THE IMPACT OF STRUCTURAL FUNDS ON THE ITALIAN MEZZOGIORNO, 1994-1999

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Abstract *- This paper aims at providing empirical evidence of the impact of Structural Funds on the economies of Italian Objective 1 Regions (the "Mezzogiorno"). In particular, we consider the effect in terms of economic growth of the 1994-1999 Community Support Framework by using a simple supply-side model estimated with a panel of regional data over the period 1970-1994. We find a high volatility in the level of growth rates induced by Structural Funds expenditure in six Southern regions (namely, Molise, Campania, Puglia, Basilicata, Calabria and Sardinia).*

Keywords - STRUCTURAL FUNDS, REGIONAL POLICY, ITALY.

JEL Classification: E62, H50, R58.

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1. INTRODUCTION

Public policies in the European Union have become the subject of an increasing number of studies over the past decade. Most scholars have focused their attention on the effects of Structural Funds (henceforth denoted as SF), as the main policy instruments, acting to meet the objectives of the Maastricht Treaty, i.e. achieving the strengthening and convergence of national (and thus, regional) economies (European Union, 1997).

The effectiveness of the EU regional policies in delivering the final objectives has been discussed both in academic and political arenas. Boldrin and Canova (2001, 2003) espouse the idea that regional policies have scarce relevance in the process of convergence among European countries. As European integration promotes efficiency and competition, the result would be a sound divergence in terms of *per capita* income, but if labour was free to move, it would allow a re-equilibrium in the geography of development in Europe (Puga, 2002). Boldrin and Canova (2001, 2003) claim that, by allocating cohesion support to poor regions, however, the European Commission reveals that it either accepts that labour is immobile, as often regional policies are meant (or at least implemented) to compensate immobile workers living in the poor regions from having less job opportunities (since firms agglomerate in rich regions). On the other hand, Martin (1998, 1999, 2003) argues that transport infrastructure and investments reducing transaction costs should be interpreted as fundamental for the reduction of income differences.

The present communication contributes to the empirical evidence on the impact of SF on the Italian Objective 1 regions, i.e. on the Mezzogiorno, by making use of de la Fuente's (2002) model. Thus, the aim of this paper is to provide an insight on the growth effect of SF across Italy's Southern regions by also evaluating the decision made by regional governments to allocate funds among productive factors. The structure of the paper is as follows. In section 2 a quantitative description of SF spending in Italy is presented; the model and the results of the analysis are in section 3. The final section contains concluding remarks and policy implications.

2. REGIONAL POLICY AND STRUCTURAL FUNDS IN ITALY

The economic literature aimed at providing empirical evidence of the impact of SF can be divided into two main categories: the first one studying the impact of SF on growth and convergence and the second focusing on the evaluation of the impact of SF spending. On the first point, Ederveen et al. (2003), in their attempt to evaluate the contribution of European regional policies to economic and social cohesion, review a number of studies, run simple econometric analysis and argue that there is room for improvement in the

effectiveness of policy interventions by European Commission. In particular, by making use of data at regional level, they test two different hypotheses:

- SF have a sound redistributive effects among European regions;
- cohesion support positively affects convergence.

Despite some degree of redistribution that seems to characterize policy interventions, the authors find that there is no univocal interpretation of results on the extent to which EU regional policies affect the process of convergence.

Dall'erba and Le Gallo (2003) consider the process of economic convergence of 145 European regions over the period 1989-1999 by using spatial econometrics techniques. They find evidence of club convergence with a negligible or even non-significant effect of SF. The same results are found by Rodriguez-Pose and Fratesi (2004). Using standard econometrics for the analysis of conditional convergence, they assess the failure of cohesion support by arguing that it has been caused by a misallocation of funds among productive factors in Objective 1 regions. Despite the concentration of investments on infrastructure and on business support, the returns to commitments on these axes are not significant. It is interesting to note how these findings do not completely confirm Martin's (2003) argumentation of an increase in the effectiveness of SF consequently to a concentration of development funds on infrastructure investment. However, it should be stated that Martin (2003) implicitly refer to the theoretical model developed in Martin and Rogers (1995) where investments in intraregional rather then interregional infrastructures lead to different results. In particular, the former ones would act as a stimulus for aggregate growth but increasing inequalities, the latter ones would produce more cohesion but lowering aggregate growth. Unfortunately, to the best of my knowledge, no data on the typology of infrastructure are available, thus a complete validation of Martin's (2003) arguments cannot be carried out. Rodriguez-Pose and Fratesi (2004) also find that only human capital investment (which only represents one-eight of the total commitments) has positive and significant returns[1].

Concerning the second category, the first attempts at modelling the effect of SF on cohesion countries was made through the construction of the well-known HERMIN and QUEST models. HERMIN is oriented to growth in order to quantify and analyse shocks to public spending in infrastructure, human capital and business support, all related to SF objectives and actions (Bradley et al., 1995). QUEST is a macroeconometric model considering a wide range of regions and countries and it is meant to quantify growth impacts of European public policies as well as changes in regional business cycles (Roeger and in't Veld, 1997).

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[1] For a policy oriented discussion of the role of investment in human capital in the context of SF and European convergence, see Garnier (2003).

By inaugurating a second generation of studies, Christodoulakis and Kalyvitis (1998a, 1998b, 2000) develop a four-sector macroeconometric model to forecast the effects of the second Community Support Framework on the Greek economy. The model can be run under alternative assumptions according to whether the effects are stemming from the demand side of the economy or incorporate the supply-side externalities that show the improvement of factor productivity. Using similar numerical simulation techniques in an endogenous growth model, Pereira (1999) investigates the effects of European Union funding on growth and convergence in cohesion countries. Results show that the absolute gains induced by SF spending are relevant only for Greece and Portugal[2], while modest for Ireland and Spain. The Italian 1994-1999 Objective 1 Community Support Framework initially allocated euro 34,4 billions (at 1994 prices), of which 78% was allocated to public resources (46% of structural funds and 32% of national funds) and 22% to private resources.

According to the structure of the Community model, the Italian Community Support Framework for Objective 1 regions has been structured into 8 priority axes (Table 1), representing a sectoral approach to programming. Axes 1 and 6 were devoted to infrastructure investment, the first to communication infrastructures and the second to public capital, including interventions on natural capital aimed at prevention and valorisation. Axis 2, endowed with the largest amount of funds, was dedicated to business support and basically funded investment in private capital. Axis 3 actions aimed at strengthening tourist industry and supporting the valorisation of the cultural heritage. The objective of Axis 4 was to sustain the agriculture by promoting product innovation, economic efficiency and rural development. Axis 5 supported the reorganisation of the fishing sector by promoting water culture and the modernisation of production technologies. Axes 4 and 5 were funded almost entirely by EAGGF and FIFG respectively. Axis 6 aimed at promoting investment in education and training all along the lines of objectives 3 and 4. Finally axis 8 was created to support the implementation of programs and the reinforcement of administrative and operations systems.

The CSF has been divided into 9 sub-frameworks: 1 multi-regional and 8 regional, one for each region (Table 2). Regional interventions received 49% of the total public resources and multi-regional interventions the remaining 51%. This distribution was the result of sectoral choices, which privileged national or regional administrative responsibilities and competences, but also the option for an increasing role of regional interventions. Regions increased their role with respect to the previous programming period, when they detained 44% of the total public resources.

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[2] For an analysis of the impact of SF spending on the Portuguese economy see also Pereira and Gaspar (1999).

Table n° 1: Initial Objective 1 1994-99 CSF for Italy: allocation of funds by priority axes (%)

Axes		Total Cost	Public Funds							Private funds
			European Funds						Total National Funds	
			Total Public Expenditure	Total	ERDF	ESF	EAGGF	FIFG		
1	Communications	16,1	12,9	14,5	22,4				10,6	27,0
2	Industry	31,4	28,8	24,9	36,8	5,5			34,3	40,6
3	Tourism	6,5	6,6	5,8	8,0	3,2			7,7	6,2
4	Agriculture – Rural Development	13,4	14,1	15,8	0,6	2,1	100,0		11,7	11,1
5	Fishing	1,5	1,7	1,7		0,9		100,0	1,5	1,2
6	Economic Infrastructure	20,8	23,4	21,8	31,0	8,9			25,6	12,0
7	Human resources	9,8	12,1	14,9	0,6	78,4			8,1	1,9
8	Technical Assistance	0,4	0,5	0,6	0,6	1,0			0,4	
	Total	100	100	100	100	100	100	100	100	100

The most centralised axes were industry (76% of the public resources to multi-regional programmes) and fishing (92%), whilst agriculture (91% to regional programmes), tourism (82%) and human resources (58% to regions) were the most decentralized. The infrastructural axes (communication and economic infrastructure) divided their resources into similar quotas. Technical assistance dedicated more resources to the multiregional level (65%).

Table n° 2: Distribution of public resources in regional and multiregional sub-frameworks

	Total	Multi-regional	Total regional	Abruzzo	Basilicata	Calabria	Campania	Molise	Puglia	Sardegna	Sicily
Communications	100	53,1	46,9	1,8	1,9	2,9	10,3	2,8	5,6	11,4	10,1
Industry	100	75,6	24,4	0,6	1,9	3,7	6,2	0,5	4,3	1,9	5,3
Tourism	100	18,1	81,9	4,6	8,3	17,8	16,3	2,4	11,8	3,3	17,5
Agriculture – Rural Development	100	9,1	90,9	3,6	9,2	11,2	14,8	5,2	15,3	14,1	17,3
Fishing	100	91,6	8,4	0,0	0,3	0,5	3,1	0,0	0,9	2,4	1,2
Economic Infrastructure	100	55,2	44,8	0,7	2,9	4,2	11,9	1,4	8,6	5,2	9,9
Human resources	100	42,0	58,0	1,4	4,5	6,6	11,5	1,5	10,3	7,2	15,1
Technical Assistance	100	65,0	35,0	1,1	4,7	5,2	5,7	1,1	3,4	4,6	9,1
Total	100	50,9	49,1	1,6	3,9	6,0	10,5	1,9	8,2	6,4	10,6

Source: Ismeri, 2002.

The distribution of public resources among regions was based on criteria related to the size of population of the regions. In the case of Abruzzo, the quota of allocated resources was half of the previous 1989-1993 quota, because of the near conclusion of its intervention (it was no longer eligible and a special phasing out with the conclusion of commitments in 1996 and payments in 1998 was defined). The other regions generally maintained their earlier quota, but the largest regions (Campania and Sicily) slightly increased their resources.

In this paper I make use of data on SF expenditure over the period 1994-2001 for six regions (Molise, Campania, Puglia, Basilicata, Calabria, Sardegna), representing 68.5% of the total GDP in the Mezzogiorno and the 58.9% of the total amount of SF[3]. Regional SF data were collected through an ad hoc survey among Managing Authorities. Notice that, even though I am mainly interested in the 1994-1999 programming period, I have extended it to 2001 because commitments to spending have been fulfilled all along the 1994-2001 period.

Expenditure has been grouped into five main categories: investment in social infrastructures, public expenditure in training and education, investment in economic infrastructures, subsidies to private investments, and technical assistance. Table 3 contains the functional and regional composition of SF expenditure in 1994 billions lira and the weight of each item in total aggregate expenditure. Subsidies to private investments account for about 30% of the total expenditure, whilst public spending accounts for over 80% of the total budget.

Table n° 3: Reclassification of Structural Funds expenditure (in billions lire, 1994)

	Economic infrastructure	Training	Social infrastructure	Private capital	Technical assistance	Total public funds	Private Funds	TOTAL
Molise	318,81	165,01	266,58	357,16	4,66	1 112,24	153,00	1 265,24
Campania	1 118,68	358,73	1 444,46	1 489,06	13,90	4 424,82	1 182,03	5 606,86
Puglia	469,02	550,13	1 251,20	1 355,40	30,19	3 655,95	1 030,10	4 686,06
Basilicata	329,49	487,50	731,43	738,73	10,18	2 297,33	421,52	2 718,86
Calabria	308,49	425,22	646,32	639,38	8,94	2 028,24	446,78	2 475,02
Sardegna	853,14	448,95	696,01	1 350,51	94,63	3 443,26	119,93	3 563,20
TOTAL	3 397,53	1 435,54	5 036,00	5 930,24	162,50	16 961,84	3 353,36	20 006,84
Total (%)	16,98	12,10	25,17	29,64	0,81	84,78	16,76	100,00

Note: Multi-regional Subframework funds have been distributed across regions according to the portion of SF allocated in the region.

3. AN EVALUATION OF THE IMPACT OF EU REGIONAL POLICY

In order to assess the impact of SF expenditure on South Italian regional economies, I adopt the supply-side approach proposed by de la Fuente (2002). The production function is assumed to be in a Cobb-Douglas form which, linearized and expressed in logs, can be written as:

$$y_{it} = \alpha_L a_{it} + \alpha_K k_{it} + \alpha_p p_{it} + \alpha_g g_{it} + \alpha_h h_{it} + \alpha_L l_{it} \quad (1)$$

where y is the regional production, k the private capital, p is the stock of social infrastructures, g are economic infrastructures (i.e. transport infrastructures), h is the stock of human capital, l the employment and a is the technological progress. Basically, the model considers three typologies of effects of SF on regional output: the short run impact, given by the production growth induced by a

3 Abruzzo and Sicily are not included in the dataset because of the lack of data.

variations in the level (i.e. investments) of capital productive factors; the medium run impact, given by the effect of investments on employment and thus by the impact of the increase in *l* on the output; finally, the long run effect, given by the recursive paths of the short and medium run effects. With these considerations in mind, let us turn to consider the pivotal role of employment creation. The labour demand, as defined by the first order conditions of the maximization problem of the representative firm, is given by:

$$l_t^* = \frac{1}{1-\alpha_L}\left(\ln \alpha_L + \alpha_L a_{it} + \alpha_K k_{it} + \alpha_p p_{it} + \alpha_g g_{it} + \alpha_h h_{it} - w_{it}\right) \tag{2}$$

where *w* is the real wage. In order to account for labor market imperfections, it would be useful to consider a friction rule, as described by the following adjustment equation:

$$\Delta l_t = -d + \gamma_1 \Delta l_t^* + \gamma_2 (l_t^* - l_t) \tag{3}$$

where *d* is the exogenous rate of employment destruction[4]. The data I use to estimate model (1)-(3) cover the period 1970-1994 and are contained in CRENOS datasets[5].

Table n° 4: Parameter estimates

Parameter	αG	αP	αK	αH	αL	γ1	γ2	R^2 =
Coefficient	0,133	0,332	0,099	0,123	0,559	0,121	0,104	0,627
	(1,96)*	(1,28)	(2,96)**	(2,53)**	(8,57)***	(1,86)*	(3,01)**	

Notes: Estimates are obtained with GMM-IV procedure with fixed effect, for which instruments are all lagged variables.
**** significant at 99%; ** significant at 95%; * significant at 90%*

Table 4 shows the GMM-IV estimates for the parameters of interest, used to compute the short term effect of SF, as depicted in table 5 for the case of Puglia. Notice that all the estimated coefficients have the expected sign; social capital is positive but not significant[6].

Column (2) in Table 5 reports the estimates for output elasticities with respect to the productive factors reported in Table 4. By multiplying these parameters by the percentage change in the corresponding stock due to investment through structural funding, we obtain the direct economic impact of SF, ΔY1, as defined in column (3). In column (4) the short run elasticities of employment are

4 Details on the model as well as on the estimation procedure can be found in de la Fuente (2002).
5 Additional details can be found at the URL www.crenos.it.
6 An extensive discussion on the appropriate production function estimates as well as endogeneity issues are discussed in Percoco (2004).

reported[7]. Once multiplied by the increase in the stock of the corresponding productive factor, they give the induced increase in employment (column 5). As a productive factor, an increase in quantity of labour will result in the growth of regional production by an amount equal to the product of the increase in employment and the elasticity of output with respect to this factor (ΔY2). Thus, by summing up the direct effect, ΔY1, and the induced growth, ΔY2, we obtain the total contribution to output growth, ΔY3, produced by SF expenditure, which is equal to an annual 1.69% for Puglia.

Table n° 5: Economic Impact of Structural Funds, Puglia 1994

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Δ log stock	Output elasticities	Direct ΔY1	Employment elasticities	Δemploy-ment	Induced ΔY2	Total ΔY3
Economic Infrastructures	0.015	0.133	0.20%	0.036	0.05%	0.03%	0.23%
Social Infrastructures	0.03	0.332	1.00%	0.091	0.27%	0.15%	1.15%
Training	0.001	0.099	0.01%	0.027	0.00%	0.00%	0.01%
Private Investment	0.021	0.123	0.26%	0.034	0.07%	0.04%	0.30%
Employment		0.559					
Total			1.46%		0.40%	0.22%	1.69%

Table n° 6: Short run and cumulative impact of Structural Funds

Region	Short run growth impact (%)	Cumulative impact (1994-2005) (%)
Molise	0.97	4.13
Campania	0.54	3.96
Puglia	1.69	6.04
Basilicata	1,57	6.13
Calabria	0.86	4.02
Sardegna	1.34	5.96

Note: The short run growth effect is calculated as the average induced growth over the period 1994-2005.

Table 6 reports the impact on growth for the remaining regions. The third column shows the long run cumulative effect, calculated by using the simple recursive procedure reported in Appendix 1 of de la Fuente's (2002) paper. In particular, capital investment made through structural funds financing affect growth through the depreciation term in a standard neoclassical investment equation. Thus, as I do not make any assumption on the path of future public investment (i.e. I assume that it is null over the period 2001-2005), infrastructure

[7] Note that the general employment elasticity with respect to productive factor *i,* is given by $\lambda_i = \frac{\gamma_1 \alpha_i}{1-\alpha_L}$.

negatively affect growth. This, in turn, means that, by extending the period under consideration all along the interval 2001-2005, I make a conservative assumption in evaluating the cumulative effect of SF on growth.

As expected, estimates of growth effect suffer from a high degree of volatility which can be interpreted in the light of two different hypotheses: i) regional economic structures present different response behaviours to the impulse given by SF spending; ii) local Governments have different levels of relative efficiency in administering development funds which, in turn, affects the effectiveness in reaching the final objectives. In particular, the second explanation is partially confirmed by the fact that Basilicata and Sardinia, which present high performances associated to SF expenditure, were awarded with extra-funds through the Performance Reserve awarded by the European Commission under proposal of the Italian Ministry of Economy and are now candidates to phase out in the aftermath of 2006.

On the first point, it should be stated that differences in the effect of SF might be explained not only in terms of different economic cycles, but also in terms of production technology as reflected by marginal productivities. In particular, if we assume that investment choice made by local Governments are driven by an output maximisation criterion, then the allocation of expenditure across factors strictly depends on marginal productivities. The marginal productivity of a production function in a Cobb-Douglas form and expressed in logs is, for the general case of infrastructure (Percoco, 2004):

$$MP_g = \ln \alpha_g + (\alpha_g - 1)g + \alpha_k k + \alpha_l l + \alpha_p p + \alpha_h h \qquad (4)$$

Table 7 reports the comparison between marginal productivities and investment mix. As expected, regions that have experienced the best performance, as depicted in table 6, are the ones that have followed the optimality rule and expended according to the hierarchy of marginal productivities. Results might be interpreted in a better way if we consider the following index of policy coherence which is meant to measure the allocative efficiency of investment by using a simple Euclidian distance measure from the optimum[8]:

The closer Φ is to zero, the more efficient is the allocation of funds across productive factors. Table 8 reports the results for the Mezzogiorno and, as expected, the regions presenting higher levels of allocative efficiency are Basilicata and Sardegna. At this point we do not have any data to explain differences in the regional performances. However, it might be argued that microeconomic forces driving the efficiency of Public Administration (i.e. the

8 For a discussion of the impact of public investment on the allocative efficiency of regions as well as for a more complex representation of the index of policy coherence see Percoco (2004).

capacity of regional Governments to make investment decision according to the fundamental structure of the economy) are likely to affect the macroeconomic outcome of public policies.

$$\Phi = \left| \frac{\sum_{j\in\{h,k,g,p\}} \frac{MP_j \Big/ \sum_{j\in\{h,k,g,p\}} MP_j}{\%I}}{4} - 1 \right| \qquad (5)$$

Most of the literature on public policy assumes a welfare maximization criterion to be the optimality rule. The analysis reported in Tables 7 and 8 is based on the hard assumption that local Government acts as if the production function was the objective function. This workable assumption is justified by the fact that the main objective of SF is economic convergence, thus the increase of per capita GDP in less developed regions. This, in turn, means that European Commission as well as local Governments are primarily interested in stimulating production by enlarging regional productive basis and/or promoting technical efficiency gains.

Table n° 7: Marginal productivities and investment mix

Productive factors	Molise		Campania		Puglia		Basilicata		Calabria		Sardegna	
	MP	%I	MP	%I	MP	%I	MP	%I	MP	%I	MP	%I
h	1.160	14.8%	0.779	8.1%	1.221	15.1%	1.761	21.3%	1.611	21.0%	1.852	20.7%
k	1.988	32.2%	2.563	33.7%	2.355	37.3%	2.139	32.2%	1.868	31.6%	2.914	40.3%
g	1.751	28.7%	1.934	25.3%	0.700	12.9%	0.968	14.4%	0.825	15.2%	1.805	25.4%
p	0.887	24.0%	1.486	32.7%	1.395	34.5%	1.284	31.9%	1.243	32.0%	0.575	13.4%

Note: Marginal productivities are computed for the year 1994.

Table n° 8: Indices of policy coherence

Region	Index of policy coherence
Molise	0.029
Campania	0.087
Puglia	0.052
Basilicata	0.023
Calabria	0.043
Sardegna	0.027

4. CONCLUSION

In this paper, I have made an attempt at quantifying the impact of SF on economic growth of Italian Objective 1 regions by using a supply-side driven model. It has been found that, despite the sound effect of development funds, induced growth rates highly vary across regions. I have tried to explain this result by analysing the coherence of the investment mix with an optimality rule based on marginal productivities and the results indicate that regions investing through a marginal productivity rule are the ones experiencing best performances in terms of output increase. Even if the model suffers from the weakness that demand effects are not taken into account, the approach I have used has the advantage that, by considering a limited number of variables, it constitutes a fast way of computing the impact of European regional policies on growth. Future research could be directed to the estimation of larger models and to the subsequent comparison with the results presented in this paper.

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L'IMPACT DES FONDS STRUCTURELS SUR LE MEZZOGIORNO ITALIEN, 1994-1999

Résumé *- L'objectif de cet article est de fournir une estimation de l'impact des fonds structurels sur la croissance économique des régions italiennes classées Objectif 1 (le "Mezzogiorno"). Nous considérons en particulier l'effet du Cadre Communautaire d'Appui 1994-1999 en utilisant un modèle simple d'offre estimé à partir d'un panel de données régionales sur la période 1970-1994. Nous détectons un degré élevé de volatilité dans les taux de croissance induits par les dépenses de fonds structurels dans six régions du sud (à savoir Molise, Campanie, Puglia, Basilicate, Calabre et Sardaigne).*

EL IMPACTO DE LOS FONDOS ESTRUCTURALES SOBRE EL MEZZO GIORNO ITALIANO, 1994-1999

Resumen *- La meta de este artículo es proveer una estimación del impacto de los fondos estructurales sobre el crecimiento económico de las regiones italianas clasificadas Objetivo 1 (el "Mezzogiorno"). Consideramos en particular el efecto del marco comunitario de apoyo 1994-1999 utilizando un modelo sencillo de oferta estimado a partir de un panel de datos regionales sobre el período 1970-1994. Detectamos un nivel elevado de volatilidad en las tasas de crecimiento debidas a los gastos de fondos estructurales en seis regiones del sur (o sea Molise, Campania, Pugli, Basilicata, Calabria y Cerdeña).*