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## Assessing the effectiveness of EU's regional policies: a new approach

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# ASSESSING THE EFFECTIVENESS OF EU'S REGIONAL POLICIES: A NEW APPROACH\*

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## Abstract

In this paper, we propose a new methodology for the assessment of EU's regional policies, making use of the HERMIN macroeconometric model. A major feature of our approach is that allows us to compare the actual evolution of the economy under analysis, with and without European funds, so that we should be able to assess in a more accurate way the effectiveness of the EU aid over the period of analysis. An empirical application of the methodology is also offered, using as a case study an Objective 1 Spanish region, Castilla-La Mancha, traditionally backward but showing in last years a special dynamism.

*Key words:* EU's regional policies, Community Support Frameworks, HERMIN-Spain model, Castilla-La Mancha

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## 1. Introduction

As is well known, regional policies devoted to eliminate disparities in social and economic welfare among regions have become in last years one of the main concerns for public involvement in the European Union (EU). Although EU's regional policies can be traced back to 1975, with the creation of the European Regional Development Fund (ERDF), they become definitively established after the 1988 reform. Such a reform is a consequence of the coming into effect of the Single European Act, which confirms the principle of economic and social cohesion among the member states, and leads to the regulation of the so called Structural Funds: the ERDF, the European Social Fund (ESF), and the Guidance Section of the European Agricultural Guidance and Guarantee Fund (EAGGF). Finally, the principle of economic and social cohesion is going to be reinforced in the Maastricht Treaty, which leads to the 1993 reform with the creation of a new Cohesion Fund that has become one of the main pillars of EU's regional policies together with the Structural Funds. As a result of this evolution, regional policies now stand for about one third of EU's budget.

The central role, both from a quantitative and qualitative point of view, of regional policies in the working of the EU, together with the problems derived from the next enlargement (since the new member countries will join with income levels quite below the EU average), are putting into question the future of EU's regional policies. Since, on the other hand, income differences among the EU regions do not seem to have decreased despite the important role played by regional policies, several studies offering critical assessments of EU's regional policies have recently appear; see, e.g., Boldrin and Canova (2001), Midelfart-Knarvik and Overman (2002), or Rodríguez-Pose and Fratesi (2004).

However, a common feature to the above quoted studies is that a counterfactual analysis is not presented, i.e., their results are not compared with the situation without regional policies. More specifically, the fact that a particular region may not be "better" despite being beneficiary of EU's regional policies, would not necessarily mean that the aid was not efficient, since the region might have been "even worse" without that aid.

In this paper, we propose a new methodology for the assessment of EU's regional policies, making use of the HERMIN macroeconometric model. More specifically, starting from the executed data for the period 1989-1999 and those programmed for 2000-2006, we will be able to analyze the impact of EU's funds on a region's output using a version of the model HERMIN-Spain adapted to that particular region. Both the demand effects following the completion of investments, as well as the long-run supply effects derived from the increase in the public capital stock, private productive capacity, and human capital, occurring as a consequence of the aid, will be estimated. A major feature of our approach is that will allow us to compare the actual evolution of the economy under analysis, with and without European funds, so that we should be able to assess in a more accurate way the effectiveness of the EU aid over the period of analysis. Finally, we provide an empirical application, using as a case study an Objective 1 Spanish region, Castilla-La Mancha, traditionally backward but showing in last years a special dynamism.

The paper is organized as follows. In section 2 we present a short theoretical review of the foreseeable evolution of the spatial location of economic activities in a context of economic integration, as well as its implications for regional policies. Our

proposed methodology is explained in detail in section 3. In section 4 we briefly describe the situation of Castilla-La Mancha's economy and its main features, before and during the reception of the EU aid. Next, in section 5 we show the results of the assessment of the EU aid received by Castilla-La Mancha's economy using our proposed methodology, over the subsequent budgeting programming periods contained in every Community Support Framework (CSF) 1989-1993, 1994-1999, and 2000-2006; and these results will be compared with the situation that would have prevailed without the EU aid. Finally, section 6 collects the main conclusions.

## **2. Regional integration and the location of economic activities**

The neoclassical growth theory has provided the "orthodox" answer about the time evolution of regional disparities. According to this theory, if a group of economies were different only in their initial capital-labour ratios, poorer economies should grow more rapidly than the rich ones, i.e., the convergence hypothesis would verify, due to the assumption of decreasing returns on capital. And, if the economies would differ also in other aspects, convergence would be just conditional (i.e., the so called "conditional  $\beta$ -convergence"), so that the growth rate of an economy would be directly related to the distance towards its steady state. On the other hand, this approach would be sceptical as regards the usefulness of regional policies, since the estimated speeds of convergence are essentially the same both for the countries using them and for those that did not use them; see, e.g., Sala-i-Martin (1996) for a more detailed account.

However, from the empirical point of view, the evidence on convergence does not seem to be too favourable for either long time periods or wide sets of countries, at the same time that the concept of "conditional  $\beta$ -convergence" has come under ever-increasing criticism; see, e.g., Quah (1996). More generally, economic convergence among EU regions seems to come to a halt in the mid-1970s, with disparities basically stabilized after the mid-1980s (Cuadrado-Roura, 2001).

On the other hand, recent years have contemplated the proliferation of a set of contributions, which attempt to elucidate the factors influencing the location of economic activities across the space: the so called New Economic Geography (NEG). Although not strictly "new" (since it collects some aspects already analyzed by the theory of location, regional science, economic history, or the theory of international trade), the interest of the NEG lies on providing a common framework from these previously disperse contributions, to analyze a phenomenon up to now not too investigated by the more orthodox approaches. The main statements of the NEG are surveyed in Ottaviano and Puga (1998) or, in a greater detail, in Fujita, Krugman and Venables (1999).

According to the NEG, location decisions by firms would be the result of the interaction of three elements: (i) firms would operate under conditions of increasing returns to scale; (ii) there are transport costs both for final goods and intermediate inputs; and (iii) the size of demand in a particular location. Then, in principle, the reduction of transport costs, in the context of a process of integration, should facilitate location in those places where production costs were lower; but it would also favour the concentration of production in a unique place: where demand is higher, in order of take advantage of scale economies (Krugman and Venables, 1990).

This analysis, however, would be incomplete since the size of the market would be exogenous, which would lead us to consider the presence of some mechanisms of cumulative causation. In this way, once initiated a process of concentration of the economic activity in a particular place, such a situation would tend to reinforce itself over time; two main mechanisms have been proposed in the NEG, namely, linkages induced by labour migration across regions (Krugman, 1991), and vertical linkages between upstream and downstream industries according to an input-output structure (Krugman and Venables, 1995; Venables, 1996).

So, in both cases an *agglomeration effect* would take place, so that the concentration of firms in a particular location would tend to generate an additional concentration. However, there would also appear a *dispersion effect*, so that the tendency to concentration might be reverted and economic activities spread geographically, due to the presence of space-immobile factors of production such as, e.g., natural resources or labour, if the latter were not fully mobile (which would be particularly relevant in the European case, as opposed to the US). Therefore, the location patterns of economic activities across the space would be essentially indeterminate, being the result of these two opposing forces, agglomeration and dispersion.

Finally, the NEG has not analyzed to a great extent the implications of the theory for regional policy. In general, in as much as we can't know if, without policies, there is too much or too little agglomeration, it would be difficult to guess the course to be followed by regional policies. One of the main instruments used by the EU's regional policies is the promotion of public infrastructure, which, in addition to increase the economy's output, it would also raise private factors' productivity; see Aschauer (1989) or, for the Spanish case, Bajo-Rubio and Sosvilla-Rivero (1993). So, regarding policies on transport infrastructure, Puga (2002) has noticed their potentially ambiguous effect on convergence. The reason would be that, although a better connexion between two regions with different development levels would give firms in the poorer region better access to the inputs and markets of the richer region, it would also make easier for firms in the richer region to supply the markets of the poorer region from its original location, which could harm the industrialization prospects of the poorer region.

### **3. Methodology**

In this paper, we propose assessing the macroeconomic effects of the EU aid by using a version, adapted to the particular economy under analysis, of the HERMIN model, jointly developed by FEDEA in Spain, the Economic and Social Research Institute in Ireland, and the Universidade Católica Portuguesa in Portugal. This is a conventional Keynesian-style model, where the expenditure and income distribution building blocks generate the standard income-expenditure mechanisms, although some neoclassical features are also incorporated, in particular within the supply-side. The HERMIN model has been used on a regular basis to assess the macroeconomic effects of both the CSFs (Bradley, Herce and Modesto, 1995) and the European Single Market (Barry *et al.*, 1997); a detailed description of the Spanish version of the HERMIN model can be found in Herce and Sosvilla-Rivero (1995).

Since our ultimate aim is identifying and modelling the channels through which the EU aid can affect the particular economy under analysis, we will differentiate both demand- and supply-side effects. From the demand side, completing the projects means

a stimulus on the economy through a higher public expenditure, which translates directly to aggregate demand and hence to output, leading also to increases in employment, income, prices, and wages. In turn, the supply-side effects perform through costs, productivity and competitiveness, raising output, decreasing imports and increasing exports, at the same time that inflationary pressures originated in the demand side are mitigated, thanks to the growth of productive capacity.

All these possible effects have been collected according with the corresponding programs:

- a) *Investment in infrastructure*. Its main effect is a reduction in transport and other communication services costs, which translates into a reduction in production costs and an improvement in competitiveness, leading in the long run to increases in output and employment.
- b) *Investment in human capital*. This program increases the efficiency and productivity of the beneficiary workers, reducing costs for the existing firms, increasing the quality of the final products, and stimulating the creation of new firms that take advantage of the increases in efficiency and productivity.
- c) *Business support*. This program is intended to encourage private investment in those activities considered to be important and desirable, to be translated into higher levels of output, exports, and employment.

We assume that economic benefits from each of the programs show themselves in form of externalities, and we try to capture them by modifying the key equations of the model (i.e., the production and factor demand equations, basically). In particular, we will differentiate two kinds of externalities: the former relates to the increase in the productivity of private factors, and the latter relates to a better quality of the final products elaborated by the private sector.

Regarding the first externality, we assume a CES production function as follows:

$$O = A \left\{ \delta [\exp(\lambda_L t) L]^{-\rho} + (1 - \delta) [\exp(\lambda_K t) K]^{-\rho} \right\}^{\frac{1}{\rho}}$$

where  $O$ ,  $L$  and  $K$  denote, respectively, value added, employment and capital stock,  $A$  is a scale parameter,  $1/(1+\rho)$  is the elasticity of substitution,  $\delta$  is a parameter of factor intensity, and  $\lambda_L$  and  $\lambda_K$  are the rates of technical progress incorporated in labour and capital, respectively. From here, the externality is incorporated by making endogenous the scale parameter as a function of the investment in public infrastructure, human capital, and private capital:

$$A_{CSF} = A_{NOCSF} \left( \frac{KGINF_{CSF}}{KGINF_{NOCSF}} \right)^{\eta_1} \left( \frac{KH_{CSF}}{KH_{NOCSF}} \right)^{\eta_2} \left( \frac{K_{CSF}}{K_{NOCSF}} \right)^{\eta_3}$$

where  $KGINF$ ,  $KH$  and  $K$  are the stocks of public infrastructure, human capital and private capital, respectively; subscripts  $CSF$  and  $NOCSF$  indicate the accumulated stock with and without the CSFs, and  $\eta_1$ ,  $\eta_2$  and  $\eta_3$  denote the corresponding elasticities.

The second externality works both directly through the effect of each program on the improvement of the quality of the final product, which leads to a higher foreign demand for those goods; and indirectly through the higher foreign direct investment inflows attracted by the availability of a better infrastructure, more skilled workforce, more developed management expertise, and higher productivity (Bajo-Rubio and López-Pueyo, 2002). This externality is captured by linking the proxy for foreign

demand used in the HERMIN model to the investment in public infrastructure, human capital, and private capital:

$$OW_{CSF} = OW_{NOCSF} \left( \frac{KGINF_{CSF}}{KGINF_{NOCSF}} \right)^{\eta_1} \left( \frac{KH_{CSF}}{KH_{NOCSF}} \right)^{\eta_2} \left( \frac{K_{CSF}}{K_{NOCSF}} \right)^{\eta_3}$$

where  $OW$  denotes the rest of the world's demand.

In our empirical application (see section 5), the following values for the different elasticities have been adopted:  $\eta_1=0.18$ , from the estimation of a production function, extended to include the public capital stock (Sosvilla-Rivero and Herce, 2002);  $\eta_2=0.07$ , from estimates of the social returns of education (Corugedo *et al.*, 1992); and  $\eta_3=0.10$ , from microeconomic information on the CSF 1989-93 (Herce, 1994). Notice that, in order to reduce risks, we have adopted moderate values for the elasticities, and the simulation has been performed so that their effects develop gradually.

It is important to stress that our model *cannot* trace the path of the economy analyzed over the specified time horizon. On the contrary, which our model *does* is measuring the change in certain macroeconomic variables with respect to a particular base (i.e., the reference scenario), following the occurrence of a shock to the economy (i.e., the investments from the CSFs). Therefore, when performing the simulations, the following criteria and definitions will be adopted:

- i) The levels of GVA, employment, and population for the period 1989-2006 are set according to the observed data and official projections.
- ii) We assume that the projections for GVA and employment include the effects of the investments from the different CSFs. That is, in absence of those investments, GVA and employment would be lower in an amount equal to those effects. These projections will be called *scenario with CSF*.
- iii) We subtract to the projections for GVA and employment (namely, those corresponding to the scenario with CSF) the total (i.e., demand- and supply side) effects estimated for the investments, in order to generate an alternative reference situation that will be called *scenario without CSF*.

#### 4. Castilla-La Mancha: Some economic features

Once explained our methodology, we will provide an empirical application, using as a case study an Objective 1 Spanish region, namely, Castilla-La Mancha. Before presenting the results, we offer in this section a brief description of the main features of Castilla-La Mancha's economy.

Castilla-La Mancha is located in the centre of the Iberian Peninsula, occupying the Southern side of the Central Plateau. Placed between Madrid to the North, Andalusia to the South, and the Valencia region to the East, its surface is 79,461 squared kilometres (15.7% of the Spanish territory), and its population about 1.7 million people (4.3% of Spain's total population), which means a very low population density. However, the main feature of Castilla-La Mancha's economy is a duality that combines industrial development, with a rural structure inherited from a very recent past. More specifically, the inner rural areas, with a strong agrarian component and lacking the basic infrastructure for development, coexist with an economic and demographic dynamism that has led to a rapid process of transformation and modernization in recent years.

The factors leading to the development of the region have been related both to territorial features, in the border areas with Madrid and the Mediterranean arch; as well as to public capital investments, due to the high-speed railway Madrid-Sevilla and the geographically decentralized University of Castilla-La Mancha. In this way, a region in principle not too attractive for investment has seen its industrialization favoured thanks to an improvement in accessibility and lower installation and operation costs.

The dynamism of Castilla-La Mancha's economy can be seen in Table 1. So, in 1988 (the year before the beginning of the first CSF) Castilla-La Mancha's *per capita* GDP was 60% of the EU's; a figure that increased to reach 67% in 1998. In addition, over these years Castilla-La Mancha's economy would have grown above the Spanish average: the accumulated rate of growth of real gross value added (GVA) (in euros of 1999) between 1988 and 1999 (i.e., the period of execution of the first two CSFs) was 2.9 and 2.6%, respectively (in *per capita* terms, 2.7 and 2.5%, respectively).

Castilla-La Mancha is the Spanish region with the largest extension of agricultural land, with 15.70% of the total Spanish cultivable surface, which means a very important share of agriculture in the whole productive activities. Although this share has decreased over time, employment in the agricultural sector has been always higher in Castilla-La Mancha than in the whole Spain, as can be seen in Table 2.

On the other hand, a key element for the region's development has been the growth in the financial resources destined to technological infrastructure, together with the externalities associated with higher R&D expenditures. These resources have come both from the Regional Development Programs approved by the European Commission, and the EU initiatives due to the ERDF. The evolution of the total R&D expenditure in Castilla-La Mancha, as a percentage of GDP, is shown in Table 2. So, R&D expenditure was in 1988 0.15% of GDP as compared to 0.72% for the whole Spanish economy. Such a percentage was raised in 1993 to 0.21%, compared to 0.91% for the whole Spanish economy; and this differential was substantially shortened in 1998 thanks to the strong growth experienced by the resources destined to R&D in Castilla-La Mancha. Even so, these advances are still quite far of reaching the level of the European average, which has amounted in last years to almost 2% of GDP, that is, more than twice the Spanish average.

## **5. An assessment of EU's regional policies on Castilla-La Mancha's economy using the HERMIN model**

Graphs 1 to 3 show some descriptive evidence on the magnitude of the CSFs to be received by Castilla-La Mancha over the whole programming period 1989-2006, and the sub-periods 1989-1993, 1994-1999, and 2000-2006. As can be seen, Castilla-La Mancha will have received on average 312 million euros over the whole period 1989-2006 (Graph 1), which would amount to 1.75% of its GVA (Graph 2). On the other hand, investment in infrastructure would be that absorbing a higher share of the total aid (46% on average), followed by investment in human capital (33%), and business support (21%) (Graph 3).

In the rest of this section we will present the results of the simulations performed from the HERMIN-Spain model, in order to assess the effects of the EU aid on the main macroeconomic variables of Castilla-La Mancha's economy.



First of all, Graph 4 shows the effects on the output level of the region, measured by real GVA at factor cost, for three simulations: (i) including only demand effects, (ii) including only supply effects, and (iii) including total effects (i.e., both demand and supply). Since we are interested in the long-run impact on potential growth, the analysis does not finish in the last programming year, 2006, but is extended to 2010 by keeping constant the received aid at the nominal level of the last year. As can be seen in the graph, the demand or Keynesian effects would increase initially real GVA, with the effect gradually decreasing afterwards, so that the initial increase on the base scenario (i.e., without EU aid) would be 2.39%, which would even increase to 3.67% in 1992, to decrease later to 1.37% in 1993. The new CSF 1994-99 leads to a new boost, with deviations of 4.21% and 5.16% on the base scenario in 1994 and 1999, respectively; which decrease later gradually from 3.82% in 2000 to 2.62% in 2010. As for the supply effects, since we have assumed (as is customary in the literature) that externalities show themselves only gradually, we would observe in 1989 a 0.06% increase on the base scenario, which would rise steadily up to a 2.05% in 2010. Finally, the total effects (Keynesian plus externalities) would lead to a real GVA above the base scenario of 2.56% in 1994, 6.65% in 1999, and 4.66% in 2006, to decrease later little by little up to 4.50% in 2010.

In turn, Table 3 shows the results of the simulation in terms of the level of real GVA, together with its accumulative growth rate (AGR) for the periods 1988-1999 (i.e., including the impact of the first two CSFs) and 1988-2006 (i.e., also including the foreseen impact of the third CSF). As can be seen, in the scenario without EU aid Castilla-La Mancha's economy would have grown in real terms over the period 1988-1999 at an accumulated rate of 2.27%, as opposed to 2.91% in the scenario with CSF; while these rates would be 2.64% and 3.02%, respectively, for the period 1988-2006.

Next, Table 4 presents the results for *per capita* income, measured in terms of *per capita* GVA in euros of 1999. As compared with the scenario without EU aid, *per capita* income would have been, on average, 245 euros greater in the period 1989-93; a figure that would rise to 415 and 628 euros in the periods 1994-99 and 2000-06, respectively. On the other hand, Table 5 shows the relative situation of Castilla-La Mancha's *per capita* income with respect to the EU average, measured as index numbers taking the value 100 for each year's EU average. As can be seen, at the end of the first programming period, Castilla-La Mancha recorded an index three points above that would have prevailed if the investments from the CSFs would not have been received, a difference that would have increased up to four and six points for the second and third programming periods, respectively. Therefore, thanks to the CSFs a slight process of real convergence towards the EU would have occurred, which would have become divergence without them.

Finally, we have also examined the effects of the EU aid on Castilla-La Mancha's unemployment rate. Graph 5 shows the difference between the unemployment rates that would be obtained under the different effects of the EU aid. As can be seen, the demand or Keynesian effects would have reduced the unemployment rate in 1989 by 1.21 percentage points, and by 1.96 points in 1992, to fluctuate later on from 0.69 points in 1993 to a maximum reduction of 2.61 points in 1999; after this year the deviations would decrease gradually to reach 1.38 points in 2006. In turn, the supply effects would increase steadily the unemployment rate as the externalities are growing up, from 0.06 percentage points in 1990, to 0.52 in 1993, 1.11 in 1999 and 1.22 in 2006.

This would be so, since the greater endowments of public infrastructure, private capital and human capital associated with the EU aid would increase private factors' productivity, so that lower amounts of labour would be required to produce the same amount of goods, which *ceteris paribus* would increase unemployment. As a consequence, the reduction in the unemployment rate resulting from the total effects would be relatively modest. The unemployment rates with and without EU aid appear in Table 6. On average, the reduction in the unemployment rate resulting from the investments from the CSF would have been 1.17 points between 1989 and 1993, and 0.75 points between 1992 and 1999, and would be estimated at 0.41 points for the period 2000-2006. As a result, Castilla-La Mancha's unemployment rate would have shown a yearly accumulative fall of 0.06% between 1988 and 1999, compared with an increase of 0.81% without EU aid; whereas, for the whole period 1988-2006 the decrease in the unemployment rate would have been 2.57% and 2.47%, with and without EU aid, respectively.

## 6. Conclusions

Since the end of the 1980s, following the reinforcement of the principle of economic and social cohesion, regional policies have become one of the main concerns for public involvement in the EU, with ever increasing resources devoted to them. In this paper, we have proposed a new methodology for the assessment of EU's regional policies, making use of the HERMIN macroeconometric model. Notice that, since economic convergence among EU regions seems to come to a halt in the mid-1970s, and given the essential theoretical ambiguity about the location of economic activities across the space, the relevant assessment would relate to a situation of no regional policies. Accordingly, a major feature of our approach is that allows us to compare the actual evolution of the economy under analysis, with and without European funds. In addition, we have provided an empirical application of this methodology, using as a case study an Objective 1 Spanish region, Castilla-La Mancha, traditionally backward but showing in last years a special dynamism. The analysis has been performed from the executed data for the period 1989-1999 and those programmed for 2000-2006, using a version of the macroeconometric model HERMIN-Spain adapted to this region.

Summarizing our main results, over the period of operation of the first two CSFs (1988-1999) the growth rate of the real output of Castilla-La Mancha's economy would have been 0.64 points above that would have prevailed without the European funds (0.38 if we include the projections of the third CSF until 2006). In addition, a slight process of real convergence towards the EU in terms of *per capita* income would have occurred, which would have become divergence without the investments from the CSFs. Finally, the unemployment rate would have shown a slightly more favourable behaviour thanks to the investments from the CSFs.

To conclude, the contribution of the EU aid to the favourable evolution of Castilla-La Mancha's economy over the last years should not be neglected. In any case, this should not mean that Castilla-La Mancha (and similarly for the other Objective 1 Spanish regions) had to trust exclusively on the EU's regional policy when looking for the next future. Although the role of the EU aid is proving to be of a great importance, this should be seen as a contribution to the development of the region's potentialities, and not as much as an indefinite grant. And especially due to the foreseeable reduction or even loss of a great part of this aid, once the enlargement of the EU to the Central and Eastern European countries was enforced. This is the case of Castilla-La Mancha,

which, even though would still be an Objective 1 region after the next EU enlargement, would lose such a condition if the announced joining of Rumania and Bulgaria was finally materialized.

## References

Aschauer, D. (1989): "Is public expenditure productive?", *Journal of Monetary Economics* 23, 177-200.

Bajo-Rubio, O. and López-Pueyo, C. (2002): "Foreign direct investment in a process of economic integration: The case of Spanish manufacturing, 1986-1992", *Journal of Economic Integration* 17, 85-103.

Bajo-Rubio, O. and Sosvilla-Rivero, S. (1993): "Does public capital affect private sector performance? An analysis of the Spanish case, 1964-88", *Economic Modelling* 10, 179-185.

Barry, F., Bradley, J., Hannan, A., McCartan, J. and Sosvilla-Rivero, S. (1997): *Single Market Review 1996: Aggregate and regional impact: The cases of Greece, Ireland, Portugal and Spain*, Kogan Page, London and Office for Official Publications of the European Communities, Luxembourg.

Boldrin, M. and Canova, F. (2001): "Inequality and convergence: Reconsidering European regional policies", *Economic Policy* 32, 207-253.

Bradley, J., Hecce, J. A. and Modesto, L. (1995): "The macroeconomic effects of the CSF 1994-99 in the EU periphery: An analysis based on the HERMIN model", *Economic Modelling* 12, 323-333.

Correa, M. D. and Manzanedo, J. (2002): "Política regional española y europea: Periodo 1983-1999", Working Paper SGFCC-2002-05, Dirección General de Presupuestos, Ministerio de Hacienda, Madrid.

Corugedo, I., García, E. and Martínez, J. (1992): "Educación y rentas. Una aplicación a la enseñanza media en España: Una nota", *Investigaciones Económicas* 16, 299-304.

Cuadrado-Roura, J. R. (2001): "Regional convergence in the European Union: From hypothesis to the actual trends", *Annals of Regional Science* 35, 333-356.

Fujita, M., Krugman, P. and Venables, A. J. (1999): *The spatial economy: Cities, regions, and international trade*, The MIT Press, Cambridge, MA.

Hecce, J. A. (ed.) (1994): *Evaluación del Marco de Apoyo Comunitario 1989-93, mimeo*, FEDEA, Madrid.

Hecce, J. A. and Sosvilla-Rivero, S. (1995): "HERMIN Spain", *Economic Modelling* 12, 295-311.

Krugman, P. (1991): "Increasing returns and economic geography", *Journal of Political Economy* 99, 483-499.

Krugman, P. and Venables, A. J. (1990): "Integration and the competitiveness of peripheral industry", in Bliss, C. and Braga de Macedo, J. (eds.): *Unity with diversity in the European economy: The Community's Southern frontier*, Cambridge University Press, Cambridge, 56-75.

- Krugman, P. and Venables, A. J. (1995): "Globalization and the inequality of nations", *Quarterly Journal of Economics* 110, 857-880.
- Midelfart-Knarvik, K. H. and Overman, H. G. (2002): "Delocation and European integration: Is structural spending justified?", *Economic Policy* 35, 322-359.
- Ministerio de Hacienda (2001): *Marco Comunitario de Apoyo 2000-2006 para las Regiones Españolas del Objetivo 1*, Madrid.
- Ottaviano, G. I. P. and Puga, D. (1998): "Agglomeration in the global economy: A survey of the 'New Economic Geography'", *World Economy* 21, 707-731.
- Puga, D. (2002): "European regional policies in light of recent location theories", *Journal of Economic Geography* 2, 372-406.
- Quah, D. T. (1996): "Empirics for economic growth and convergence", *European Economic Review* 40, 1353-1375.
- Rodríguez-Pose, A. and Fratesi, U. (2004): "Between development and social policies: The impact of European Structural Funds in Objective 1 regions", *Regional Studies* 38, 97-113.
- Sala-i-Martin, X. (1996): "Regional cohesion: Evidence and theories of regional growth and convergence", *European Economic Review* 40, 1325-1352.
- Sosvilla-Rivero, S. and Herce, J. A. (2002): "Efectos del Plan de Infraestructuras 2000-2007 sobre las Comunidades Autónomas", Report for the Spanish Ministry of Infrastructure, FEDEA, Madrid.
- Venables, A. J. (1996): "Equilibrium locations of vertically linked industries", *International Economic Review* 37, 341-359.

**Table 1**  
**Castilla-La Mancha, Spain, and EU-12 *per capita* GDP**  
**(indices at constant prices of 1985)**

	Castilla-La Mancha	Spain	EU-12
1988	60.2	73.0	100
1993	66.3	77.9	100
1998	67.1	81.2	100

Source: Eurostat.

**Table 2**  
**Castilla-La Mancha: Some economic indicators**

	Employment in the agrarian sector (percentage on total)		Total R&D expenditure (percentage of GDP)	
	Castilla-La Mancha	Spain	Castilla-La Mancha	Spain
1988	22.0	13.0	0.15	0.72
1993	14.8	9.1	0.21	0.91
1998	13.5	7.7	0.48	0.89

Source: Spanish National Institute of Statistics.

**Table 3**  
**Effects of the EU aid on Castilla-La Mancha's real output**  
**(million euros of 1999)**

	With CSF	Without CSF
1988	13833	13833
1989	14807	14453
1990	15384	15008
1991	15962	15334
1992	15832	15151
1993	16147	15328
1994	16040	15629
1995	16377	15516
1996	16581	15878
1997	17297	16416
1998	18188	17661
1999	18963	17701
2000	19779	18710
2001	20358	19328
2002	20830	19790
2003	21481	20425
2004	22097	21029
2005	22730	21651
2006	23631	22121
AGR 88-99	2.91	2.27
AGR 88-06	3.02	2.64

Source: Own elaboration from HERMIN-based simulations.

**Table 4**  
**Effects of the EU aid on Castilla-La Mancha's *per capita* income**  
**(euros of 1999 per person)**

	With CSF	Without CSF
1988	8308	8308
1989	8914	8701
1990	9274	9047
1991	9610	9232
1992	9500	9091
1993	9651	9162
1994	9548	9304
1995	9708	9197
1996	9802	9387
1997	10207	9687
1998	10707	10396
1999	11126	10386
2000	11549	10925
2001	11825	11227
2002	12041	11440
2003	12359	11751
2004	12656	12045
2005	12962	12347
2006	13408	12551
Average 89-93	9121	8876
Average 94-99	9937	9522
Average 00-06	12074	11446
AGR 88-99	2.42	2.36
AGR 88-06	2.69	2.32

Source: Own elaboration from HERMIN-based simulations.

**Table 5**  
**Castilla-La Mancha's *per capita* income in terms of purchasing power parity**  
**(index EU-15=100)**

1993		1999		2006	
With CSF	Without CSF	With CSF	Without CSF	With CSF	Without CSF
66	63	66	62	67	61

Source: Second report on economic and social cohesion, Second intermediate report on economic and social cohesion, Spanish Regional Accounts and HERMIN-based simulations.

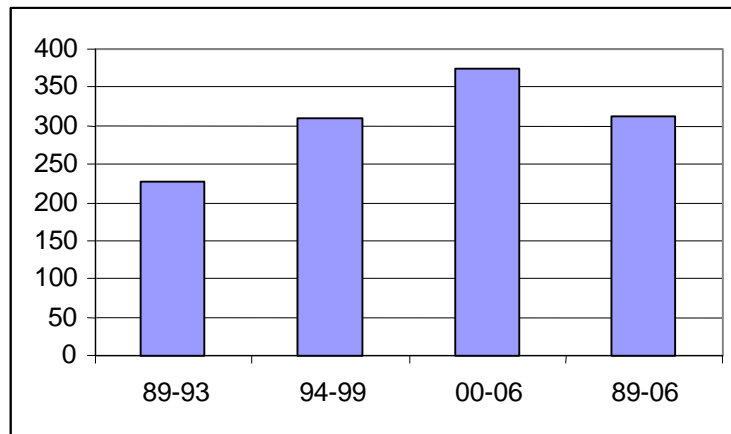
**Table 6**  
**Effects of the EU aid on Castilla-La Mancha's unemployment rate**  
**(unemployed as a percentage of the labour force)**

	With CSF	Without CSF
1988	15.12	15.12
1989	14.19	15.41
1990	13.09	14.24
1991	13.17	14.89
1992	15.66	17.23
1993	19.54	19.71
1994	19.69	19.90
1995	20.19	21.49
1996	19.59	20.24
1997	18.63	19.57
1998	16.88	16.75
1999	15.02	16.52
2000	12.56	13.34
2001	9.30	9.85
2002	9.38	9.84
2003	9.34	9.71
2004	9.38	9.68
2005	9.43	9.65
2006	9.47	9.64
AGR 88-99	-0.06	0.81
AGR 88-06	-2.57	-2.47

Source: Own elaboration from HERMIN-based simulations.

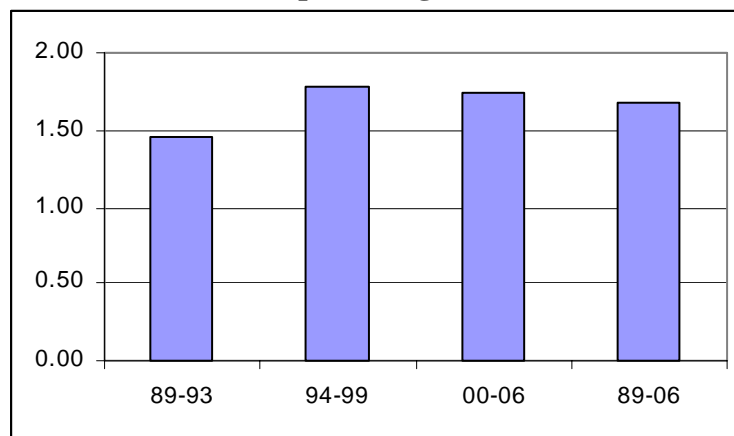


**Graph 1**  
**Average values of the CSFs received by Castilla-La Mancha**  
**(million euros of 1999)**



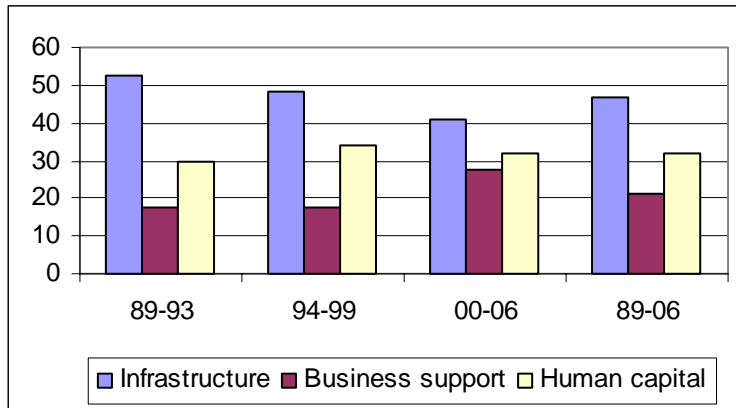
Source: Own elaboration from Correa and Manzanedo (2002).

**Graph 2**  
**Share of the CSFs on Castilla-La Mancha's GVA**  
**(percentages)**



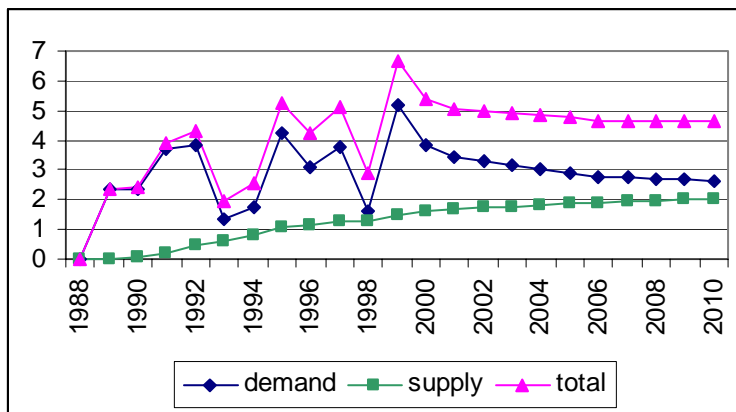
Source: Own elaboration from Correa and Manzanedo (2002) and data from Instituto Valenciano de Investigaciones Económicas.

**Graph 3**  
**Distribution of the CSFs by categories of investment**  
**(percentages)**



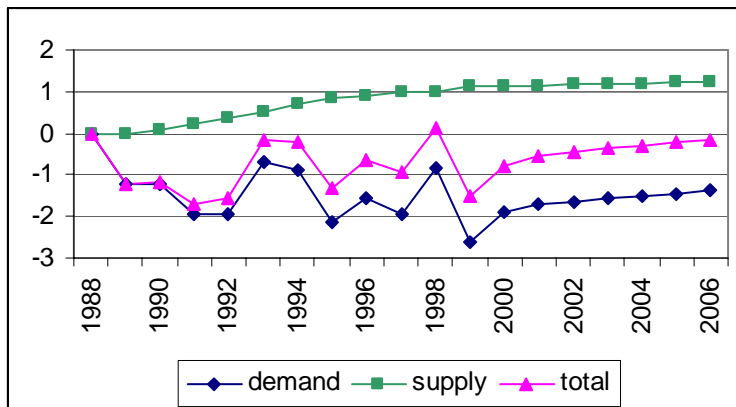
Source: Correa and Manzanedo (2002) and Ministerio de Hacienda (2001).

**Graph 4**  
**Effects of the EU aid on Castilla-La Mancha's real output**  
**(percent deviation with respect to the scenario without EU aid)**



Source: Own elaboration from HERMIN-based simulations.

**Graph 5**  
**Effects of the EU aid on Castilla-La Mancha's unemployment rate**  
**(deviation with respect to the scenario without EU aid)**



Source: Own elaboration from HERMIN-based simulations.