Cohesion Policy and Sectoral Growth in the Italian Regions (1994-2013)

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Abstract: In this paper we put to test the impact of the European Structural Funds on the economies of the 20 Italian administrative regions for the 1994-2013 period. The main elements of novelty are that we assess the impact of the Funds on four sectors (agriculture, energy and manufacturing, construction, services), and that we evaluate the Funds' effects on the basis of a model of their regional allocation. We also consider nationally-financed development funds. Our evidence implies that the Funds had a significant impact on regional GDP per capita. We also find that (nationally-financed) subsidies to firms increase GDP per capita. Different types of Structural Funds are found to have widely different influences, with the European Regional Development Fund, arguably, having the strongest impact. Sectoral evidence implies that European Structural Funds tend to favour services, while reducing the share of energy and manufacturing in the economy. On the other hand, nationally-financed subsidies to firms per capita seem to affect equally all sectors of the economy (***JEL*: C43, D24**).

Keywords: European Structural Funds, nationally-financed development funds, sectoral development, multi-output multi-input transformation functions.

1. Introduction

Today more than ever, it does not seem feasible to advance towards a closer integration of the European Union, without favouring a greater economic and social cohesion between its countries. Yet, there are still very deep economic and social disparities both between countries and between regions that compose the Union, undermining its unity and cohesion. The importance of economic and social cohesion is enhanced by the EU enlargement to Southern and Eastern Europe, and the establishment of economic and monetary union, which leaves very little room for manoeuvre at national level not only for monetary but also for fiscal policy. Hence the need to evaluate the appropriateness and effectiveness of development policies implemented through the European Structural Funds. The Funds are, especially since the introduction of *Agenda 2000*, the European Community's primary tool to sustain development in areas facing economic problems. Although marked differences in levels of regional development characterise many European countries, Italy is a particularly interesting (and worrying) case study for cohesion policies, because of the existence of an area of the country, the South, whose delays in development are relevant and are perpetuated over time (Allen and Stevenson, 1974; Putnam, 1993; Paci and Saba, 1998; Iuzzolino, 2009).

The persistence of such disparities, in the presence of significant financial resources dedicated to cohesion policy, raises issues about the effectiveness of these interventions, and, in particular, on the impact of European Structural Funds. This paper aims to assess whether the financial resources redistributed by the EU actually contributed to reduce interregional disparities in Italy. We also aim to identify effective practices and sectors of intervention. Indeed, the main element of novelty in the present work vis-à-vis the existing literature resides in the fact that the empirical analysis is carried out by considering separately four sectors (agriculture, energy and manufacturing, construction, services). Furthermore, we undertake evaluation of the Funds' effects on the basis of a model of the allocation rules of the Funds, arguably allowing a better treatment of the selection bias. Our empirical framework, unlike most of the earlier work, also considers along with the European Structural Funds different types of nationally-financed funds.

This exercise takes places in a period characterised by fears of hitting the automatic release of resources for 2007-2013 (in 7 months, from May to December 2015 still about 12 billion euro, 26.4% of the overall total, must be reported back), an excessive fragmentation of resources between projects and beneficiaries[1] (which undermines the structural impact of specific interventions), and the need to limit the delays, unfortunately already evident at the outset of the new programming cycle (2014-2020) (as of May 2015, 12 Regional Operational Programmes - over the 39 planned - are not yet approved). We thus intend to evaluate the Funds' effectiveness with a view to their scheduled lapse at the end of this programming cycle.

The remainder of the paper is organised as follows. Section 2 presents the institutional set-up of the Funds, describing the EU Objectives, the different types of Funds and their evolution across the years 1994-2013, with special emphasis on Italy. Section 3 provides a survey of the empirical literature existing on the argument. Section 4 illustrates the empirical procedures and the data, while the results of the empirical analysis are shown and commented in Section 5. Section 6 concludes and sets out some implications for future research.

2. European Structural Funds: the Institutional Set-up

As is well known, a variety of different programmes are gathered under the label of Structural Funds:

1) the European Regional Development Fund (ERDF) was created in 1975 with the aim of reducing regional imbalances in the EU. It targets less-developed regions and primarily finances projects involving investments in physical capital (private and public), support for small and medium firms, and R&D;

2) the European Social Fund (ESF) was created in 1957 with the aim of promoting training and the educational attainment among the labour force, as well as other forms of active labour market policies;

3) the European Agricultural Guidance and Guarantee Fund (EAGGF) dated back to 1962 and was a component of the Common Agricultural Policy. It aimed to accelerate the adjustment of

[1] Tortorella (ed.) (2011, 2012, 2013, 2014, 2015), Marinuzzi and Tortorella (2015), Tortorella (2015).

agricultural structures and contribute to the development of rural areas. In 2007, the EAGGF gave way to the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD);[2]

4) the Financial Instrument for Fisheries Guidance (FIFG), which supported fisheries, was created in 1994, and substituted by the European Fisheries Fund (EFF) in 2007.

In this paper we will not consider an important instrument of the EU's development policy: the Cohesion Fund. This fund, created in 1993 after the Maastricht Treaty, supports particular projects of member states (not regions) with GDP per capita levels below 90% of the EU mean. As Italy does not satisfy this criterion, it is not a beneficiary of the Cohesion Fund.

The Funds have been managed within given programming periods. The first programming period we consider (1994-99) was articulated around the following objectives:

Objective 1: Economic and structural adaptation of less-developed regions; this includes all regions with GDP per capita levels below 75% of the EU average over the last three years;[3]

Objective 2: Economic recovery of regions affected by industrial crisis (as defined by three eligibility criteria);

Objective 3: Combating long-term unemployment through reforms of education, training and employment services;

Objective 4: Facilitating the adaptation of workers to changes in production systems;

Objective 5a: Facilitating rural development within the Common Agricultural Policy (CAP);

Objective 5b: Facilitating rural development through the adjustment of industrial structures in areas with high levels of agricultural employment, low levels of agricultural income, low population density and/or a significant depopulation trend.

The reform implemented for 2000-06 attempted to improve the effectiveness of the Funds through a clearer allocation of responsibilities among the Commission and member states and a greater concentration of aid: there were three Objectives instead of six. *Objective 1* always related to the economic and structural adaptation of less-developed regions; *Objective 2* supported the

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[2] In what follows we will consider EAGGF (from 2007 the EAGF and the EAFRD) and FIFG (or EFF) jointly, given their highly similar object.

[3] In Italy these regions include Abruzzo (until 1996), Sardegna and Molise (until 2006), Campania, Puglia, Basilicata, Calabria, Sicilia.

social and economic restructuring of areas (be they industrial, rural, urban or centred on fishery) with structural problems; *Objective 3* aimed at creating new jobs through reforms of education, training and employment services.

In 2007-2013 *Objectives 1*, *2* and *3* were reorganised around the *Convergence Objective*, aiming to accelerate the convergence of less-developed regions and member states; the *Regional Competitiveness and Employment Objective,* aiming to strengthen employment and competitiveness in other areas; and the less quantitatively important *European Territorial Cooperation Objective*. Beside these three objectives, co-financed by ERDF and ESF, there are the Rural Development Programmes, supported by the EARDF, and a national fishery programme supported by the EFF.

Structural Funds per inhabitant are much higher in the Italian Southern regions, especially with respect to the ERDF. However, note that there is considerable variation even among the Mezzogiorno regions. Particularly high values are obtained for Molise and Basilicata. Note also that a substantial share of Structural Funds is not allocated to any single region, but to multi-regional aggregates. In the following analysis we shall assume that this funding affects regions proportionally to the shares of regionally-allocated Funds.

In Tables 1 and 2 we give the total financial endowment available for the three programming periods under scrutiny, by Fund and Objective[4] : they are respectively 52,452 million euros for 1994-1999,[5] 64,294 million euros for 2000-2006,[6] and 65,914 million euros for 2007-2013.[7]

The ERDF prevails in all three programming periods: it absorbs over 60% of the available resources in 1994-1999 and 2000-2006 and just about half of them in 2007-2013. Another persistent feature, derived from the raison d'être of the Funds, relates to the larger shares of funding allocated to the relatively backward areas: 60.7% and 71.4% of endowments in 1994-

[4] A substantial share of Structural Funds is not allocated to any single region, but to multi-regional aggregates. In the following analysis we shall assume that these finds are equally spread among all regions. We also adopted different hypotheses, such as spreading these funds proportionally to the shares of regionally-allocated Funds; or, multi-regional funding being allocated by area (North-Centre or South), spreading these funds proportionally to the shares of regionally-allocated Funds only within the relevant area. Estimates based on these hypotheses have a slightly lower fit and do not show substantial differences vis-à-vis the results we report in this paper.

[5] Data to 31/12/2003.

[6] Data to 31/12/2010.

[7] Data to 30/04/2015, excepting the data for rural development and fishery, financed respectively by EARDF and EFF, and updated to 31/12/2012.

1999 and 2000-2006 were destined to Objective 1 and 47.8% of funding in 2007-2013 went to the Convergence Objective.

Table 1 - Financial endowment of structural interventions in Italy for the 1994-1999, 2000-2006 and 2007-2013 programming periods, by Fund (million euros)

Structural Fund	1994-1999 (data to 31/12/2003)		2000-2006 (data to 31/12/2010)		2007-2013 (data to 30/04/2015)	
	a.v.	%	a.v.	%	a.v.	%
ERDF	32,641	62.2%	40,512	63.0%	33,352	50.6%
ESF	9,931	18.9%	16,613	25.8%	14,018	21.3%
EAGGF	9,090	17.3%	6,088	9.5%		
FIFG	790	1.5%	1,080	1.7%		
EAFRD*					17,695	26.8%
EFF*					849	1.3%
Total	**52,452**	**100.0%**	**64,294**	**100.0%**	**65,914**	**100.0%**

* MEF data to 31/12/2012.

Source: elaboration by IFEL-Dipartimento Studi Economia Territoriale on MEF data, various years.

Table 2 - Financial endowment of structural interventions in Italy for the 1994-1999, 2000-2006 and 2007-2013 programming periods, by Objective (million euros)

Objective	1994-1999 (data to 31/12/2003)		2000-2006 (data to 31/12/2010)		2007-2013 (data to 30/04/2015)	
	a.v.	%	a.v.	%	a.v.	%
Objective 1	31,850	60.7%	45,896	71.4%		
Objective 2	4,352	8.3%	7,183	11.2%		
Objective 3	3,047	5.8%	9,098	14.2%		
Objective 4	921	1.8%				
Objective 5a	2,704	5.2%				
Objective 5b	5,174	9.9%				
No Objective	4,406	8.4%	2,118	3.3%		
Convergence					31,494	47.8%
Competitiveness					15,179	23.0%
European Territorial Cooperation					697	1.1%
Rural Development*					17,695	26.8%
Fishery*					849	1.3%
Total	**52,452**	**100.0%**	**64,294**	**100.0%**	**65,914**	**100.0%**

* MEF data to 31/12/2012.

Source: elaboration by IFEL-Dipartimento Studi Economia Territoriale on MEF data, various years.

3. A Short Overview of the Empirical Literature

The empirical literature on the impact and effectiveness of European regional policy is substantial. The, papers can be classified on the basis of 1) the period considered in the analysis, 2) the level of territorial disaggregation of the analysis, 3) the estimation method applied, and 4) the variables included in the model (dependent variables, covariates and their frequency).

Period and level of territorial disaggregation widely differ across the papers. For instance, Rodriguez Pose and Fratesi (2004) or Esposti and Bussoletti (2008) take into account only ten (1989-1999) or eleven (1989 -2000) years, against the 35 years (1960 -1995) of Ederveen et al. (2002). Ederveen et al. (2002) and Beugelsdijk and Eijffinger (2005) consider respectively thirteen and fifteen countries, while the analysis of Rodriguez Pose and Fratesi (2004) is based on 162 EU15 regions and that of Esposti and Bussoletti (2008) on 206 EU15 regions.

Concerning the econometric method applied, many papers estimate a regression à la Barro, augmented by the Structural Funds, in order to test various hypotheses about growth and convergence among regions (Garcìa–Solanes and Maria-Dolores, 2002a, 2002b; Cappelen et al. 2003; Rodriguez Pose and Fratesi, 2004; Beugelsdijk and Eijffinger, 2005; Aiello and Pupo, 2007; Puigcerver-Peñalver, 2007; Esposti and Bussoletti, 2008). There are also some estimates of other type (Boldrin and Canova, 2001; Coppola and Destefanis, 2007, 2015) and macroeconomic simulation models (Hermin and Quest, see the surveys by Tondl, 2004; Marzinotto, 2012; and Prota and Viesti, 2013).

The different methods applied and the dataset and variable used in the literature obviously imply heterogeneous results. Usually the Structural Funds seem to have a positive impact on growth but the empirical works come to different conclusions.

Boldrin and Canova (2001), mainly relying on the assessment of changes in the empirical distributions of labour productivity, find that the Structural Funds do not generate any large effects on the convergence process, and their main conclusion is that regional policies can generally be rationalised in terms of redistributive practices, motivated by the nature of the political equilibria on which the EU is built.

On the other hand, according to Garcìa–Solanes and Maria-Dolores (2002a, 2002b) the inclusion of Funds in the regressions increases the estimated speed of convergence and has a significant impact on the steady-state growth rate, but these effects are stronger in the country (as opposed to the region) regressions.

For Ederveen et al. (2002) the "quality" of institutions matters, because the set of rules of institutions in a country determines the allocation of the funds to productive activities or to "rent-seeking" activities. On the contrary in Beugelsdijk and Eijffinger (2005) the empirical evidence does not indicate that more corrupt countries use their Funds in a more inefficient way, and also for this reason the hypothesis that Structural Funds reduced interregional disparities within the current 15 European countries cannot be rejected. Cappelen et al. (2003) find that EU regional support has a positive impact on the growth performance of European regions. However, their results also show that this impact is much stronger in more developed environments (not only institutionally, but also technology-wise), emphasising the importance of accompanying policies that improve the competence of the receiving environments. Esposti and Bussoletti (2008) find different results among the regions without a clearly explainable pattern. Their generally positive (albeit small) impact of Funds on the growth of Objective 1 regions turns negative is some cases (i.e. German, Greek and Spanish Objective 1 regions). The largest effect is found for French Objective 1 regions.

Rodriguez-Pose and Fratesi (2004) detect an interesting distinction between development axes. The returns to commitments on infrastructure and business support are not significant (despite the concentration of development funds on these axes). Support to agriculture has only short-term (positive) effects on growth. Only investment in education and human capital has medium-term positive and significant returns. Another interesting result by Cappelen et al. (2003) is that, according to their results, EU regional support has a positive impact only after 1989. On the other hand for Puigcerver-Peñalver (2007) the impact of Structural Funds has been stronger during the 1989-93 programming period than in 1994-99.

The macrosimulation models, such as Hermin or Quest, generally find that regional policy has a positive impact, in both the short and long run, on GDP and employment. The size of the impact observed typically varies across countries.

All the studies examined so far deal with countries or a wide set of European regions. Concerning the impact of the Structural Funds on Italian regions, Aiello and Pupo (2009) focus on the effects of EU spending from 1996 to 2007 as regards the 20 Italian administrative regions. They use data on actually spent, rather than accredited funds. Their empirical analysis is based on panel estimates of an augmented neoclassical growth model. They find that the Funds, although having a stronger impact in the South than in the Centre-North, have only weakly contributed to regional convergence in Italy. Coppola and Destefanis (2007) adopt a different framework to study the impact of accredited Funds across Italian regions in 1989-2003. The components of total factor productivity change are measured through a non-parametric FDH approach and then regressed on Funds and other variables. They find that the Funds have a weak but significant impact on changes in total factor productivity, as well as on capital accumulation and changes in employment. However, in a recent paper (Coppola and Destefanis, 2015) the same authors find, for the period 1989-2006, virtually no effect of actually spent Funds on capital accumulation and employment.

Clearly, macroeconomic simulations have a richer structure than the other econometric analyses. Yet they also rely on many more (often untested) hypotheses about model specification (variables included, some key parameters, dynamic structure, functional form, etc.). In our paper, we do not want to take sides on a simulation vs. estimation debate. Rather, we aim to identify effective practices and sectors of intervention. In order to do so, we rely on two practices that, to the best of our knowledge, radically innovate vis-à-vis the existing literature. Firstly, we use sectoral data, in order to better understand the way in which the Funds impact on different industries. Second, we undertake evaluation of the Funds' effects on the basis of a model of the allocation rules of the Funds (see Bouvet and Dall'erba, 2010). Arguably this should allow a better treatment of the selection bias (linked to the fact that Funds are distributed not randomly but on the basis of observable criteria).

4. The Empirical Framework

In principle, Structural Funds should increase the productive capacity of the benefited regions, and reduce their economic performance gap vis-à-vis the other areas (European Commission, 2000; p. 155). This impact can be gauged by assessing the relationship between the Funds, productivity and factor accumulation. We are interested in a macroeconomic impact assessment, concerning aggregate effects on a particular territory. The main challenge that policy evaluation has to face is to distinguish the changes in the economic situation caused by policies from those caused by other factors. As is well known (see, for instance, Blundell and Costa Dias, 2000), the fundamental problems in this respect are the omitted variable bias (linked to the difficulty of measuring the effects of intervention separately from other factors) and the selection bias (linked to the fact that Funds are not distributed randomly but on the basis of given criteria, possibly impairing the comparison between target and non-target areas).

Here we address these problems through the following fixed-effect panel specification for a standard growth equation:

$$(4.1)\ x_{it} = \alpha_1 x_{it-1} + \alpha_{2j}FUNDS_{jit} + \alpha_3 Z_{it} + \alpha_4 gfi_{it} + \alpha_5 \Delta n_{it} + \alpha_{6j}Pred(FUNDS_{jit}) + \alpha_i + \alpha_t$$

where *i=1,… 20*, refers to the region, *t=1, 2, 3* to the period, and *j=1, 2, 3* to the Fund types (EAGGF, ERDF, ESF, …); x_{it} is the natural logarithm of the (real) GDP per capita.

Following a customary template to the empirical analysis of GDP long-run growth, we include in (4.1) gfi_{it}, the (log of the) gross fixed investment per capita, and Δn_{it}, the (log) variation of population. $FUNDS_{it}$ are the various funds (ERDF, ESF, EAGGF, in terms of amounts paid to the regions from the *Fondo di Rotazione*, the Italian government unit gathering funds from the UE), included in the equation in natural logs (adding a unit constant to address cases in which funds were equal to zero). Therefore, the α_{2j} coefficients can be interpreted as elasticities. We include the three Funds jointly or in various combinations in (4.1) in an attempt to avoid spurious results. Finally, the Z_{it} variable includes a vector of national funds (related to regional and industrial policies) accruing to a given region. Among them are capital account expenditures (*spese in conto capitale*), the funds from national cohesion policies (they include the national resources of the *Fondo di rotazione* and such funds as the *Fondo innovazione tecnologica*, *Fondo contributo imprese*, *Fondo solidarietà nazionale*, and when available, the *Fondi aree depresse*) and the current-account subsidies to firms (*trasferimenti in conto corrente alle imprese*).[8] These funds, especially capital account expenditures, are often believed (see e.g. Viesti and Prota, 2008; Prota

[8] For reasons of data availability we could not produce a series of *capital-account* subsidies to firms separated by the rest of capital account expenditures.

and Viesti 2012) to be an important stimulus to regional growth. Their amounts changed considerably during the period under analysis, generally decreasing. Therefore, omitting these variables is a potential source of misspecification.

The adoption of a fixed-effect approach, as suggested in Wooldridge (2002) for the purposes of policy evaluation, can account for systematic differences across time and regions and address, at least to some extent, both omitted variable and selection bias. Through the x_{it-1} variable, we allow for the dynamic structure inherent to the data. The omission of this variable could potentially lead to seriously biased estimates.

We want however to pursue further the search for a treatment of the selection bias problem, along the lines of the selection on observables approach. Following Bouvet and Dall'erba (2010), $FUNDS_{it}$ can be modelled as the outcome of a process including a set of economic and political determinants:

$$(4.2)\ FUNDS_{jit} = \alpha_1 \mathbf{X}_{it-1} + \alpha_6\ PERIOD\_2*SOUTH + \alpha_6\ PERIOD\_3*SOUTH + \alpha_i + \alpha_t$$

Here we model $FUNDS_{jit}$ as the function of a vector $\mathbf{X}_{it-1}$, including various measures of the regional rate of unemployment and of sectoral shares of employment, PERIOD_2 - a dummy variable equal to 1 in the second Funds' programming period (2000-2006); PERIOD_3 - a dummy variable equal to 1 in the third period (2007-2013); and the interaction terms PERIOD_n*SOUTH. SOUTH is a dummy variable equal to 0 for the non-Mezzogiorno regions and to 1 for the Mezzogiorno regions. Using these variables, we can account for systematic differences across time and regions and address, at least to some extent, both omitted variable and selection bias (in essence, Funds are awarded to the Mezzogiorno regions).

Then the predicted value from this regression exercise ($Pred(FUNDS_{jit})$) can be included in (4.1) following the tenets of the selection on observables approach. Equations (4.1) and (4.2) are estimated through fixed-effect panel techniques.

Estimating model (4.1)-(4.2) already innovates vis-à-vis the existing literature about the impact of Structural Funds. There is however another point, which has received little attention in the literature: the sectoral impact of the Funds (Coppola and Destefanis, 2007, 2015, being, to the best of our knowledge the only analyses on this). It could be thought that in order to deal with this issue it is enough to replicate model (4.1)-(4.2) sector by sector. However, there are not data about the amount of European (or nationally-financed) funds spent in each sector. Regressing sectoral output on these funds would assume away both the impact of the funds on the rest of the economy and the impact of the rest of the economy on the sector under scrutiny.[9]

Drawing upon the literature on multi-output multi-input transformation functions (see Coelli and Perelman, 1999; Kumbhakar 2012, 2013; for further details on this kind of specification), we model the relationship between sectoral GDP per capita and funds as:

$$(4.3)\ -x_{s\ it} = \alpha_1(x_{non\text{-}s\ it} - x_{s\ it}) + \alpha_2 s_{it-1} - \alpha_3(x_{non\text{-}s\ it-1} - x_{s\ it-1}) - \alpha_{4j}FUNDS_{jit} - \alpha_5 Z_{it} - \alpha_6 gfi_{it} + \alpha_7 \Delta n_{it} - \alpha_{8j}Pred(FUNDS_{jit}) + \alpha_i + \alpha_t$$

where gfi_{it}, Δn_{it}, $FUNDS_{it}$ and Z_{it} have the same meaning as in (5.1). On the other hand, $x_{s\ it}$ is the GDP of sector *s* divided by total population, and $x_{non\text{-}s\ it}$ is the GDP of all sectors of the economy, *but sector* s, always divided by total population. In the Cobb-Douglas transformation (4.3), $x_{s\ it}$ and $x_{non\text{-}s\ it}$ are joint outputs produced by inputs gfi_{it}, Δn_{it}, $FUNDS_{it}$ and Z_{it}. We could however go one step further, and ask ourselves whether gfi_{it}, Δn_{it}, $FUNDS_{it}$ and Z_{it} may have different impacts across different sectors. For gfi_{it}, it could make more sense to take advantage of the available data and split this variable into $gfi_{\ s\ it}$ and $gfi_{\ non\text{-}s\ it}$. On the other hand, for $FUNDS_{it}$ and Z_{it}, about which sectoral estimates are unavailable, we can rely on interaction terms that *conflate both the sectoral endowment and effect of these policy variables*. We end up with the following equation (also to estimated through fixed-effect panel techniques):

$$(4.4)\ -x_{s\ it} = \alpha_1(x_{non\text{-}s\ it} - x_{s\ it}) + \alpha_2 x_{si\ t-1} - \alpha_3(x_{non\text{-}s\ it-1} - x_{s\ it-1}) - \alpha_{4j}FUNDS_{jit} - \alpha_{5j}FUNDS_{jit}\,(x_{non\text{-}s\ it} - x_{s\ it}) - \alpha_6 Z_{it} - \alpha_7 Z_{it}\,(x_{non\text{-}s\ it} - x_{s\ it}) - \alpha_8 gfi_{\ s\ it} - \alpha_9 gfi_{\ non\text{-}s\ it} + \alpha_{10}\Delta n_{it} - \alpha_{11j}Pred(FUNDS_{jit}) + \alpha_i + \alpha_t$$

[9] For this reason, just including in a sectoral equation the output of the rest of the economy along with the other regressors would not be a satisfactory way of modelling this nexus. In this case, we would implicitly assume that the rest of the economy is not affected by the funds.

whose long-run solution can be rewritten as:

(4.5) $(\alpha_s x_{s\,i} - \alpha_{5j}FUNDS_{jit} - \alpha_7 Z_{it}) + (\alpha_{non\text{-}s}\, x_{non\text{-}s\,i} + \alpha_{5j}FUNDS_{jit} + \alpha_7 Z_{it}) = \alpha_{4j}FUNDS_{jit} + \alpha_6 Z_{it} \ldots$

If the interaction terms are significant, $FUNDS_{it}$ and Z_{it} not only affect aggregate GDP but also its sectoral composition. Hence our analysis can be used to identify sectors where policy intervention is particularly effective (or detrimental).

Regional data for real GDP, value added, gross fixed investment, employment and labour units are taken from ISTAT's regional accounting. These data are separately considered for four industries: agriculture, energy and manufacturing, construction, services. The latter cannot be split in market and non-market services because the allocation of these services to different industries considerably changed with the new SEC95 national accounting (see for instance Collesi, 2000). *Private* physical capital accumulation was obtained by subtracting to total investment expenditure the gross fixed investment from public administration, health and education. European Structural Funds and national funds were taken from the *Spesa statale regionalizzata* database of the Ministry of Economy and Finance. All these series were deflated using a regional GDP deflator and divided by the regional number of inhabitants. It must be stressed that these series relate to the amounts disbursed by the various regions, as taken from the *Spesa Statale Regionalizzata*. These data are available from 1994 up to 2013.

5. Structural Funds and GDP per capita across the Italian Regions

The empirical framework presented in the previous section is geared to assess the effects of Structural Funds (as well as of nationally-financed funds) on regional growth. In order to give some perspective to this impact it is customary in the literature to provide some descriptive evidence about convergence. We do so for σ-convergence in Table 3, by comparing across the programming periods the standard errors for (the natural logs of) real GDP per capita and value added per labour unit. This exercise reveals the existence of, first, some convergence between the economies of the Italian regions and then some divergence to be ascribed to the Great Recession. Overall, some very weak convergence between the economies of the Italian regions seems to emerge, apparently driven by what happens in services. High sectoral heterogeneity appears however from Table 3, enhancing the potential interest of our results. Indeed, this descriptive evidence, however, obviously does not clarify what type of convergence process is at work and especially the role that regional policies play in it.

Table 3 - σ-convergence

Standard errors of logs **Real VA per Labour Unit**	***Period***		
	1994-99	***2000-06***	***2007-13***
Total Economy	0.282	0.267	0.280
Agriculture	0.314	0.324	0.372
Energy & Manufacturing	0.524	0.506	0.540
Construction	0.331	0.274	0.342
Services	0.268	0.263	0.265

Source: own elaboration on Regional Accounting Data from Istat

Tables A.1-A.8 in the Appendix present the main evidence concerning the direct impact of Funds (and other development funds) on our variables of interest.[10] Overall, our results imply that the Funds had a significant impact on GDP per capita. Table A.1 conveys this message well. A, say, doubling of Structural Funds per capita increase the steady-state level of GDP per capita by more than a half of the same proportional increase of investment per capita, and more than twice as much of nationally-financed subsidies to firms per capita. This impact diminishes for single Funds taken in isolation. Different types of Structural Funds have substantially different influences. The ERDF has arguably the strongest impact. What is however noticeable that Funds' aggregations are much more significant than single Funds. Possibly the estimation of the growth equation is more affected by omitted variable bias when the Funds are taken in isolation. Also note that while we find that (nationally-financed) subsidies to firms have a positive impact on GDP per capita growth, other national funds (especially national *cohesion* funds) were not significant.

[10] We do not provide diagnostic tests. They are generally satisfactory and available upon request.

We do not report results for (4.2). Generally speaking only the dummy variables are significant when estimating this relationship. Once values for Pred($FUNDS_{jit}$) are obtained and included in (4.1) and (4.4), they turn out to be significant in some specifications, especially the ones concerning agricultural and aggregate funds. More research seems to be granted on this nexus, however.

Turning now to the sectoral estimates,[11] it is easy to see that they are characterised by higher goodness of fit (as witnessed by the significantly higher log-likelihood ratios). The transformation function uses the available information in a more efficient way than aggregate estimates. The gist of the aggregate results is maintained. However, there are very interesting insights coming from the interaction terms involving $FUNDS_{it}$ and Z_{it}. The generally weaker results for the ESF acquire a more precise shape in terms of significant evidence that this fund is detrimental to agriculture and construction (as well as favourable to services). Also the sum of all Agriculture-oriented Funds (that we label *al2*) tends to increase the share of services in the economy. Given these results about ESF and Agriculture-oriented Funds, it comes as no surprise that various funds' aggregations favour services. These aggregations also tend to reduce the share of energy and manufacturing in the economy. Finally it is interesting to notice that the interaction terms associated with nationally-financed subsidies to firms per capita are never significant. These funds appear to affect equally all sectors of the economy.

6. Concluding Remarks

In this paper we consider the impact of the European Structural Funds on convergence across Italian regions across the three waves of the Funds concerning the 1994-2013 period. We focus on the impact of Funds on productivity and employment in the Italian regions, considering separately the Funds' effects on four sectors (agriculture, manufacturing, construction, services) of the regional economies. We consider the Funds' effects on GDP per capita in the Italian

[11] In order to understand correctly Tables A.2-A.8 relatively to A.1, it should be kept in mind that the sign of the investment and funds' coefficients in (4.3) and (4.4) are inverted vis-à-vis those in (4.1). Also note that in Tables A.2-A.8, for the sake of parsimony, we provide results for a version of (4.4) with a single investment variable (hence we impose $\alpha_8 = \alpha_9$).

regions. Unlike in most of the earlier work, we allow for official series for disbursed European Structural Funds and for different types of nationally-financed funds.

Our evidence implies that the Funds had a significant impact on GDP per capita. Different types of Structural Funds are found to have substantially different influences, with the ERDF, arguably, having the strongest impact. We also find that (nationally-financed) subsidies to firms have a positive impact on GDP per capita. Sectoral evidence implies that European Structural Funds tend to favour services, while reducing the share of energy and manufacturing in the economy. On the other hand, nationally-financed subsidies to firms per capita seem to affect equally all sectors of the economy.

Given the pattern of sectoral results, it may be interesting to gain further knowledge about the impact of the Funds on the service sector. Thus, future work may involve the splitting up of this sector into two parts, loosely related to the distinction between market and non-market services. Keeping in mind the strictures illustrated in Collesi (2000), this could simply mean separating public administration, health and education from the other services. As already noticed in the text, further work is also needed on the modelling of the mechanism of funds' allocation. In this sense, the nexus between European and nationally-financed funds should be more carefully appraised.

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APPENDIX

Legend of Tables A.1-A.8

By construction, we include fixed region-idiosyncratic effects in our panel estimates. We also include year-specific effects, not shown in the interest of parsimony, in all specifications. Coefficient significance is highlighted by star number:
* means a p-value < .1; ** a p-value < .05; *** a p-value < .01.
N is the number of observations. *ll* is the log of the likelihood function.

As far as labelling is concerned,
agr stands for agriculture, *iss* for energy and manufacturing, *cos* for construction, *ser* for services.
lifl_pc stands for private gross fixed investment (total investment expenditure minus investment from public administration, health and education);
z always indicates the nationally-financed subsidies to firms from current account expenditures,
Labels *erdf* and *esf* are self-explanatory,
al2 denotes the sum of all Agriculture-oriented Funds,
due is the sum of ERDF and ESF,
dua the sum of ERDF and Agriculture-oriented Funds,
tre the sum of ERDF, ESF and Agriculture-oriented Funds,
fdr the sum of ERDF, ESF, Agriculture-oriented Funds and national co-financing.
ly_S_ly~f denotes variable $FUNDS_{jit}$ $(x_{non\text{-}s\ it} - x_{s\ it})$ for each sector S in turn,
ly_S_ly_~p denotes variable z_{it} $(x_{non\text{-}s\ it} - x_{s\ it})$ for each sector S in turn.
An *f* termination indicates a first-order forwarded variable.
A *hat* termination indicates a predicted variable.
All these variables are in natural logarithms.

Table A.1 – Eq. (4.1), Total Economy

Fund var.	erdf	esf	al2f	duef	duaf	tref	fdrf
lifl_pc	0.0207***	0.0225***	0.0203***	0.0201***	0.0177***	0.0151**	0.0133*
erdff	0.0023*						
esff		0.0003					
al2f			0.0021**				
duef				0.0035*			
duaf					0.0061***		
tref						0.0067***	
fdrf							0.0074***
z	0.0044***	0.0043***	0.0041***	0.0043***	0.0036***	0.0034***	0.0034***
erdffhat	-0.0056						
esffhat		0.0093					
al2fhat			-0.0032*				
duefhat				-0.0060			
duafhat					-0.0095**		
trefhat						-0.0126*	
fdrfhat							-0.0155
N	380	380	380	380	380	380	380
ll	1165.7200	1162.9574	1165.7874	1165.9560	1175.4933	1174.0479	1173.9795

Table A.2 – Eq. (4.4), Various sectors, Specifications including ERDF

Variable	agr0_erdf	agr1_erdf	agr2_erdf	agr3_erdf	iss0_erdf	iss1_erdf	iss2_erdf	iss3_erdf
lifl_pc	-0.0216***	-0.0209***	-0.0222***	-0.0214***	-0.0237***	-0.0246***	-0.0236***	-0.0245***
erdff	-0.0023*	-0.0080	-0.0023*	-0.0079	-0.0025**	-0.0058*	-0.0026**	-0.0061*
z	-0.0044***	-0.0045***	-0.0020	-0.0022	-0.0039***	-0.0039***	-0.0083*	-0.0085*
ly_AGR_ly~ f		0.0016		0.0015				
ly_ISS ly~ f						0.0021		0.0022
ly_COS_ly~ f								
ly_SER_ly~ f								
ly_AGR_ly_~p			-0.0007	-0.0006				
ly_ISS_ly_~p							0.0030	0.0031
ly_COS_ly_~p								
ly_SER_ly_~p								
erdffhat	0.0040	0.0085	0.0035	0.0080	-0.0084	-0.0094	-0.0095	-0.0107
N	380	380	380	380	380	380	380	380
ll	1174.3295	1174.8531	1174.3928	1174.9067	1184.7436	1185.5803	1185.5936	1186.5363

Variable	cos0_erdf	cos1_erdf	cos2_erdf	cos3_erdf	ser0_erdf	ser1_erdf	ser2_erdf	ser3_erdf
lifl_pc	-0.0253***	-0.0245***	-0.0255***	-0.0247***	-0.0196***	-0.0200***	-0.0189***	-0.0193***
erdff	-0.0023*	-0.0091	-0.0023*	-0.0091	-0.0028**	-0.0068**	-0.0028**	-0.0068*
z	-0.0045***	-0.0045***	-0.0083	-0.0084	-0.0033***	-0.0032***	-0.0070*	-0.0067*
ly_AGR_ly~ f								
ly_ISS ly~ f								
ly_COS_ly~ f		0.0025		0.0025				
ly_SER_ly~ f						-0.0040		-0.0039
ly_AGR_ly_~p								
ly_ISS_ly_~p								
ly_COS_ly_~p			0.0015	0.0016				
ly_SER_ly_~p							-0.0041	-0.0038
erdffhat	0.0039	0.0050	0.0040	0.0051	-0.0068	-0.0060	-0.0072	-0.0064
N	380	380	380	380	380	380	380	380
ll	1169.4452	1169.7245	1169.5309	1169.8163	1188.0861	1189.6855	1189.0043	1190.5103

Table A.3 – Eq. (4.4), Various sectors, Specifications including ESF

Variable	agr0_esf	agr1_esf	agr2_esf	agr3_esf	iss0_esf	iss2_esf	iss3_esf	iss3_esf
lifl_pc	-0.0230***	-0.0233***	-0.0237***	-0.0238***	-0.0261***	-0.0263***	-0.0261***	-0.0264***
esff	-0.0006	-0.0118**	-0.0006	-0.0118**	-0.0004	-0.0037	-0.0004	-0.0036
z	-0.0044***	-0.0046***	-0.0017	-0.0026	-0.0040***	-0.0039***	-0.0076*	-0.0074
ly_AGR_ly~ f		0.0031**		0.0031**				
ly_ISS ly~ f						0.0021		0.0021
ly_COS_ly~ f								
ly_SER_ly~ f								
ly_AGR_ly_~p			-0.0007	-0.0006				
ly_ISS_ly_~p							0.0024	0.0024
ly_COS_ly_~p								
ly_SER_ly_~p								
esffhat	-0.0056	-0.0083	-0.0053	-0.0080	-0.0016	-0.0013	-0.0018	-0.0014
N	380	380	380	380	380	380	380	380
ll	1171.3958	1173.3798	1171.4723	1173.4248	1180.7194	1181.3759	1181.2823	1181.9072

Variable	cos0_esf	cos1_esf	cos2_esf	cos3_esf	ser0_esf	ser1_esf	ser2_esf	ser3_esf
lifl_pc	-0.0266***	-0.0253***	-0.0268***	-0.0255***	-0.0219***	-0.0220***	-0.0214***	-0.0215***
esff	-0.0005	-0.0211**	-0.0005	-0.0214**	-0.0008	-0.0064*	-0.0007	-0.0063*
z	-0.0044***	-0.0044***	-0.0097	-0.0106	-0.0033***	-0.0032***	-0.0065*	-0.0062*
ly_AGR_ly~ f								
ly_ISS ly~ f								
ly_COS_ly~ f		0.0078**		0.0079**				
ly_SER_ly~ f						-0.0060**		-0.0059**
ly_AGR_ly_~p								
ly_ISS_ly_~p								
ly_COS_ly_~p			0.0021	0.0025				
ly_SER_ly_~p							-0.0035	-0.0033
esffhat	-0.0107	-0.0133	-0.0110	-0.0136	0.0009	0.0008	0.0002	0.0002
N	380	380	380	380	380	380	380	380
ll	1166.8213	1168.9571	1166.9791	1169.1839	1183.3363	1186.0282	1184.0024	1186.6411

legend: * p<.1; ** p<.05; *** p<.01

Table A.4 – Eq. (4.4), Various sectors, Specifications including AL2

Variable	agr0_al2	agr1_al2	agr2_al2	agr3_al2	iss0_al2	iss1_al2	iss2_al2	iss3_al2
lifl_pc	-0.0198***	-0.0194***	-0.0199***	-0.0179***	-0.0243***	-0.0241***	-0.0244***	-0.0242***
al2f	-0.0025**	0.0052	-0.0025**	0.0062	-0.0021**	-0.0050	-0.0021**	-0.0048
z	-0.0040***	-0.0039***	-0.0035	-0.0093	-0.0037***	-0.0035***	-0.0064	-0.0044
ly_AGR_ly~ f		-0.0021		-0.0024				
ly_ISS_ly~ f						0.0019		0.0018
ly_COS_ly~ f								
ly_SER_ly~ f								
ly_AGR_ly_~p			-0.0001	0.0014				
ly_ISS_ly_~p							0.0018	0.0006
ly_COS_ly_~p								
ly_SER_ly_~p								
al2fhat	0.0032*	0.0039*	0.0032*	0.0041*	0.0026	0.0028	0.0026	0.0028
N	380	380	380	380	380	380	380	380
ll	1175.4147	1177.5151	1175.4174	1177.7822	1183.7709	1184.9777	1184.0874	1185.0086

Variable	cos0_al2	cos1_al2	cos2_al2	cos3_al2	ser0_al2	ser1_al2	ser2_al2	ser3_al2
lifl_pc	-0.0244***	-0.0224***	-0.0246***	-0.0217***	-0.0200***	-0.0184***	-0.0197***	-0.0184***
al2f	-0.0022**	-0.0090	-0.0022**	-0.0106	-0.0022**	-0.0057**	-0.0021**	-0.0055**
z	-0.0041***	-0.0039***	-0.0074	0.0013	-0.0031***	-0.0027***	-0.0057**	-0.0033
ly_AGR_ly~ f								
ly_ISS_ly~ f								
ly_COS_ly~ f		0.0025		0.0031				
ly_SER_ly~ f						-0.0035**		-0.0034**
ly_AGR_ly_~p								
ly_ISS_ly_~p								
ly_COS_ly_~p			0.0013	-0.0020				
ly_SER_ly_~p							-0.0028	-0.0006
al2fhat	0.0036*	0.0032*	0.0035*	0.0032*	0.0023	0.0023	0.0023	0.0023
N	380	380	380	380	380	380	380	380
ll	1169.9139	1170.8226	1169.9769	1170.9286	1186.3306	1189.0433	1186.7611	1189.0601

legend: * p<.1; ** p<.05; *** p<.01

Table A.5 – Eq. (4.4), Various sectors, Specifications including DUE

Variable	agr0_due	agr1_due	agr2_due	agr3_due	iss0_due	iss1_due	iss2_due	iss3_due
lifl_pc	-0.0210***	-0.0197***	-0.0216***	-0.0202***	-0.0229***	-0.0237***	-0.0227***	-0.0235***
duef	-0.0037**	-0.0195**	-0.0037**	-0.0194**	-0.0037**	-0.0091**	-0.0038**	-0.0094**
z	-0.0043***	-0.0046***	-0.0017	-0.0027	-0.0036***	-0.0035***	-0.0082*	-0.0082*
ly_AGR_ly~ f		0.0043**		0.0043**				
ly_ISS ly~ f						0.0034		0.0035
ly_COS_ly~ f								
ly_SER_ly~ f								
ly_AGR_ly_~p			-0.0007	-0.0005				
ly_ISS_ly_~p							0.0031	0.0032
ly_COS_ly_~p								
ly_SER_ly_~p								
duefhat	0.0063	-0.0069	0.0073	-0.0061	0.0329	0.0339	0.0362	0.0374
N	380	380	380	380	380	380	380	380
ll	1174.8505	1177.4128	1174.9209	1177.4507	1185.4029	1186.6335	1186.3185	1187.6246

Variable	cos0_due	cos1_due	cos2_due	cos3_due	ser0_due	ser1_due	ser2_due	ser3_due
lifl_pc	-0.0243***	-0.0225***	-0.0245***	-0.0227***	-0.0185**	-0.0185**	-0.0177**	-0.0178**
duef	-0.0038**	-0.0203*	-0.0037**	-0.0203*	-0.0045**	-0.0113***	-0.0046***	-0.0111***
z	-0.0043***	-0.0043***	-0.0087	-0.0087	-0.0030***	-0.0028***	-0.0067*	-0.0061
ly_AGR_ly~ f								
ly_ISS ly~ f								
ly_COS_ly~ f		0.0062		0.0062				
ly_SER_ly~ f						-0.0068**		-0.0065**
ly_AGR_ly_~p								
ly_ISS_ly_~p								
ly_COS_ly_~p			0.0017	0.0017				
ly_SER_ly_~p							-0.0041	-0.0036
duefhat	0.0121	0.0084	0.0121	0.0083	0.0277	0.0250	0.0299	0.0270
N	380	380	380	380	380	380	380	380
ll	1170.0992	1171.1691	1170.2118	1171.2842	1189.4904	1192.2561	1190.4294	1192.9820

Table A.6 – Eq. (4.4), Various sectors, Specifications including DUA

Variable	agr0_dua	agr1_dua	agr2_dua	agr3_dua	iss0_dua	iss1_dua	iss2_dua	iss3_dua
lifl_pc	-0.0182***	-0.0184***	-0.0184***	-0.0177***	-0.0222***	-0.0228***	-0.0223***	-0.0228***
duaf	-0.0064***	0.0030	-0.0064***	0.0040	-0.0059***	-0.0116**	-0.0058***	-0.0116***
z	-0.0037***	-0.0036***	-0.0029	-0.0065	-0.0033***	-0.0031***	-0.0054	-0.0030
ly_AGR_ly~ f		-0.0025		-0.0028				
ly_ISS_ly~ f						0.0037		0.0038
ly_COS_ly~ f								
ly_SER_ly~ f								
ly_AGR_ly_~p			-0.0002	0.0008				
ly_ISS_ly_~p							0.0014	-0.0000
ly_COS_ly_~p								
ly_SER_ly_~p								
duafhat	0.0083**	0.0087**	0.0083**	0.0088**	0.0091*	0.0099**	0.0092*	0.0099**
N	380	380	380	380	380	380	380	380
ll	1185.3835	1186.4462	1185.3910	1186.5262	1193.4360	1195.1871	1193.6449	1195.1872

Variable	cos0_dua	cos1_dua	cos2_dua	cos3_dua	ser0_dua	ser1_dua	ser2_dua	ser3_dua
lifl_pc	-0.0223***	-0.0212***	-0.0223***	-0.0208***	-0.0174**	-0.0163**	-0.0172**	-0.0163**
duaf	-0.0062***	-0.0110	-0.0062***	-0.0121	-0.0062***	-0.0113***	-0.0061***	-0.0114***
z	-0.0037***	-0.0036***	-0.0045	-0.0010	-0.0027***	-0.0024**	-0.0045	-0.0019
ly_AGR_ly~ f								
ly_ISS_ly~ f								
ly_COS_ly~ f		0.0018		0.0022				
ly_SER_ly~ f						-0.0054*		-0.0055*
ly_AGR_ly_~p								
ly_ISS_ly_~p								
ly_COS_ly_~p			0.0003	-0.0010				
ly_SER_ly_~p							-0.0020	0.0005
duafhat	0.0106**	0.0105**	0.0106**	0.0104**	0.0078*	0.0084*	0.0080*	0.0083*
N	380	380	380	380	380	380	380	380
ll	1179.9157	1180.0941	1179.9200	1180.1228	1197.1031	1199.3882	1197.3297	1199.4016

legend: * p<.1; ** p<.05; *** p<.01

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Table A.7 – Eq. (4.4), Various sectors, Specifications including TRE

Variable	agr0_tre	agr1_tre	agr2_tre	agr3_tre	iss0_tre	iss1_tre	iss2_tre	iss3_tre
lifl_pc	-0.0178***	-0.0179***	-0.0180***	-0.0177***	-0.0219***	-0.0225***	-0.0220***	-0.0225***
tref	-0.0072***	-0.0012	-0.0072***	-0.0009	-0.0065***	-0.0145***	-0.0064***	-0.0143***
z	-0.0036***	-0.0036***	-0.0026	-0.0044	-0.0031***	-0.0029***	-0.0059	-0.0032
ly_AGR_ly~ f		-0.0016		-0.0017				
ly_ISS ly~ f						0.0053**		0.0052**
ly_COS_ly~ f								
ly_SER_ly~ f								
ly_AGR_ly_~p			-0.0003	0.0002				
ly_ISS_ly_~p							0.0019	0.0002
ly_COS_ly_~p								
ly_SER_ly_~p								
trefhat	0.0118*	0.0125*	0.0118*	0.0126*	0.0163*	0.0180*	0.0169*	0.0181*
N	380	380	380	380	380	380	380	380
ll	1183.0553	1183.3469	1183.0663	1183.3533	1191.2148	1193.4849	1191.5675	1193.4897

Variable	cos0_tre	cos1_tre	cos2_tre	cos3_tre	ser0_tre	ser1_tre	ser2_tre	ser3_tre
lifl_pc	-0.0219***	-0.0205***	-0.0219***	-0.0196***	-0.0168**	-0.0154*	-0.0166**	-0.0154*
tref	-0.0069***	-0.0143	-0.0070***	-0.0168*	-0.0069***	-0.0140***	-0.0068***	-0.0143***
z	-0.0036***	-0.0035***	-0.0033	0.0017	-0.0025***	-0.0022**	-0.0046	-0.0016
ly_AGR_ly~ f								
ly_ISS ly~ f								
ly_COS_ly~ f		0.0028		0.0038				
ly_SER_ly~ f						-0.0076**		-0.0079***
ly_AGR_ly_~p								
ly_ISS_ly_~p								
ly_COS_ly_~p			-0.0001	-0.0020				
ly_SER_ly_~p							-0.0023	0.0007
trefhat	0.0170**	0.0167**	0.0170**	0.0165**	0.0131	0.0139	0.0137	0.0137
N	380	380	380	380	380	380	380	380
ll	1177.6728	1177.9912	1177.6734	1178.1079	1194.8259	1197.9602	1195.1222	1197.9830

Table A.8 – Eq. (4.4), Various sectors, Specifications including FDR

Variable	agr0_fdr	agr1_fdr	agr2_fdr	agr3_fdr	iss0_fdr	iss1_fdr	iss2_fdr	iss3_fdr
lifl_pc	-0.0165**	-0.0165**	-0.0170**	-0.0171**	-0.0208***	-0.0210***	-0.0209***	-0.0211***
fdrf	-0.0072***	-0.0078	-0.0072***	-0.0085	-0.0066***	-0.0138***	-0.0065***	-0.0131***
z	-0.0037***	-0.0037***	-0.0017	-0.0014	-0.0031***	-0.0030***	-0.0067	-0.0055
ly_AGR_ly~ f		0.0002		0.0004				
ly_ISS_ly~ f						0.0047**		0.0043**
ly_COS_ly~ f								
ly_SER_ly~ f								
ly_AGR_ly_~p			-0.0005	-0.0006				
ly_ISS_ly_~p							0.0024	0.0017
ly_COS_ly_~p								
ly_SER_ly_~p								
fdrfhat	0.0135	0.0134	0.0135	0.0134	0.0240*	0.0243*	0.0255*	0.0253*
N	380	380	380	380	380	380	380	380
ll	1180.8575	1180.8606	1180.9036	1180.9161	1189.8382	1191.3053	1190.4299	1191.5900

Variable	cos0_fdr	cos1_fdr	cos2_fdr	cos3_fdr	ser0_fdr	ser1_fdr	ser2_fdr	ser3_fdr
lifl_pc	-0.0212***	-0.0201***	-0.0212***	-0.0199***	-0.0162**	-0.0153*	-0.0158*	-0.0152*
fdrf	-0.0071***	-0.0149	-0.0071***	-0.0158*	-0.0067***	-0.0134***	-0.0066***	-0.0129***
z	-0.0036***	-0.0036***	-0.0047	-0.0017	-0.0026**	-0.0024**	-0.0055	-0.0040
ly_AGR_ly~ f								
ly_ISS_ly~ f								
ly_COS_ly~ f		0.0030		0.0033				
ly_SER_ly~ f						-0.0070**		-0.0064**
ly_AGR_ly_~p								
ly_ISS_ly_~p								
ly_COS_ly_~p			0.0004	-0.0007				
ly_SER_ly_~p							-0.0032	-0.0018
fdrfhat	0.0234**	0.0235**	0.0234**	0.0235**	0.0176	0.0174	0.0192	0.0183
N	380	380	380	380	380	380	380	380
ll	1176.3225	1176.5600	1176.3285	1176.5766	1192.3463	1194.3708	1192.9181	1194.5349