' X_{i,t-1} + \gamma' P_{i,t} + \varepsilon_{i,t} \qquad (1)$$

where:

y is again the per-capita spending at the regional level for the various policies: Regional, Rural Development and first-pillar CAP;

X is the index of structural disadvantage of the regions calculated with the Principal Components Analysis (PCA);

P is the per-capita spending in *OTHER* areas of Community policy other than y

μ are fixed individual effects: the non-observable features of regions that impact upon the allocation of funds but which remain invariant over time;

τ is the temporal trend

ε is idiosyncratic error

and with *i* representing the region, *t* the programming period (1994-99, 2000-06, 2007-13) and *t-1* (for the Index of Structural Disadvantage) the year preceding each programming period (i.e. 1993, 1999 and 2006 respectively).

The estimate of parameter β therefore, indicates the funds' capacity to target the most disadvantaged regions of the European Union. A significant and positive value of parameter β would denote a systematic association between the structural disadvantage of the European regions and the 'intensity' of the support provided by the various policies. This association offers a measure of the compatibility of policies – regardless of their different specific functions – with the more general objective of territorial cohesion. Vice-versa, the lack of significance for this coefficient would suggest a substantially 'neutral' distribution of Community resources from the territorial viewpoint and hence its potential conflict with the cohesion objectives announced by European Commission. In addition, the evolution of this coefficient across different programming periods will test the capability of subsequent policy reforms to impact upon the spatial distribution of funding in line with 'cohesion' objectives.

The estimate of parameter γ on the other hand, is a measure of the trade-offs or synergies operating between different policy areas. A significantly negative value for this parameter would suggest that a 'compensatory' mechanism is at work among the policies thus maintaining a substantial equilibrium as between the transfers received from the various regions of the Union. On the contrary, a positive value for the parameter would suggest that the funds of different policies tend to target the same areas with a 'cumulative' and/or 'knock-on' process among the policies. In addition, the estimation of an interaction term between structural disadvantage and the funds allocated for the various policies will make it possible to evaluate if this cumulative effect coincides with the most disadvantaged areas (suggesting the presence of 'pro-cohesion' synergies) or if it is linked to the capacity of the regions to attract funds from different policies by virtue of characteristics other than their being disadvantaged.

The structural disadvantage index of the regions (x) is defined on the basis of those structural characteristics of regional economies that the economic literature as a whole associates (either singularly or in various combinations) with a reduced or non-existent capacity to converge upon levels of growth and development that characterise the 'core' of the EU (Boschma 2004; Budd and Hirmis 2004; Cheshire and Magrini 2000; Huggins 2009; Pike et al. 2006; Rodriguez-Pose 1998a and b). Such features refer to three principal dimensions: the accumulation of human capital (Lundvall 1992; Malecki 1997; Crescenzi 2005; Huggins 2009), the productive use of such capital in terms of the demand for and supply of specific sectoral skills (Gordon, 2001) and the overall endowment of basic infrastructures (Chancre e Thompson 2000; Crescenzi and Rodriguez-Pose 2011 and 2012), which makes the circulation and productive utilisation of regional resources possible. Each of these possible sources of structural disadvantage finds justification in different strands of the literature on the economic performance of the regions. Thus while the neoclassical approach has given greatest emphasis to the role played by physical capital endowments (public and private) in improving the productivity of a local factors, the latest theories linked to 'endogenous growth' draw attention to the importance of human capital and its 'qualitative' composition (in terms of skill composition) in line with – and especially as regards the latter feature – the literature on the operation of global markets at local levels and upon the determinants of the spatial concentration of unemployment. However, some recent contributions - by integrating various theoretical approaches - have shown how the simultaneous presence of all these factors of 'socio-economic disadvantage' constitutes a permanent obstacle to the long-term development of the European regions (as also those of the United States) (Crescenzi and Rodriguez-Pose 2011 and 2012; Rodríguez-Pose and Crescenzi 2008; Crescenzi et al 2007 & 2013; Kitson et al. 2004). As a consequence, the effectiveness of regional development

policies can be assessed in terms of their capacity to 'target' in an 'equilibrated' fashion all these factors simultaneously. For this reason the capacity of all EU policies to re-distribute Community financial resources, in a manner more or less compatible with the general objective of territorial cohesion, has been empirically tested by evaluating the relationship between structural disadvantage – i.e. the simultaneous presence of factors of disadvantage in all the dimensions discussed earlier – and the funds earmarked to each region. The distributive mechanisms of a policy are, therefore, deemed virtuous from the point of view of territorial cohesion whenever they manage to channel a greater volume of resources towards the most deserving areas in structural terms, i.e. those where structural disadvantage is highest. This is an a priori criterion, which applies independently of the evaluation of the impact of the single policies. Different policies propose different objectives and, therefore, impact on different factors (ranging from the traditional farm income support for the first pillar CAP to the formation of human capital for some regional development programmes). However, the overall geography of the distribution of Community resources has a consistent impact on the most general processes of territorial cohesion through synergies or conflicts that arise between various policy areas. Therefore, an assessment of the capacity of Community redistributive mechanisms to channel resources towards structural disadvantage is an a priori measure of their general compatibility with the requirement of territorial cohesion.

The concept of structural disadvantage as applied to the European regions is operationalized by identifying suitable proxies for each of the foregoing three dimensions: the 'Percentage of the Population with a Tertiary Educational Attainment' and the 'Percentage of the Economically Active Population with a Tertiary Educational Attainment' are chosen as proxies for the accumulation of human capital; the 'Long-Term Unemployed as a Percentage of All Unemployed' and

'the Percentage of the Economically Active Persons in Agriculture' (Federico 2005) are chosen as the proxy for the productive use of human capital; and 'Kilometres of Motorway per 1000 Inhabitants' is the proxy for basic infrastructural assets. The choice of these simple indicators is dictated by the limited availability of homogeneous statistical data for all the European regions commencing from 1993, i.e. the year prior to the first programming period considered in this analysis. The information contained in the variables chosen is synthesised as a single indicator by means of Principal Component Analysis (PCA) (Duntenam 1989; Jolliffe 1986) whose results, set out in Tables A-1 and A-2 in Appendix A, generate the 'Structural Disadvantage Index' used in the following analysis. The first principal component accounts for around 50% of the total variance of the original indicators (as shown by the eigenanalysis of the correlation matrix in Table A-2) and its scores are computed from the standardised value of the original variables by using the coefficients listed under 'Component 1' in Table A-1, pre-multiplied by -1 in order to match the interpretation of the index as a proxy for Structural Disadvantage (i.e. the higher the value of the index the stronger the structural disadvantage of the regions). As customary in the literature, the first Principal Component is used to 'summarize' the information of the original indicators into one single index to be directly compared with expenditure patterns (Rodríguez-Pose and Crescenzi 2008; Crescenzi 2009). Additional components of the PCA – although able to account for additional (but progressively decreasing) variability of the original indicators – do not have an immediate economic interpretation and are, consequently, not included in the analysis[4]. The PCA coefficients assign a large positive weight to educational achievement and infrastructure endowment; these are major components of the socio-economic tissue of the regions. A negative weight is assigned, instead, to the long term component of unemployment and to the percentage of agricultural labour. The

first Principal Component ('Component 1') scores – once pre-multiplied by -1 - constitute the 'Structural Disadvantage Index' introduced into the regression analysis as an aggregate proxy for the structural disadvantage of each region. Regions with reduced infrastructural and human capital endowments and higher rates of long-term unemployment and agricultural labour force suffer from structural disadvantage (higher value of the 'Structural Disadvantage Index') In order to minimize the potential endogeneity between allocated financial resources and regional disadvantage and, at the same time, account for the conditions observed by the policy-makers when allocating the funds, the index is calculated for each year t-1 preceding each programming period (time variant indicator) holding constant the PCA coefficients (computed on the longitudinal dataset[5]).

3.1 A joint territorial database for Community spending from 1994 to 2013.

The analysis carried out in this article is based upon an innovative database containing information on the first and second pillar of the CAP and the Structural Funds of regional policy in the last three programming periods (1994-1999, 2000-2006 and 2007-2013) that referred to the member states of the EU15.

The data are aggregated at the level of the relevant administrative authorities in the framework of the policies considered. Obviously, the administrative level of interest will vary from one Member State to another according to how the responsibilities for agriculture, rural development and regional policies are distributed. Therefore, while in general terms the information gathered contributes towards the establishment of a homogenously regionalised databank, data are organised with reference to different territorial levels (NUTS levels)[6] in different member states.

The information gathered constitutes the sum of the resources directly funded by the European Union, as illustrated in the table in Appendix C. Consequently, financial resources deriving from national co-financing do not form part of the databank used for the analysis. There are two reasons for this: first, the analysis sets out to establish an a priori geographical allocation of resources rather than their territorial impact; second, as we wish to draw attention to the structures of the negotiated policies at a Community level, co-financing would modify the relations between the first-pillar of CAP, which does not envisage a national contribution, and the second pillar of CAP and the Structural Funds.

As concerns the first pillar of the CAP, existing literature has encountered considerable difficulty in obtaining consolidated data at regional level for relatively long time intervals. Some criticism has also been made in recent years on account of the fragmentation and quality of available expenditure data, notwithstanding the "European Transparency Initiative" (Reg. (EC) n° 1290/2005) that requires Member States to annually publish the beneficiaries of appropriations made from the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Rural Development Fund (EARDF). To overcome these limitations, first-pillar CAP data have been processed in an innovative manner based on the 'Farm Accountancy Data Network' (FADN), while the financial appropriations, actually allocated to each territorial unit, have been utilised for rural development and regional policy (See annex B for a detailed discussion of the procedures followed).

In the framework of rural development, as noted earlier, interventions were financed not only by the EAGGF Guarantee section but also by the EAGGF Guidance section up until the last programming period when the resources were merged into a single fund (EAFRD). As regards both the 1994-1999 programming period and Agenda 2000, the data referring to rural development policy come from two sources: DG

REGIO, for data on EAGGF Guidance; DG AGRI[7], for data on EAGGF-Guarantee. In the 2007-2013 programming period, the EAFRD data derived from the single programming instruments of the EU15 member states[8].

Structural Fund data were derived from an ad hoc dataset provided by the Directorate General for Regional Policy of the European Commission (DG REGIO) in May 2009.

Altogether the databank comprises about 3,000 observations that specify the estimate of actual expenditure (for the first-pillar) and the funds allocated (for the Structural Funds and rural development) in the three programming periods considered with regard to the regions of the EU 15 Member States.

EUROSTAT was the source of the data on the structural characteristics of the regions that we used for the computation of the Structural Disadvantage Index.

Countries without a relevant regional articulation (Denmark, Ireland and Luxemburg) were necessarily excluded from the analysis.

4. Empirical Results

4.1 Composition of expenditure and territorial coordination

The analysis of the correlation between regional allocations for the same policy in successive programming periods and between different policies in the same time period sheds light on the equilibrium between persistence and compensation in the relations between the various areas of Community policy. Table 1 sets out a preliminary analysis of the simple correlations (and their statistical significance) between per capita expenditure at a regional level and, respectively, the regional

policies, rural development and first-pillar CAP in the three programming periods considered (1994-1999; 2000-2006; 2007-2013).

If we observe the correlation between expenditure allocations for the same policy in successive programming periods we can evaluate the level of persistence over time of the policy itself in the distribution of its resources at a territorial level. The analysis of persistence in regional expenditure allocations enables us to make a first evaluation of the territorial impact of the reforms that succeeded one another over time in the various Community policy frameworks. Both regional policies and first-pillar CAP exhibit a high level of persistence in the regional allocation of funds between programming periods: for regional policies a 97% correlation was found between 94-99 and 2000-2006, and a 92.5% correlation between the 2000-2006 and 2007-2013 programming periods; as regards the regional distribution of first-pillar CAP expenditure the correlation was respectively 94% and 93%, a sign of the ongoing link between the 'new' CAP, based on decoupled direct payments, and the 'old' one, based on market policy. As regards rural development, the correlations between successive periods showed more dynamism: 64% between 94-99 and 2000-2006; and 80% between 2000-2006 and 2007-2013, due to the significant growth and modification that this policy underwent in the last twenty years, together with the ambiguity of its reform process. For these reasons, the foregoing compromise (*more money to territorial intervention in rural areas, but under the control of the agricultural lobbies and institutions*) decided with Agenda 2000 was crucial: on one hand, it had the merit of introducing a more organic rural development policy, giving it more financial resources, but on the other it was responsible for its 'dilution' in a big container of different measures, the second Pillar of the CAP, which as a component of agricultural policy is still dominated by a sectoral (more than territorial) approach.

[Insert Tab.1 here]

By referring once again to Table 1 we can evaluate the level of correlation between the various policy areas in the same programming period as well as their evolution over time so as to capture the degree of complementarity/substitutability between different EU policies. In this context a significant reduction in the correlation of regional level spending between regional policies and rural development is immediately evident: from 80% in the period 94-99, it falls to 59% in the period 2000-06 and to 50% in the period 2007-13, thus suggesting that these two policy areas have been progressively moving apart. As just mentioned, the origin of this process can be found in the political compromise decided with Agenda 2000, and, which, moreover, has been reinforced during the 2007-2013 programming period, with the abandonment of the integrated programming approach, decoupling rural development policy form regional policies and allocating it in the same agricultural fund also for the intervention in the objective 1 regions.

The association between other policy areas is inferior in relative terms but substantially stable over time.

4.2. Territorial concentration and the spatial structure of expenditure

In order to throw light on the relationship between policies and their potential compatibility with the objective of territorial cohesion, it is necessary to study the spatial distribution of their financial resources and their capacity for geographical concentration in line with the structural disadvantage of regions.

Table 2 illustrates the Moran's I Indices for each policy and programming period and for the Structural Disadvantage Index of the regions. The lack of spatial autocorrelation in the allocation of funds – with an I index close to the expected value, E(I), indicated in the table – would seem to point to an indiscriminate distribution of funds. On the contrary, a positive Moran I index that is significantly different from E(I) denotes the presence of a positive spatial autocorrelation: high spending areas are associated with a 'neighbourhood' of areas with relatively high spending levels, in line with the principle of the 'geographical concentration' of spending for the purpose of maximising its effectiveness in territorial terms.

[Insert Tab.2]

The Moran I index for Regional Policy points to there being a clear concentration of Community spending that tends to increase, albeit marginally, in response to successive reforms and to a progressive reinforcement of the criterion of the territorial concentration of spending. Rural Development Policies, although exhibiting a level of territorial concentration considerably lower than that of the regional policies, reveal a significant increase in their capacity to focus financial resources upon specific areas of intervention in the last programming period (Greenbaum and Bondonio 2004). In other words, despite the progressive 'decoupling' from regional policies discussed earlier, the mechanisms to select the beneficiaries of the rural development policy for the 2007-2013 programming period was able to guarantee a higher level of territorial focus. On the other hand, the geography of first-pillar CAP spending – in line with the sectoral and non-territorial nature of this policy – exhibits a much lower degree of territorial concentration (and statistically less significant) with respect to rural development. Furthermore, this differential tends to widen in the period 2007-2013.

In order to evaluate whether or not the degree of territorial concentration reached by the policies is suitable for tackling the persistent structural disadvantage of the

economic periphery of the EU, it is necessary to compare the degree of spatial autocorrelation with that of the Structural Disadvantage Index. Structural disadvantage for the year preceding the beginning of each programming period (Table 2) exhibits much more spatial concentration than Community funds, which should, instead, be contributing towards attenuating this disadvantage, thereby suggesting the need to move towards a further increase in the territorial concentration of interventions (Crescenzi 2009).

Altogether these results suggest that shifting resources from first-pillar CAP to Rural Development interventions can increase the coherence of overall Community spending in terms of the territorial concentration criterion, and potentially that the degree of coherence can move closer towards the degree of structural disadvantage of the regions. However, if the CAP is to contribute towards the achievement of the EU's long-term objectives, it does appear necessary to make an improvement in the distributive criteria also for the first-pillar, taking greater account of the economic and territorial disadvantages that characterise the context in which agricultural activity is performed. The further move of the CAP 2014-2020 towards a first-pillar support fully decoupled and progressively based on a flat rate per hectare goes precisely in this direction.

4.3 The association between funds received and structural disadvantage

The estimate of the regression model specified in Equation 1 offers a systematic analysis of the territorial structure of the Community funds and of their capacity to develop reciprocal synergies and target the more disadvantaged areas.

Table 3 sets out the results of the cross-section heteroskedasticity-robust OLS estimate of the empirical model that was estimated separately for each Community

policy and each programming period. The per capita spending at regional level for each Community policy is, therefore, regressed onto the Structural Disadvantage Index discussed above and onto a set of national dummies whose purpose is to isolate any national fixed effect: the systematic capacity of regions belonging to the same country to receive more (or less) funds regardless of their degree of disadvantage with respect to other areas of the Union.

[Insert Tab.3]

The results concerning Regional Policies (Table 3, columns 1-3) highlight a positive and statistically significant link between structural disadvantage and funds received by the regions. A higher degree of structural disadvantage is associated with a higher level of spending on regional policies regardless of the country to which the region belongs. The association between disadvantage and Community spending increased from 2000 as shown by an increase in the significance of the coefficient.

The analysis of the coefficients associated with national dummy variables (lower part of the table, indicated by the corresponding country codes) provides confirmation of the model's explanatory power. The regions of post-unification Germany (DE) received (in the period 94-99, column 1) systematically higher levels of financing with respect to the other regions, in addition to what would have been 'justified' by their degree of structural disadvantage. However, this effect (shown by the magnitude and significance of the 'DE' dummy variable coefficient) tends to disappear in the successive programming periods (columns 2 and 3). On the contrary, the 'premium' for the regions of the cohesion countries, Portugal (PT), Spain (ES) and Greece (GR), is systematic and persistent – positive and statistically significant in all programming periods (columns 1, 2 and 3). This premium is provided in addition to the Cohesion Fund reserved for cohesion countries and Ireland, and from which the latter withdrew in January 2004[9]. The data provide no confirmation, instead, of the hypothesis that a

redistribution mechanism operates between different policy contexts in order to systematically favour the United Kingdom as 'compensation' for the limited benefits obtained from the first pillar of the CAP[10]. In order to improve the efficiency of the estimates and formally test the stability of the relationship between Structural Disadvantage and EU funding, the different programming periods are pooled thus simultaneously estimating the coefficients for all time periods (column 4). The pooled OLS estimations confirm the robustness of previous results. In addition the F-test rejects the null hypothesis of constant coefficients in the three programming periods (column 4 – bottom section of the table), confirming that changes in the relationship between funding and structural disadvantage over time are statistically significant.

As regards Rural Development Policies (Table 3, columns 5-8) the association between funds and structural disadvantage appears to be considerably weaker than that of the regional policies, and above all is found to wane over time commencing from the 2000-2006 programming period (the statistical significance of the changes in these coefficients over time is confirmed by the formal statistical test in the pooled OLS estimates reported in table 8). This weakness also seems to underline the predominance of the sectoral function in the criteria used for distributing resources within the framework of rural development. Therefore, the progressive 'decoupling' between the regional policies and rural development interventions, as observed in the preceding paragraph, is accompanied by a reduction in the association between the two policies and the structural disadvantage of the regions probably due to the abandonment of the integrated programming among the various funds. If we consider the distribution of the 'national premiums' implicit in the regional allocation of funds for Rural Development (again by looking at the National Dummy variables in the lower part of the table) we find, in this case too, a mechanism for the assignment of premiums to cohesion countries (significant and positive national dummies in all

programming periods) that, furthermore, was later extended – commencing from the period 2000-2006 – to some economically strong countries such as Sweden, Finland and Austria; which may, in part, be explained by their possessing a high proportion of agricultural land classified as Less Favoured Areas (IEEP, 2006)[11].

As concerns the first-pillar of the CAP (Table 3, columns 9-12) the association with disadvantage remains positive and significant, in line with the findings of Tarditi and Zanias (2001). However, in this case, the test for the stability of these coefficients over time (column 12) fails to reject the null hypothesis, suggesting that various policy reforms have not significantly changed the targeting of this stream of funding towards structurally disadvantaged areas. In addition, the total variability in the regional allocation of funds explained by the model (as indicated by the R-square) is relatively limited and decreases over time. And, as the following table clearly illustrates, this relationship disappears altogether when additional controls for the characteristics of the regions are introduced into the model. Nevertheless, it is possible to ascertain that as regards the first-pillar – in line with our expectations – no 'premium' mechanism is detectable in favour of countries on the EU's periphery, even if the initial penalisation of Portugal (found for the period 94-99, negative coefficient for the Dummy Variable PT in column 9) seems to have been corrected in successive periods (in columns 10 and 11 the coefficient loses its significance). In addition, even the penalisation to which the Italian (IT) and British (UK) regions were subject (again negative sign of the corresponding dummy variable) also seems to have disappeared in the more recent programming periods (columns 10 and 11) although in these same periods the 'premium' for the French (FR) regions was reinforced (the 'France' national dummy variable becomes positive and significant in successive programming periods, columns 10 and 11).

The value of the Moran's I from the regression residuals is reported in the table for each regression, alongside the usual diagnostic statistics. The weight matrix for the computation of the Moran's I is based on the same weighting scheme and procedure adopted for the calculation of the Index in table 2. The Moran's I test detects the presence of some residual spatial autocorrelation only in regressions 1 to 3 (Regional Policy), while in all other regressions the test is not statistically significant. In order to check the robustness of the estimated coefficients all models are re-estimated by means of a SARAR model (reported in the 'Robustness Checks' section) that explicitly accounts for spatial dependence in the data, delivering similar results.

Table 4 sets out the results of the estimation of the model of empirical analysis as specified in Equation 1, estimated with two-way fixed-effects panel methodology[12]. Spatial autocorrelation in the residuals has been checked for by using the Moran's I test for each year. The test statistics are not significant for the majority of the years covered by the regression and in all other cases the magnitude of Moran's I is low. However, in the 'Robustness Checks' section of the paper, all models are re-estimated by means of Spatial Panel Data Techniques, confirming the robustness of our results.

The availability of regionalised expenditure data for the three consecutive programming periods enables us to make simultaneous use of both the cross-section and time-series variability of the data through the methodologies of panel data analysis. The estimation of the empirical analysis model in its fixed effects panel data specifications makes it possible to evaluate the relationship between structural disadvantage and Community funds after controlling for all the region-specific characteristics that are non-observable/non-measurable and invariant over time (fixed effects) and for all factors common to all regions and subject to development over time (temporal dummies). This specification, therefore, allows us to evaluate the capacity of the various policies to target their funds upon structural disadvantage by

removing from this relationship not only the effects of belonging to a certain country (as in the cross-section analysis discussed earlier) but also – for example – those of geographical position, historical factors, institutional quality (i.e. the general capacity of local institutions to attract EU resources over and above their structural disadvantage), sectoral macro-structure, firm-size structure etc..

[Insert Tab.4]

Columns 1 and 2 of Table 4 reveal a weak relationship between structural disadvantage and funds for Regional Policies after controlling for the time-invariant characteristics of the regions. A low correlation between funds and structural disadvantage that varies over time denotes a limited capacity on the part of regional policies to target the more structurally backward areas by tackling the factors of disadvantage that can develop over time. If we observe the relationship between various policy areas (column 2) it does not appear that any 'compensatory' mechanism exists at a regional level between regional policies and the first pillar of the CAP: receiving an amount of funds that is lower (higher) with respect to the average in terms of first-pillar CAP funds is not compensated by a larger (smaller) appropriation in terms of Structural Funds, as indicated by the non-significant coefficient. The relationship between the two policy areas is found to be non-systematic even when it is attempted to relate potential compensation synergies/mechanisms to structural disadvantage by introducing an interaction term between the two variables (column 3).

The analysis of the structure of rural development policies – which as suggested by the foregoing analysis have undergone very significant developments in recent years, in terms of their financing and territorial structure – reveals a good capacity to target financial resources upon the most disadvantaged areas (column 4). The somewhat 'hybrid' nature of the Rural Development Policies, which is the result of a place-

based transformation of the 'old' sectoral policies, clearly emerges when we consider the 'knock-on effect' of the rural development funds with regard to both first-pillar CAP funds (column 5) and regional policy funds (column 7). After controlling for conditions of structural disadvantage, the areas that obtain more funds for rural development policies are those that have received a relatively higher amount of funds for the other two areas of Community policy, which denotes a carry-over effect not found in the regional policies. Is this a virtuous process for concentrating the resources of different policies in disadvantaged areas? Unfortunately, the interaction term between spending on other policies and the index of structural disadvantage indicates that synergies of this type are absent: as concerns both first pillar CAP spending (column 6) and regional policies (column 8), the concentration of funds in the same areas does not coincide with the most disadvantaged areas.

The rural development policies, therefore, seem to be significantly influenced by the other policy areas with respect to which they absorb resources and 'borrow' intervention models, but this influence does not translate itself into synergetic financial allocations in favour of the more disadvantaged areas. Conversely, the reduction in the relative weight (in terms of the Community budget) of first pillar CAP spending would seem to favour an increase in the overall relationship between spending and structural disadvantage (thus making the EU budget altogether more 'pro cohesion'): first pillar CAP spending is quite unrelated to the disadvantage of beneficiary areas after controlling for the time-invariant characteristics of the regions (column 9). However, a regional allocation of funds that is the most compatible with the territorial cohesion objectives is not an automatic consequence of the shifting of resources from one policy area to another.

A systematic reading of the results suggests that the reinforcement of rural development policies can potentially promote compatibility between the allocation of

total EU resources and cohesion. Yet the development of synergies in disadvantaged areas is still very limited as this is crucially conditioned by the need for a more pronounced 'territorial vocation' of these policies, as also for a stronger integration and coordination with other policies 'on the ground'. In the same way, the capacity of regional policies to target resources upon the weaker areas has still to be improved and such a capacity is certainly very much influenced by changes in the mechanisms of policy regulation.

Further analysis of spatial dependence in funds' allocations and robustness checks

Even if the diagnostic tests on the residuals (Moran's I) tend to exclude the presence of residual spatial autocorrelation, in order to test the robustness of the results and further explore the spatial patterns of the expenditure for different EU policies, both cross-sectional and panel data regressions are re-estimated by means of spatial econometric techniques that explicitly model spatial interactions between regions[13].

In table 5 the cross-sectional analysis of the relationship between structural disadvantage and allocated funds is re-assessed by means of a SARAR (Spatial-autoregressive model with spatial-autoregressive disturbances) model (Kelejian and Prucha, 2010). In this model the funds allocated to region *i* depend also on spatially-weighted average of the dependent variable observed for the other cross-sectional units (lambda parameter in table 5) as in the standard spatial-autoregressive (SAR) model. However, SARAR models also allow for the disturbances to be generated by a spatial-autoregressive process (as in the Spatial Error Model): the part of regional funding that is not justified by structural disadvantage (the error term) is also allowed to follow a spatial pattern (rho parameter in table 5).

The SARAR models are estimated by means of maximum likelihood, specifying the spatial weight matrixes for both the spatial-autoregressive and the spatial-error terms as discussed in section 3 of this paper[14].

[Insert Tab.5]

The results reported in Table 5 confirm the conclusions discussed in the previous section on the relationship between expenditure and structural disadvantage. The magnitude and significance of the lambda parameters confirm that after controlling for structural disadvantage and national dynamics the level of funding of neighbouring regions has either a very limited negative (for regional policies) or a non-significant (rural development policy after 2000 and CAP) impact on internal allocations. The rho parameters are significant only for regional policy and limited in magnitude, suggesting that some residual spatial interactions might be in place in this policy area due to political economy processes at the local level not captured by the present analysis (De Filippis et al. 2013).

As a final robustness check the panel data models presented in Table 4 are re-estimated in order to take into account spatial interactions by following Elhorst (2009), Lee and Yu (2010a and 2010b) and LeSage & Pace (2009). The specifications included in Table 4 are estimated – in line with the cross-sectional analysis presented above - as SARAR[15] models for panel data with fixed effect[16] and the corresponding results (estimated by Maximum Likelihood and with W matrices defined as for the cross-sectional case) are presented in Table 6.

[Insert Tab.6]

The spatial panel data results reinforce the key conclusions presented in previous paragraphs. The association between structural disadvantage and EU funding becomes non significant (or even negative) after controlling for spatial interactions: it is

confirmed to be non-significant for both Regional Policy (columns 1, 2 and 3) and CAP first Pillar (column 9) and either non-significant (column 4) or negative (columns 5, 6 and 7) for Rural Development Policies. The negative association between structural disadvantage and rural development funds only emerges in the spatial model after controlling for the allocations under the PAC first pillar (column 5) and Regional Policy (column 7). In other words, when spatial interactions between regions are fully accounted for and after controlling for funding received via other EU policies, Rural Development Funds tend to follow a redistributive logic that 'rewards' relatively less disadvantaged regions (negative sign of the β parameter). This result highlights the risk – extensively discussed in the conceptual section of the paper – that Rural Development policies might be used to compensate 'core' regions for the progressive reduction in CAP first-Pillar funding, curbing their capability to target territorial disadvantage factors (Bureau and Mahè 2008; Esposti 2008; Gallent et al.2008). The coordination between Regional and Rural Policies is confirmed to be positive and significant (column 7) while, in this spatial analysis, the PAC First Pillar seems to be better coordinated with Regional Policies than with Rural Development Policies (Columns 2 and 5). However, the synergies between various policies in structurally disadvantaged areas (columns 3, 6 and 8: Interaction terms with structural disadvantage) are confirmed to be non-significant. The coefficients of the spatially lagged dependent variable and the spatial error reported in the lower section of Table 6 suggest the presence of significant spatial interactions in the allocation of the funds – linked to political economy factors – whose further exploration is in our agenda for future research.

5. Conclusions

The relations between the various EU policy areas and their degree of compatibility with the objective of EU territorial cohesion is constantly evolving and is still far from being consolidated. The on-going policy debate on the future of the EU policies exhibits a growing emphasis upon coordination between policies and their compatibility with the cohesive territorial development of the European Union. However, the analysis of the impact that successive adjustments to the Community budget and the macro processes of reform have had upon the spatial structure of expenditure demonstrate that if, on the one hand, various policy areas show significant interrelations, on the other, the synergies between policies remain relatively limited and also reveal a trend that is not always in line with the 'declared' objectives of the reforms undertaken.

Nevertheless, the results produced in this paper do provide material for timely 'policy-learning', thus making it possible to clearly identify the weaknesses of the various policies with respect to coordination and territorial cohesion, and offering useful insights for the assessment of the potential territorial implications of the composition of the 2014-2020 Community budget.

Changes in the composition of the EU budget in terms of the relative 'weight' of different policies will certainly open new 'windows of opportunity' for territorial cohesion (De Filippis et al. 2013). At a first glance, the decreasing trend in financial emphasis on CAP expenditure - which is confirmed for 2014-2020 financial framework - should make it possible to reinforce both Rural Development policies and Regional Policies, and allow coordination and territorial cohesion to benefit from their 'place-based' approach. However our results have also made potential threats apparent.

First of all, our results highlight the need to increase coordination between the various contexts of Community policy by – for example – bringing (back) Rural Development Policies and Regional Policies within a Common Strategic Framework. Yet it is also clear that neither coordination with regional policies nor the shifting of resources from one policy area to another are 'virtuous' in themselves as regards territorial cohesion. All areas of Community policy – including regional policies – have their light and dark sides in terms of how they target resources on structural disadvantage: the capacity to make a positive contribution to territorial cohesion crucially depends upon the policies actually implemented 'on the ground' within the single policy areas and upon the respective allocation mechanisms.

Second, the impact of a reinforcement of Rural Development Policies and Regional Policies on territorial cohesion, is largely dependent upon the capacity of these policies not to 'lose territorial focus' over time (Greenbaum and Bondonio 2004), thereby frustrating the benefits of a place-based approach and resurrecting the equitable distribution problem associated with the 'old sectoral paradigm'. In this sense, the introduction of thematic sub-programmes within the RDPs seems to go in the right direction. Furthermore, rural development policies should learn from the experience of regional policies but without replicating their defects. In this regard, our results suggest that incorporating rural development policies within the complex framework of cohesion policies would not by itself constitute a guarantee that these interventions would be more cohesion-orientated. Even for regional policies, there is still significant room for improvement in the funds' allocation mechanisms from the point of view of increasing their spatial concentration and focus on disadvantage. The progressive increase in the resources earmarked to this area of Community policy has produced only limited benefits in terms of spending structure and seems to have led to a partial 'dilution' in the interventions over time.

Third, the results of the analysis on the territorial structure of fund allocation suggest to balance the opposing views emerging in the debate on the future of the EU Regional Policy. Some economists suggest that 'some reallocation of the funds across target regions would lead to higher aggregate growth in the EU and could generate faster convergence than current scheme does' (Becker et al. 2010, p.1). Conversely, the Barca Report (2009) adopted a more 'conservative view on territorial allocation' (p.p.113 and 158) on the basis of the lack of valid alternatives and the high political 'costs' of negotiations on these issues. Our analysis has highlighted the possibility of improving the geographic concentration of financial resources in all spheres of Community policy but it also suggested that this objective should be pursued by means of a careful evaluation of the specific needs of each area (also in terms of thematic priorities). For this purpose a set of robust indicators of economic and social disadvantage can certainly support a more transparent redistribution of financial resources. However, more effective targeting of financial resources towards structural disadvantage also requires the mobilization of national and local actors, in the framework of a stronger coordination at EU level. This is certainly a long evolutionary process, but the 'Common Strategic Framework' approach for a synergic use of all Community funds adopted by the European Commission (2012) and confirmed in the Reform of the EU Cohesion Policy 2014-2020 (European Commission 2013a) seem to be going in the right direction.

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APPENDIX A –Structural Disadvantage Index for the EU Regions: Principal Components Analysis (PCA)

Table A-1 – Structural Disadvantage Index: Principal Components Analysis, Scoring coefficients (1993-2006)
sum of squares(column-loading) = 1

Variable	Component* 1	Component 2	Component 3	Component 4	Component 5
Agricultural Labour Force	-0.4357	-0.1607	0.5541	0.6907	-0.0137
Long Term Component of Unemployment	-0.1988	0.6518	0.5816	-0.439	0.0674
Education Population	0.5864	-0.1657	0.3517	0.0632	0.7078
Education Employed People	0.582	-0.0958	0.3971	0.0123	-0.703
Kms of motorways per thousand inhabitants	0.2967	0.716	-0.2706	0.571	0.0052

*For the calculation of the Structural Disadvantage Index, the score for Component 1 has been pre-multiplied by -1 to match the interpretation of the index as a proxy for Structural Disadvantage (i.e. the higher the value of the index the stronger the structural disadvantage of the region)

Table A-2 – Structural Disadvantage Index: Principal Components Analysis, Principal components/correlation

Component	Eigenvalue	Difference	Proportion	Cumulative
Component 1	2.424	1.29763	0.4848	0.4848
Component 2	1.12637	0.102927	0.2253	0.7101
Component 3	1.02344	0.611799	0.2047	0.9148
Component 4	0.411645	0.397104	0.0823	0.9971
Component 5	0.0145409	.	0.0029	1

APPENDIX B – Methodology for the computation of Common Agricultural Policy-First Pillar expenditure at the Regional Level

The following Farm Accountancy Data Network (FADN) PUBLIC DATABASE indicators were used for the computation of CAP-First Pillar Payments: Total Subsidies on Crops[17] (SE610), Total Subsidies on Livestock[18] (SE615) and Decoupled Payments[19] (SE630). Conversely, "Environmental Subsidies" (SE621) as per art. 69 Reg. (CE) n. 1782/2003 were not included in the computation of total regional expenditure.

The following steps were followed for the computation of 'Total Regional Expenditure for first-pillar CAP:

1) The above-mentioned annual subsidies (Euro/Farm) were added up for each region and multiplied by the number of farms located in each region (total regional subsidies) and each member state (total national subsidies);
2) Total national subsidies calculated on the basis of FADN data were compared with actual payments as reported in the Yearly Financial Reports of EAGGF – Guarantee / EAGF (European Commission, 1994-2009);
3) In order to account for non-commercial farms not covered by the FADN database, the difference between actual and estimated national payments was subdivided across regions in proportion to their share of non-FADN farms (i.e. Number of Non-FADN Farms in Region i / Total Number of Non-FADN Farms in Country j) calculated from EUROSTAT data for each region;
4) Total regional subsidies were calculated as the sum of 'Total regional subsidies for FADN-Farms' (Step 1) and 'Total regional subsidies for Non-FADN-Farms' (Step 3).

5) Total payments in each Programming Period (to match Structural Funds and Rural Development expenditure) computed reiteration of Steps from 1 to 4 for each individual year.

In order to conduct a robustness check, Total Regional Payments estimated with this procedure were compared with a sample of actual payments at the regional level available from the Italian National Paying Agency. The Pearson Correlation between regional level payments is very high (0.98)[20].

Appendix C – Databank structure by programming period, policy area and source of funding

<table>
<tr><td></td><td>Programmes</td><td colspan="3">1994-1999</td><td>Programmes</td><td colspan="2">2000-2006</td><td>Programmes</td><td>2007-2013</td></tr>
<tr><td>Agricultural policies</td><td>CAP - first pillar</td><td colspan="3">EAGGF - Guarantee</td><td>CAP - first pillar</td><td colspan="2">EAGGF - Guarantee</td><td>CAP - first pillar</td><td>EAGF</td></tr>
<tr><td rowspan="6">Rural development</td><td></td><td colspan="3">EAGGF - Guarantee
(Accomp. measures)*</td><td></td><td colspan="2">EAGGF - Guarantee</td><td rowspan="6"></td><td rowspan="6">EAFRD</td></tr>
<tr><td>Ob. 1</td><td colspan="3" rowspan="5">EAGGF - Guidance</td><td></td><td colspan="2" rowspan="5">EAGGF - Guidance</td></tr>
<tr><td>Ob. 5A</td><td>Ob. 1</td></tr>
<tr><td>Ob. 5B</td><td>Leader +</td></tr>
<tr><td>Ob. 6</td><td></td></tr>
<tr><td>Leader II</td></tr>
<tr><td rowspan="7">Cohesion Policies</td><td>Ob. 1</td><td colspan="3">ERDF ESF FIFG</td><td rowspan="2">Ob. 1</td><td colspan="2" rowspan="2">ERDF ESF FIFG</td><td rowspan="2">Convergence</td><td>ERDF</td></tr>
<tr><td>Ob. 6</td><td colspan="3">ERDF ESF FIFG</td><td>ESF</td></tr>
<tr><td>Ob. 2</td><td>ERDF</td><td>ESF</td><td rowspan="2"></td><td rowspan="2">Ob. 2</td><td>ERDF</td><td>ESF</td><td rowspan="3">Regional Competitiveness and Employment</td><td>ERDF</td></tr>
<tr><td>Ob. 5B</td><td>ERDF</td><td>ESF</td><td>ESF</td></tr>
<tr><td>Ob. 3</td><td>ESF</td><td colspan="2" rowspan="2"></td><td rowspan="2">Ob. 3</td><td rowspan="2">ESF</td><td rowspan="2"></td><td rowspan="2">ESF</td></tr>
<tr><td>Ob. 4</td><td>ESF</td></tr>
<tr><td>13 Comm. Initiatives</td><td colspan="3">several funds</td><td>4 Comm. Initiatives</td><td colspan="2">several funds</td><td>Territorial Cooperation</td><td>ERDF</td></tr>
</table>

*Information on accompanying measures for the period 1994-1999 (EAGGF-guarantee) are not currently available.

EAGF: European Agricultural Guarantee Fund

EAFRD: European Agricultural Fund for Rural Development

ERDF: European Regional Development Fund

ESF: European Social Fund

FIFG: Financial Instrument for Fisheries Guidance - The databank has no information on the Cohesion Fund

Table 1 - Correlation Analysis: Per Capita Expenditure for Regional Policy, Rural Development and PAC 1st Pillar

	Regional Policy 94-99	Regional Policy 00-06	Regional Policy 07-13	Rural Development 94-99	Rural Development 00-06	Rural Development 07-13	PAC 1st Pillar 94-99	PAC 1st Pillar 00-06	PAC 1st Pillar 07-13
Regional Policy 94-99 (Per Capita Expenditure)	1								
Regional Policy 00-06 (Per Capita Expenditure)	0.9680*	1							
	(0.000)								
Regional Policy 07-13 (Per Capita Expenditure)	0.8961*	0.9250*	1						
	(0.000)	(0.000)							
Rural Development 94-99 (Per Capita Expenditure)	0.8090*	0.7884*	0.7464*	1					
	(0.000)	(0.000)	(0.000)						
Rural Development 00-06 (Per Capita Expenditure)	0.5553*	0.5946*	0.5645*	0.6377*	1				
	(0.000)	(0.000)	(0.000)	(0.000)					
Rural Development 07-13 (Per Capita Expenditure)	0.4498*	0.4909*	0.4982*	0.5626*	0.7998*	1			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
PAC 1st Pillar 94-99 (Total Regional Payment pc)	0.4126*	0.4475*	0.4156*	0.4755*	0.3699*	0.3390*	1		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
PAC 1st Pillar 00-06 (Total Regional Payment pc)	0.3897*	0.4315*	0.4110*	0.4760*	0.4545*	0.4961*	0.9374*	1	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
PAC 1st Pillar 07-13 (Total Regional Payment pc)	0.3869*	0.4126*	0.3800*	0.4687*	0.4152*	0.4155*	0.8498*	0.9347*	1
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

(P-values in parentheses - *** p<0.01, ** p<0.05, * p<0.1)

Tab.2 - Territorial concentration of expenditure for Regional, Rural Development and PAC 'first pillar' - Measures of global spatial autocorrelation

Variables	I	E(I)	sd(I)	z	p-value
Regional Policy 94-99	0.244	-0.007	0.042	5.973	0.000
Regional Policy 00-06	0.25	-0.007	0.042	6.14	0.000
Regional Policy 07-13	0.258	-0.007	0.042	6.305	0.000
Rural Development 94-99	0.13	-0.007	0.042	3.254	0.001
Rural Development 00-06	0.11	-0.007	0.04	2.932	0.002
Rural Development 07-13	0.201	-0.007	0.042	5.01	0.000
PAC 1st Pillar 94-99	0.116	-0.007	0.042	2.922	0.002
PAC 1st Pillar 00-06	0.12	-0.007	0.042	3.03	0.001
PAC 1st Pillar 07-13	0.105	-0.007	0.042	2.676	0.004
Index of Structural Disadvantage (PCA) 1993	0.339	-0.007	0.042	8.209	0.000
Index of Structural Disadvantage (PCA) 1999	0.325	-0.007	0.042	7.863	0.000
Index of Structural Disadvantage (PCA) 2006	0.317	-0.007	0.042	7.683	0.000

Table 3 - Cross Section Analysis and Pooled OLS with period dummies- Robust Standard Errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	Regional Policy	Regional Policy	Regional Policy	Regional Policy	Rural Development	Rural Development	Rural Development	Rural Development	CAP 1st Pillar	CAP 1st Pillar 1	CAP 1st Pillar	CAP 1st Pillar
	1994-99	2000-06	2007-13	1994-2013 (Pooled)	1994-99	2000-06	2007-13	1994-2013 (Pooled)	1994-99	2000-06	2007-13	1994-2013 (Pooled)
Index of Structural Disadvantage (PCA)	54.05**	85.97***	80.38***	62.29***	17.27***	35.89*	21.02*	22.95***	189.3***	263.7***	224.0***	218.5***
	(20.82)	(28.58)	(23.87)	(19.04)	(6.038)	(18.34)	(11.13)	(8.711)	(44.94)	(63.44)	(67.28)	(45.55)
SE	28.97	21.67	85.08	45.24	7.375	114.0***	173.6***	98.31***	-193.8	139.4	132.7	26.10
	(33.09)	(88.38)	(68.78)	(45.67)	(10.66)	(22.32)	(11.21)	(15.94)	(148.8)	(145.7)	(150.4)	(91.84)
DE	242.3***	273.1*	219.0**	244.8***	59.75*	91.04*	89.73**	80.17***	-228.5	-157.5	-61.47	-149.2
	(91.83)	(145.8)	(106.5)	(69.25)	(32.60)	(46.15)	(35.91)	(24.47)	(153.1)	(166.9)	(189.6)	(102.8)
IT	131.6	71.79	51.63	85.01	34.07	25.39	89.90	49.79	-650.0***	-708.8**	-543.4*	-634.1***
	(88.24)	(147.1)	(113.1)	(70.95)	(30.67)	(77.78)	(54.96)	(35.77)	(220.7)	(276.7)	(298.7)	(157.2)
FR	40.13	-72.09	-107.4*	-46.47	-0.0428	-3.962	31.67	9.222	304.2	450.9*	544.8**	433.3***
	(50.94)	(97.10)	(61.45)	(45.77)	(15.31)	(40.70)	(24.87)	(20.28)	(208.7)	(236.7)	(250.0)	(136.5)
AT	-27.67	-78.80	-139.9*	-82.14	-9.364	323.4***	420.3***	244.8***	-466.7***	-116.7	-302.3	-295.2**
	(70.94)	(123.9)	(83.59)	(57.68)	(17.34)	(45.77)	(26.96)	(36.77)	(168.0)	(190.3)	(205.8)	(115.7)
PT	1,095***	1,402***	1,310***	1,269***	125.6***	206.5**	227.0***	186.4***	-587.4**	-642.8*	-521.2	-583.8***
	(99.77)	(184.6)	(195.3)	(98.09)	(29.75)	(85.07)	(49.44)	(36.51)	(259.3)	(335.9)	(343.2)	(183.7)
NL	20.15	-93.19	-154.4***	-75.81*	-10.51	-48.99*	-30.30*	-29.94*	-129.2	-317.6*	-249.6	-232.1**
	(50.57)	(96.87)	(53.73)	(45.10)	(12.98)	(29.25)	(18.24)	(17.87)	(154.1)	(162.7)	(172.3)	(102.8)
UK	83.71	-14.93	24.00	30.93	-10.92	-39.82	24.46	-8.761	-325.6**	-294.1*	-161.0	-260.2***
	(59.20)	(90.97)	(84.98)	(49.74)	(12.94)	(27.58)	(21.95)	(17.32)	(152.7)	(159.4)	(174.7)	(99.31)
ES	615.0***	677.9***	430.2***	574.4***	84.62***	187.1**	156.3***	142.7***	-32.19	367.6	617.5**	317.6**
	(86.93)	(134.7)	(102.1)	(66.11)	(19.48)	(71.97)	(45.40)	(30.65)	(211.0)	(278.0)	(305.9)	(156.8)
GR	1,193***	1,754***	1,109***	1,352***	150.1***	241.2***	237.4***	209.6***	419.9	393.3	421.0	411.4**
	(112.3)	(177.7)	(115.0)	(85.14)	(28.72)	(80.30)	(49.07)	(35.23)	(270.0)	(331.8)	(402.7)	(195.2)
FI	29.19	175.4	142.1	115.6*	33.78*	197.1	511.2***	247.4**	735.7***	1,914***	1,619***	1,423***
	(54.28)	(138.1)	(100.2)	(64.27)	(20.01)	(191.5)	(169.5)	(97.64)	(168.6)	(339.8)	(331.9)	(208.8)
Dummy 1994				-117.6***				-127.4***				-228.8***
				(29.47)				(13.78)				(66.24)
Dummy 2000				121.7***				-4.015				76.21
				(35.18)				(18.04)				(73.37)
Interaction Term Index of Structural Disadvantage*Dummy 1994				-25.33				-8.476				-11.18
				(20.60)				(8.218)				(44.17)
Interaction Term Index of Structural Disadvantage*Dummy 2000				58.86**				13.81				32.46

				(24.43)				(10.03)				(46.72)
Constant	129.9**	338.7***	326.9***	263.8***	40.06***	111.9***	78.88***	120.8***	925.5***	1,103***	946.5***	1,043***
	(50.88)	(97.31)	(61.41)	(49.12)	(15.06)	(40.76)	(25.15)	(20.58)	(157.9)	(172.3)	(191.7)	(114.5)
Observations	139	139	139	417	139	139	139	417	139	139	139	417
R-squared	0.811	0.827	0.787	0.795	0.502	0.421	0.604	0.461	0.537	0.539	0.465	0.500
Moran's I Test	0.092***	0.058**	0.067***		-0.059	-0.047	0.013		-0.002	-0.003	-0.016	
p-value	(0.009)	(0.061)	(0.037)		(0.104)	(0.138)	(0.314)		(0.45)	(0.459)	(0.419)	
F-Test on Coeff.Stability over time (Index Structural Disadvantage)[1]				6.47***				2.71**				0.6
Prob > F				[0.0017]				[0.068]				[0.5503]

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

[1.] Null Hypothesis: Beta Index of Structural Disadvantage 1994 = Beta Index of Structural Disadvantage 2000 = Beta Index of Structural Disadvantage 2007

Tab. 4 - Structural Disadvantage and the Regional Distribution of EU funds: Panel Data Analysis (Fixed Effect Two-Way), Regional Policy, Rural Development Policy, PAC 1st Pillar 1994-2013

VARIABLES	(1) Regional Policy	(2) Regional Policy	(3) Regional Policy	(4) Rural Development	(5) Rural Development	(6) Rural Development	(7) Rural Development	(8) Rural Development	(9) CAP 1st Pillar 1
	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013
Structural Disadvantage Index (PCA) Panel	44.27	47.71*	30.17	27.40*	32.06**	44.55***	24.81*	26.92*	-54.84
	(27.45)	(26.06)	(30.00)	(14.33)	(13.79)	(14.25)	(13.51)	(14.26)	(50.63)
PAC 1st Pillar		0.0627	0.0630		0.0849***	0.0847***	0.0753**	0.0749**	
		(0.0565)	(0.0578)		(0.0326)	(0.0318)	(0.0309)	(0.0304)	
Regional Policy							0.152***	0.157***	
							(0.0241)	(0.0290)	
Interaction Term Disadvantage*PAC 1st Pillar			0.0153			-0.0109			
			(0.0185)			(0.00865)			
Interaction Term Disadvantage*Regional Policy								-0.00472	
								(0.0101)	
TD00	96.02***	89.25***	89.14***	-19.89	-29.06**	-28.98**	-42.62***	-42.39***	108.0**
	(27.00)	(25.89)	(26.03)	(13.89)	(13.72)	(13.81)	(12.82)	(12.80)	(43.17)
TD94	-169.6***	-159.3***	-155.6***	-159.7***	-145.7***	-148.4***	-121.5***	-121.1***	-164.2***
	(34.05)	(36.18)	(36.57)	(20.26)	(20.09)	(20.09)	(21.26)	(21.39)	(60.91)
Constant	557.1***	493.7***	486.6***	222.3***	136.6***	141.7***	61.53	61.01	1,010***
	(20.38)	(64.10)	(66.82)	(10.04)	(34.12)	(32.82)	(40.02)	(40.33)	(38.53)
Observations	417	417	417	417	417	417	417	417	417
R-squared	0.291	0.297	0.299	0.325	0.354	0.358	0.403	0.404	0.277
Number of id	139	139	139	139	139	139	139	139	139

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 - SARAR Analysis - Cross-section

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Regional Policy	Regional Policy	Regional Policy	Rural Development	Rural Development	Rural Development	CAP 1st Pillar	CAP 1st Pillar	CAP 1st Pillar
	1994-99	2000-06	2007-13	1994-99	2000-06	2007-13	1994-99	2000-06	2007-13
Index of Structural Disadvantage (PCA)	48.13**	74.86***	87.35***	17.97***	33.13**	13.09*	191.0***	262.5***	217.6***
	(18.84)	(25.87)	(24.40)	(6.511)	(15.39)	(7.227)	(43.06)	(58.34)	(61.50)
SE	-717.9***	-1,024***	21.82	17.97	123.4*	-70.38	-99.73	131.7	123.3
	(213.1)	(290.3)	(181.5)	(39.39)	(65.12)	(108.0)	(314.7)	(553.8)	(440.4)
DE	-217.5	-346.7	148.8	51.98	98.78	128.2**	-178.9	-158.4	-45.82
	(193.3)	(266.9)	(170.9)	(36.68)	(69.28)	(63.10)	(265.8)	(443.2)	(384.9)
IT	-386.6*	-591.6**	10.50	32.49	35.53	109.2*	-599.8*	-708.1	-523.6
	(207.3)	(286.9)	(192.4)	(44.16)	(75.39)	(66.25)	(310.6)	(473.2)	(442.6)
FR	-378.9**	-653.9**	-137.6	-1.871	2.719	107.9	341.3	451.3	560.5
	(185.2)	(255.4)	(171.5)	(38.29)	(56.58)	(70.44)	(274.1)	(403.7)	(391.2)
AT	-527.6**	-734.3**	-178.0	-10.73	326.5	521.0***	-410.9	-117.7	-291.9
	(206.5)	(285.2)	(186.9)	(41.28)	(0)	(71.95)	(301.1)	(453.7)	(427.3)
PT	420.5*	461.5	1,257***	125.6**	223.7**	71.73	-511.4	-643.7	-496.4
	(229.4)	(316.5)	(218.8)	(51.29)	(89.06)	(98.76)	(365.2)	(604.0)	(518.6)
NL	-99.42	-233.5	-176.2	-10.86	-44.64	-9.124	-113.2	-317.6	-241.3
	(163.9)	(226.6)	(172.0)	(38.87)	(61.60)	(64.25)	(275.0)	(390.1)	(396.2)
UK	-490.1**	-831.8***	-26.14	-5.314	-30.38	69.62	-256.2	-298.6	-159.9
	(198.1)	(271.5)	(175.4)	(38.02)	(53.57)	(81.93)	(289.6)	(483.0)	(408.2)
ES	25.80	-144.6	402.1**	85.22**	197.3***	213.6***	33.17	365.9	631.1
	(202.3)	(278.5)	(176.5)	(38.42)	(54.90)	(59.71)	(287.2)	(464.0)	(402.5)
GR	566.7**	899.1***	1,079***	145.5***	255.1***	345.8***	472.1	394.1	445.2
	(221.9)	(306.3)	(202.7)	(46.49)	(76.67)	(72.97)	(325.6)	(517.9)	(466.7)
FI	-782.9***	-969.9***	53.73	44.68	212.7***	408.0***	839.9**	1,907***	1,617***
	(230.6)	(314.6)	(206.5)	(47.50)	(82.23)	(101.2)	(362.6)	(650.0)	(511.9)
Constant	1,106***	1,738***	449.6***	23.44	90.62	16.95	786.1**	1,115	957.2**
	(223.7)	(302.0)	(172.2)	(35.29)	(0)	(53.99)	(327.2)	(750.7)	(467.1)
lambda	-0.0143***	-0.0159***	-0.0105*	0.0134***	0.00396	0.00646	0.00658	-0.000605	-0.00138
	(0.00318)	(0.00242)	(0.00606)	(0.00353)	(0.0139)	(0.00563)	(0.0105)	(0.0249)	(0.0136)
rho	0.0538***	0.0537***	0.0158***	-0.0243***	-0.0115	0.380***	-0.00668	-0.000125	-0.00320
	(0.00211)	(0.00207)	(0.00292)	(0.00300)	(0.0262)	(0.0181)	(0.0112)	(0.0306)	(0.0156)
sigma2	37,039***	70,744***	59,014***	4,211***	25,913***	14,987***	182,221***	328,685***	369,540***
	(4,496)	(8,587)	(7,124)	(508.0)	(3,271)	(1,810)	(21,966)	(39,427)	(44,343)
Observations	139	139	139	139	139	139	139	139	139
chi2	380.9***	427.2***	432.5***	188.7***	98.77***	522.4***	171.1***	154.9***	119.6***

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tab.6 - Spatial Panel Data Analysis (SARAR Model with Fixed Effect): Regional Policy, Rural Development Policy, CAP 1st Pillar 1994-2013

VARIABLES	(1) Regional Policy	(2) Regional Policy	(3) Regional Policy	(4) Rural Development	(5) Rural Development	(6) Rural Development	(7) Rural Development	(8) Rural Development	(9) CAP 1st Pillar
	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013	1994-2013
Index of Structural Disadvantage (PCA) Panel	-8.462	0.0959	13.56	-5.989	-83.41***	-88.77**	-89.62***	-69.52**	-63.41
	(36.41)	(36.38)	(43.61)	(15.31)	(31.87)	(38.22)	(31.16)	(34.36)	(41.72)
PAC 1st Pillar		0.111**	0.112**		0.0563	0.0558	0.0490	0.0486	
		(0.0529)	(0.0530)		(0.0462)	(0.0463)	(0.0452)	(0.0450)	
Regional Policy							0.234***	0.272***	
							(0.0635)	(0.0691)	
Interaction Term Disadvantage*PAC 1st Pillar			-0.0108			0.00430			
			(0.0194)			(0.0169)			
Interaction Term Disadvantage*Regional Policy								-0.0374	
								(0.0274)	
TD00	-3.366	-15.52	-14.34	10.04	-10.38	-10.97	-51.53	-45.14	41.20
	(63.10)	(62.87)	(62.89)	(12.95)	(55.06)	(55.10)	(54.91)	(54.92)	(44.21)
TD94	-8.762	22.81	25.91	-134.9***	52.79	51.60	98.82	115.8*	41.01
	(69.39)	(70.43)	(70.60)	(19.09)	(61.81)	(61.98)	(61.62)	(62.65)	(70.53)
W*Regional Policy Exp,	0.0532***	0.0532***	0.0532***						
	(0.000994)	(0.00102)	(0.00102)						
W*Rural Development				-0.0176***	0.0525***	0.0525***	0.0525***	0.0525***	
				(0.00124)	(0.000524)	(0.000524)	(0.000514)	(0.000516)	
W*PAC									0.0666***
									(0.00831)
Lambda (spatial error)	0.0532***	0.0533***	0.0533***	0.0951***	0.0525***	0.0525***	0.0525***	0.0526***	0.00738
	(0.00100)	(0.00108)	(0.00110)	(0.00791)	(0.000546)	(0.000547)	(0.000550)	(0.000559)	(0.00511)
sigma_eps^2	46,616***	45,953***	45,917***	9,552***	35,193***	35,186***	33,550***	33,336***	66,852***
	(4,015)	(3,958)	(3,955)	(814.3)	(3,030)	(3,029)	(2,888)	(2,870)	(5,717)
Observations	417	417	417	417	417	417	417	417	417
R-squared	0.023	0.248	0.247	0.063	0.070	0.066	0.145	0.167	0.031
Number of groups	139	139	139	139	139	139	139	139	139

Robust standard errors in parentheses - Uses the Lee & Yu transformation (JOE 2010) to generate consistent estimates of sigma^2.
*** p<0.01, ** p<0.05, * p<0.1

1 In this document the Common Agricultural Policy (CAP) was given the objective to deliver 'a territorially and environmentally balanced EU agriculture within an open economic environment' (European Commission 2010b, p.4). The recently approved CAP reform remains a compromise between the 'traditional' sectoral focus of this policy and its 'new' rationale based on the support for public goods generated by agricultural activities (e.g. environmental or land protection) (European Commission, 2013b). Notwithstanding the hybrid nature of its objectives, the CAP 2014-2020 has further reinforced its territorial and environmental scope.

2 (Reg. (EC) n. 1782/2003)

3 Alternative definitions for the spatial weights matrix are possible: k-nearest-neighbours weighting or other binary matrices (rook and queen contiguity matrices). The use of different methods generated qualitatively similar results to those presented in the paper.

4 The inclusion of an additional PCA component into the regression models has been tested as a robustness check with no significant impact on the results of the analysis reported in the paper.

5 The stationarity of the variables was preliminarily tested: The tests confirmed the stationarity of the series, allowing us to implement the PCA analysis on the panel dataset and assure the comparability of the index across programming periods.

6 Regions in Belgium, Germany and the United Kingdom are classed at NUTS1 level while Denmark, Ireland and Luxembourg have no sub-national divisions: for the remaining EU15 member states expenditure has been classified at the NUTS2 level.

7 Data available from the Rural Development Plans (RDPs) of the EU15 (http://ec.europa.eu/agriculture/rur/countries/index_en.htm).

8 http://ec.europa.eu/agriculture/rur/countries/index_en.htm

9 The Cohesion Fund has not been included in the databank as its resources are allocated at the national level.

10 The imbalance in the UK's contribution position led to the Fontainbleau Agreement (1984) and the determination of a permanent rebate of its contribution towards the Community budget (De Filippis, Sardone, 2010).

11 This is especially true for Austria and Finland, which in 2005 accounted for 72% and 100% respectively of SAU (IEEP, 2006).

12 The choice of a Fixed Effects approach is justified on both conceptual and empirical grounds. From the conceptual point of view, the regions included in the dataset cannot be considered as a 'Random Sample' of the EU regions (Wooldridge 2002 see page 251; Mundlak 1978). In addition the individual components cannot be considered as uncorrelated with the explanatory variables as assumed in a Random Effects approach. From the empirical standpoint, the Hausman test confirms that Fixed Effects estimation has to be preferred over Random Effects. The F-test for the joint significance of individual effects also confirms the high significance of the regional fixed effects.

In our dataset the cross-sectional dimension is significantly larger than the time dimension (the explanatory variables cover the 1993-2006 period). In this context, the low time-series variability of the dataset a priori prevents non-stationarity from affecting our estimates through spurious correlation. The hypothesis of stationarity is confirmed by three different unit root tests for panel data (the Im-Pesaran-Shin, the augmented Dickey-Fuller and the Phillips-Perron tests) which, as expected, reject the hypothesis of non-stationarity at conventional significance levels.

13 The authors would like to thank one of the anonymous referees for raising this relevant point.

14 The results presented in the table are computed with the - spreg – command for STATA.

15 The estimation of SAR models produces very similar results. SARAR models are preferred here as more general.

16 The estimations are computed by means of the user-written STATA command - xsmle – developed by Hughes et al. 2012 on the basis Paul Elhorst and Michael Pffermayr Matlab code.

17 Including:-Amounts paid to producers of cereals, oilseeds and protein crops (COP crops) and energy crops payments. -Amount of premiums received by COP producers obliged to set aside part of their land. Such land may, however, be used for certain non-food crops -All other farm subsidies on field, horticultural and permanent crops.

18 Including: Any subsidies on dairy products, All farm subsidies received for cattle other than dairy cows in production, Any subsidies on sheep/goat milk products, All other farm subsidies on other livestock or livestock products.

19 Including: Single Farm payment, Single Area payment, Amount resulting from the application of modulation to the first EUR 5000 or less of direct payments.

20 The detailed table available upon request.