European Regional Development Policies:
History and Current Issues

Sandy Dall'Erba

Department of Economics, CATT, University of Pau, Cedex, France

About the Author

Sandy Dall'erba is a graduate student at the Centre d'Analyse Technique et de Traitement des données économiques at the Université de Pau in Pays de l'Adour, France. His research interests include EU regional economic policy, European economic integration, and the impact of policy decisions on economic growth in European Union member states. He wrote this paper while studying at the the Regional Economic Analysis Laboratory, University of Illinois, Urbana-Champaign. He can be reached at : sandy.dallerba@etud.univ-pau.fr

Abstract:

The objective of this paper is to demonstrate that the European regional development funds do not allow simultaneous achievement of goals of efficiency and equity when they are dedicated to financing transportation infrastructures. The paper first gives some insights on the history and the nature of regional development funds. Then we focus on the degree to which Ireland, Spain and Portugal (but not Greece), the main beneficiaries of regional policies, have been able to move to the European average (in terms of per capita income) since their membership in the EU, which also corresponds to the time when regional assistance was initiated in these countries. Empirical evidence also reveals that income disparities are increasing among regions within each of these countries and this raises the question as to whether the impact of regional funds is or is not rather favorable to this particular convergence pattern, given that one of the primary objectives of regional funding has been to ensure greater cohesion over the whole European territory. The answer comes mainly from the type of infrastructure regional funds finance. Since a significant part of regional funds is devoted to transportation issues, their impact on regional development has to be seen in the light of characteristics of the transport sector and the specific requirements in transport of each individual sector. The paper concludes that transportation infrastructures promote the country's aggregate growth but cannot be seen as an efficient instrument to reduce interregional disparities in Europe.

1. Introduction

The lack of theoretical support underlying European regional development policies may appear astonishing, more especially when one considers that the European Union (EU) devotes about one third of its budget and 0.46% of its GDP to the implementation of these policies (euro 195 billion at 1999 prices over 2000-06). In order to bring more insights to the analysis of these policies, this paper proceeds as follows. The following section presents an overview of the history and the instruments of regional policies. Section 3 tests, using time series data, whether the four poorest European countries (Ireland, Spain, Greece and Portugal, also called cohesion countries) have succeeded in catching-up to the European average since their membership in the EU, which also corresponds with the implementation of regional assistance in the country. A sign of catching-up would reflect more cohesion among members and that, in this case, regional assistance generated a positive impact. The convergence pattern among regions within each cohesion country is investigated as well. Section 4 provides some explanation of the convergence process described in section 3 and then focuses on the trade-off efficiency-equity introduced by regional funds when they are devoted to transportation infrastructures. In other words, since a significant part of regional funds is devoted to this type of infrastructure, their impact on regional development clearly depends on changes in the field of transport and on the specific requirements in transport of each individual sector. Section 5 summarizes the main findings and adds some concluding comments.

2. The evolution of regional development policies

2.1 History of the structural assistance

Before the enlargement of 1973, regional policy was very little developed. Founders cared more for fostering trade links within member States and developing the Common Agricultural policy. The European Social Fund (ESF) and the European Agricultural Guidance and Guarantee Fund (EAGGF) were therefore created in 1958 to implement the common policies. However they equally aimed at favoring labor mobility and retraining, and improving the structures of farms and rural infrastructures.

Loans of the European Bank for Investment (EBI) were equally allocated to rural regions, and those of the European Community of Coal and Steel to regions in industry decline.

Only the enlargement to Ireland, the United-Kingdom and Denmark in 1973 started regional policies out. The first enlargement which coincided with the first oil shock revealed to the Community the necessity of a solidarity policy in order to help rural periphery and the least prosperous regions of the new integrated countries, mainly Ireland. The UK was also afraid of losing out to its continental competitors and of an unbalanced financial support allocated to the agricultural industries of the Member States. It then obtained in the negotiation of accession an assurance that the European regional policy would be set up. The European Regional Development Fund (ERDF) was then created in 1975 as a redistribution instrument. It has aimed to assist the least favoured regions and has focused mainly on productive investments, infrastructures and small and medium enterprises development.

With the enlargement to Greece in 1981, to Spain and Portugal in 1986, the width of European regional disparities appeared, as the European area (EU9 to EU12) increased by 48%, its population by 22%, but its per-capita GDP decreased by 6%. The Single Market of 1987 has imposed to help peripheral countries to improve their transport infrastructure network and introduced for the first time multiannual coordinated development actions.

Under the pressure of Spain, the Commission President Jacques Delors and the Heads of State and government adopted an action plan which doubled the amounts allocated to structural funds for the 1989-1993 Delors I package to reach ecu 18.3 billion in 1992.

The first reform of the structural funds was undertaken in 1989. It fostered the principle of multiannual programming, established five priority development objectives (see section I-2) placed a system of partnership with the Member States (principle of additionality which states that EU structural aid must be additional to and supplement national investment) and the economic and social actors and created the Community Initiatives which face structural problems specific to the whole Community territory. They are complementary to the Community Support Frameworks and the Single Programming Documents, which were negotiated between the Commission and the Member states on the basis of regional and national development plans. In

the 1994-99 programming period, the Commission set out guidelines for 13 Community initiatives that were reduced to four in 2000 (see section I-2-1).

Thanks to Spain once again, Community funds allocated to the poorest countries over the 1993-1999 Delors II package (154.5 billion ecu at 1994 prices) were increased during the negotiation of the 1992 Maastricht Treaty, which is the basis for the Economic and Monetary Union. The main prerequisite for introducing a common currency is a high degree of convergence between the economies of the Member States. Adjustments and increasing investments are both necessary for the poorest countries and regions to catch up with their richer neighbours. This presents a potential conflict of objectives for the least prosperous countries: on the one hand, they must invest heavily in order to reduce the development gap and increase their capacity for growth and prosperity. This implies a considerable additional investment in expanding, upgrading and modernizing infrastructures. On the other hand, participating Member States are required to reduce their budget deficit and keep the public debt under control in order to join the EMU. A solution to this dilemma was provided in the Maastricht Treaty through the cohesion funds since 1994.

The most recent enlargement to Austria, Finland and Sweden in 1995 obliged to extend the actions of the structural funds to foster the development of under-populated areas of the two new Scandinavian countries. Once again the implementation of a new regional objective was included in the discussions before the accession of the new members.

At last, the most recent reform of the structural funds happened the 24th and 25th of March 1999, when the Heads of State and government met for the European Council of Berlin. The priority objectives were redefined and reduced to three for the 2000-06 Agenda 2000 package (see section I-2), which brought up the question of the efficiency of targeting Community expenses. The Council of Berlin was also the occasion to test the extent of Member States' solidarity, since each of them bargained to reduce its own net contribution to the Community budget. However, in the prospect of the future enlargement, a financial help (ecu 80 billion for 2000-06, at 1999 prices) for the central and eastern European countries applying for membership

was created: the Instrument for Structural Policies for Pre-Accession (ISPA), which must improve their environmental situation and develop their transport network.

In 1999, structural aids represented 36% and the Common Agricultural Policy 47% of the Community budget, as reported in Table 1 below. For the period 2000-2006, the total amount affected to structural policies is euro 195 billion, at 1999 prices.

Table 1- Evolution of the part of structural funds in the Community budget

	1984	1988	1993	1999	2000	2006
CAP in million euros and %	18 330	27 635	34 678	40 440	40 920	41 660
	65.4	65	52.4	47	44.5	38.9
Structural actions in million euros and %	3 220	6 419	20 478	30 950	30 045	29 170
	11.5	15.1	31	36	32.6*	27.2**

Source: Charpin (1999), p. 185 and the European Council (Berlin, mars 1999)
* 36% with pre-accession funds
** 45.8% with accession and pre-accession funds

Table 2- Scale of structural intervention

	1989-93 in % GDP	**1994-99 in % GDP**	**Euro per capita per annum 1994-99 / 2000-06**
Portugal	3.07	3.98	299 / 275
Greece	2.65	3.67	284 / 288
Ireland	2.66	2.82	346 / 123
Spain	0.75	1.74	181 / 157
Italy	0.27	0.42	63 / 71
UK	0.13	0.25	37 / 38
France	0.14	0.22	43 / 36
Germany	0.13	0.21	45 / 49
Austria	/	0.19	39 / 26
Belgium	0.11	0.18	34 / 26
Netherlands	0.07	0.15	28 / 24
UE	0.29 (UE12)	0.45(UE12) 0.51 (UE15)	75 (UE15)

Source: Eurostat, European Commission (1996) and Mc Quaid (2000)

Note : We can also notice that the scale of structural intervention does not go beyond 4% of each country's GDP. This is meant to ensure that countries are able to absorb the EU money that is coming their way, i.e. limit the inflation risk, but it will also guarantee that the poorest countries will receive the least aid in absolute terms.

2.2 The instruments of regional development policies

2-2-1 Regional funds

The largest structural fund is the European Regional Development Fund (which covered Objective 1, but also Objectives 2, 5b and 6), but other funds grant assistance: the European Agricultural Guidance and Guarantee Fund (the Guidance Section supports rural development measures in Objectives 1, 5a, 5b and 6 regions, whereas the Guarantee section operates in the whole territory), the European Social Fund (for Objectives 1, 2, 3, 4, 5b and 6) and the Financial Instrument for Fisheries Guidance (FIFG) which operates in all coastal regions selected as Objective regions (Objectives 1, 5a and 6).

Over time and with the addition of new funds and countries, the scope and definition of "less favoured" regions expanded to the point that structural funds currently flow to almost all NUTS II level regions[1]. Over the period 1994-99, structural funds amounted to ecu 154.5 billion at 1994 prices. This was roughly one-third of the Community budget which absorbs at the utmost 1.27% of the Community GNP.

We present first the Objectives of the CSF that stated before the 2000-06 package, as their number has been reduced to three. Two categories of Objectives were defined for structural policy since 1987 (articles 158 and 162 of the Treaty of the European Union). On the one hand there were the regional Objectives (1, 2, 5b and 6) which concentrated about 85% of the budget, on the other hand horizontal Objectives (3, 4 and 5a), which could be applied to the whole Community territory. Note that a single region does not correspond to several objectives.

Objective 1 was dedicated to the economic adaptation of the least developed regions. The criterion for eligibility for funding in NUTS II level regions is that GDP per capita in PPP

---

[1] NUTS: Nomenclature of Territorial Units for Statistics. The Commission uses as regional statistical concept the spatial classification established by Eurostat on the basis of national administrative units. Europe can therefore be shared either in 77 NUTS I level regions, or 211 NUTS II, 1031 NUTS III, 1074 NUTS IV or 98433 NUTS V. Regional objectives are however mostly designated at either NUTS II or NUTS III level regions.

(Purchasing Power Parity) terms be below 75% of the Community average[2]. This group included about 50 NUTS II level regions, from which the whole regions of Greece, Ireland and Portugal, and about two thirds of the Spanish regions[3]. Other European countries benefited from it too. Eventually, almost 92 million people, 26.6% of the total population, were concerned. Expenditures under Objective 1 amounted to 68% of total structural funds, with the ERDF as the main contributor.

The economic recovery of regions affected by the industrial crisis was financed according to Objective 2. It was intended for NUTS III level (and smaller) regions which satisfied three eligibility criteria: an unemployment rate above the Community average, a percentage share of industry employment higher than the Community average, and a decline in the employment level of the industry sector. They covered 60.5 million people, or 16.3% of the population, and accounted for 11% of the total structural funding.

Objective 3 tended to reduce long-term unemployment and improve the insertion of the young people into working life. It also included the promotion of equal employment opportunities for men and women. This Objective covered the whole territory and financed various NUTS levels, mostly NUTS III. Over time, about 4% of the population was concerned. 9.4% of the funds were dedicated to this Objective.

Objective 4 covered the whole Community too and was targeted to facilitate the adaptation of workers and retraining to industry changes and to changes in the production process. Programmes were financed at different levels (mostly NUTS II or III), and used 1.6% of the total resources.

---

[2] Note that the Community average is defined as the ratio of the sum of all member countries' GDP (in PPP) on the total European population, which means that this average even includes countries too small to be divided in NUTS II level regions. Note moreover that the Community average used for the attribution of cohesion funds is based on GNP.

[3] All the Spanish regions were eligible at the objective 1 level, with the exception of the Communidades de Madrid, Cataluñia, Aragon, Baleares, Navarra, Pais Vasco (52.8% of the Spanish population). The other Objective 1 regions were the five Länder of former East Germany (20.7% of the German population); Sicilia, Sardegna, Calabria, Basilicata, Puglia, Campania, Molise and Abruzzi (until 1996) in Italy (36.6%); Corse, Guadeloupe, Guyane, French portion of the Hainaut province, Martinique and Réunion in France (4.4%); Northern Ireland, Highlands and Islands

Objective 5a targeted to foster the adaptation of agricultural and fisheries structures, whereas Objective 5b speeded up the adaptation of rural structures and of the fishery sector, in the framework of the reform of the Common Agricultural Policy. Units smaller than NUTS III level were eligible for Objective 5b when they had a low level of socio-economic development (measured by GDP per capita) and two of the following criteria: high share of agricultural employment, low level of agricultural income, low population density and/or significant depopulation trend. About 33 million people (10 of which are in France and 8 in Germany , i.e. 8.8% of European population) benefited from it, for 4.9% of the total funds. Objective 5a covers the whole Community and has access to about 5% of the funding.

Objective 6 concerned only NUTS II level regions in the northern parts of Finland and Sweden, as it was created for regions with a population density of eight inhabitants per km^2 or less. 0.4% of the Community population benefit from it, for an amount below 1% of the total support.

In June 1994, the Commission set out guidelines for the 13 Community initiatives in the 1994-99 programming period[4]. They were financed by one or more funds.

In order to target more the eligibility of regions to Community interventions over 2000-2006, the European Council of March 1999 has reduced the number of its objectives to three. Objective 1 is for the development and structural adjustment of NUTS II level regions whose development

and Merseyside in the UK (6.0%); Burgenland in Austria (3.5%); the province of Hainaut in Belgium (12.8%); Flevoland in Netherlands (4.5%).

[4]   Interreg II was devoted to cross-border cooperation (strand A), energy networks (strand B), cooperation on regional planning (strand C); Employment was divided (Employment-NOW promoted equal opportunities for women and access to future-oriented occupations and positions of responsibility; Employment-horizon improved employment prospects for disabled people; Employment-Youthstart for integrating people under 20 into the labor market; employment-Integra for integrating people threatened with social exclusion and measures to combat racism and xenophobia); leader II for rural development; Adapt for adapting the work force to industrial change and the information society; SMEs for boosting the competitiveness of small and medium-sized business; Urban for regenerating urban areas in crisis; Konver promoted the economic diversification in areas heavily dependant on the defense sector; Regis II for integrating the most remote regions; Retex for fostering economic diversification in regions dependent on the textile and clothing industry; Resider II for converting steel areas; Rechar II for converting coal-mining areas; Peace for supporting the process of peace and reconciliation in Northern Ireland; and Pesca for encouraging economic diversification in areas dependent on the fisheries sector.

is lagging behind (regions whose per capita GDP is below 75% of the Community average, former Objective 6 areas and the most remote regions like the French overseas departments, the Canary Islands, the Azores, Madeira). 69.7% of total funds (involving ERDF, ESF, EAGGF Guidance section, FIFG) and 22.2 % of total Community population are concerned[5].

Objective 2 supports the economic and social conversion of areas facing structural difficulties. Eligibility criteria are the following: for industrial areas, the three criteria remain the same as before. For rural areas, a low population density or a large proportion of the workforce employed in agriculture, together with a high rate of unemployment or a depopulation trend. Urban areas which meet at least one of the following five criteria: a high long-term unemployment rate, a high level of poverty, environmental problems, a high crime and delinquency rate or a low level of education. Areas dependent on fisheries, a significant proportion of employment in the fisheries sector, coupled with a decline in employment in this sector. 11.5 % of total funding (financed by ERDF and ESF) are dedicated to this objective, which moreover concerns no more than 18% of the Community population according to the Regulation.

Objective 3 supports the adaptation and modernisation of national policies and systems of education, training and employment. This Objective serves as a reference framework for all measures to promote human resources measures in a national territory without prejudice to the specific features of each region. It takes account of the Title on employment in the Treaty of Amsterdam and the new European strategy for employment. 12.3% of total funds (financed by the ESF) are devoted to this.

At last, 0.5% of total funds (financed respectively by FIFG and EAGGF Guidance section) is dedicated to adapt structures in the fisheries sector and rural development measures (outside Objective 1), 0.51% for innovative measures and technical assistance. For the current period, the Commission wanted to increase the European dimension of the Community initiatives and strengthen the way they complement the priority Objectives. The Commission proposed to reduce their number to four and devote 5.35% of the budget. Interreg III (financed by ERDF) is therefore a cross-border, transnational and interregional cooperation, which intends to encourage the harmonious and balanced development and spatial planning of the European territory. Leader

---

[5] Two special programmes are also funded with Objective 1 resources: the Peace programme of assistance for the peace process in Northern Ireland and the border regions of the Republic of Ireland (to run from 2000 to 2004), and the special assistance programme for certain NUTS II level Swedish regions that meet the criteria of low population density.

+ (financed by EAGGF Guidance section) is devoted to the rural development via integrated programmes and cooperation between local action groups. Equal (financed by ESF) is a transnational cooperation which promotes new approaches to combating all forms of discrimination and inequalities in connection with access to the labor market. Urban (financed by ERDF) is devoted to the social and economic regeneration of towns and neighbourhoods in crisis, with a view to promoting sustainable urban development. The population concerned by regional funds decreases from one half to one third of the Community population.

Table 3 - Indicative funding allocations per Member State in the 2000-06 period (at 1999 prices, euro million)

| Member State | Objectives | | | | | FIFG (Outside Obj. 1) | Total |
	1	Transitional support Objective 1	2	Transitional support Objective 2	3		
BE	0	625	368	65	737	34	1 829
DK	0	0	156	27	365	197	745
DE	19 229	729	2 984	526	4 581	107	28 156
GR	20 961	0	0	0	0	0	20 961
ES	37 744	352	2 553	98	2 140	200	43 087
FR	3 254	551	5 437	613	4 540	225	14 620
IE (1)	1 315	1 773	0	0	0	0	3 088
IT	21 935	187	2 145	377	3 744	96	28 484
LU	0	0	34	6	38	0	78
NL	0	123	676	119	1 686	31	2 635
AT	261	0	578	102	528	4	1 473
PT	16 124	2 905	0	0	0	0	19 029
FI	913	0	459	30	403	31	1 836
SE (2)	722	0	354	52	720	60	1 908
UK (1)	5 085	1 166	3 989	706	4 568	121	15 635
EUR 15	127 543	8 411	19 733	2 721	24 050	1 106	183 564

1: including the Peace initiative (2000-2004).
2: including the special program for the Swedish coastal areas.
Source: The European Commision (1999)

Under the new regulations, regions or areas that were eligible for regional assistance under the objectives in 1994-99, but which are no longer eligible in 2000-06, qualify for an appropriate level of degressive transitional assistance in order to avoid an abrupt cessation of Community funding and consolidate the achievements of earlier structural assistance (this is the transitory

support or "phasing out"). Among those areas which are no longer eligible for Objective 1 funding, a distinction should be made between those which, in 1999, meet the basic eligibility criteria for funding under the Objective 2 and those that do not. The former are entitled to transitional assistance from the four Structural Funds until 31 December 2006, whereas ERDF funding for the latter will be stopped on 31 December 2005. Areas eligible under Objective 2 and 5b in 1999 that do not qualify for the new Objective 2 are entitled to transitional assistance from the ERDF until 31 December 2005. Other assistance may also be available between 2000 and 2006: from the ESF under Objective 3, from the EAGGF Guarantee section as part of rural development schemes (including the accompanying measures to the CAP), and from the FIFG (as part of the accompanying measures to the common fisheries policy).

Spain has been therefore the largest beneficiary of the structural funds, receiving almost one quarter of the total (ecu 34.4 billion over 1994-99 at 1994 prices), Germany and Italy are second (21 billion each), while France, Greece, Portugal and the UK are all about 15 billion, the "least beneficiary" countries being Denmark (800 million) and Luxembourg (100 million), as the remaining countries are between. Boldrin and Canova (2001) note according to these results that "it seems that every member country is economically disadvantaged, at least along some dimension"! The bargaining during the Council of Berlin has proved that it seems obvious to each member country.

2-2-2 Cohesion funds

Since 1994 (article 130a of the Treaty), cohesion funds have provided financial support to countries having a GNP[6] per capita in Standard of Purchasing Power below 90% of the Community average, i.e. Spain (which benefited from 51.7% of these funds over 1994-99), Portugal (22%), Greece (16.6%) and Ireland (9.5%). Total commitments (respectively payments) for 1994-99 were ecu billion 16.7 (11.6) at current prices and amount euro 18 billion at 1999 prices for 2000-06.

---

[6] This time, the GNP is considered because cohesion funds are allocated to the whole country and come up to the cohesion gap that peripheral countries had when convergence criteria (equally defined at the national level) were adopted.

These funds are still contributing up to 80-85% of total public expenditure (the rest depends on national or regional additionality in order to avoid regions present unviable projects), and try to support equivalently two kinds of projects. Firstly, environmental projects which aim at achieving the Community's environmental objectives. This should take the form of water treatment, transportation and environmental improvement. Secondly, transport infrastructure projects which generate mostly road and railway infrastructures for the Trans-European Transport Network (TEN). The following table shows that it was mostly respected, except for the payments that favored transport infrastructures in Spain (60.8% of total payments) and undermined environmental infrastructures (39.2%). It equally presents how the European Commission committed itself for 2000-06.

Table 4- Commitments and payments of cohesion funds (at current prices)

	Total		Transport		Environment	
	Millions euros	% of total	Millions euros	%	Millions euros	%
Commitments 1993-99						
Ireland	1 495.3	8.9	748.3	**50.0**	747.0	**50.0**
Greece	2 998.2	17.9	1 534.6	**51.2**	1 463.6	**48.8**
Portugal	3 005	17.9	1446	**48.1**	1 559	**51.9**
Spain	9 251	55.2	4 597	**49.7**	4 654	**50.3**
Technical assistance	8.4	0.05	/	/	/	/
Total	16 760.9	100	8 328.3	**49.7**	8 424.3	**50.3**
Payments 1993-99						
Ireland	1 112.5	9.5	587.8	**52.8**	524.7	**47.2**
Greece	1 938.7	16.6	1 012.8	**52.2**	925.9	**47.8**
Portugal	2 562.1	22.0	1 361.3	**53.1**	1 200.8	**46.9**
Spain	6 022.3	51.7	3 665	**60.8**	2 357.3	**39.2**
Technical assistance	7.8	0.06	/	/	/	/
Total	11 643.4	100	6 626.9	**56.9**	5 008.7	**43.1**

Source: The European Commission (Annual report on cohesion fund 1999)
Note: The difference between commitments and payments can be explained as follows: the first advance was no more than 50% of the relevant commitment, the second was 30% of the commitment, and the balance was paid upon the conditions for the completion of the program being fulfilled. Moreover many projects have been applied by the end of 1999, that is why they do not appear on the 1993-199 payments. For the 2000-06 period, the Commission makes subsequent payments on the basis of actual expenditure, as certified by the member State.

According to the evolution of growth rates in cohesion countries, the commitments for 2000-06 are shared as follow: Spain (61-63.5% of the total, i.e. 11 160 million euros at 1999 prices), Greece and Portugal (16-18% each, 3 060 million euros), and Ireland (2-6%, 720 million euros). Because of its impressive catching-up (Ireland's GDP per capita is over 90% of the European

average since 1997), Ireland should not benefit from such aid anymore, but it has been given assistance in order to sustain long-term investments.

2-2-3 The European Investment Bank (EIB)

The main means by which the EIB assists regional development is through loans for individual projects. These amounted to over euro 66 billion over the period 1994-99. Most of them went to the financing of infrastructure projects, in transport, telecommunications and energy, which, in most cases, formed part of major networks of European interest. Over the period 2000-06, the EIB will continue to support the creation and development of productive activities in the more disadvantaged regions, not only by helping to finance these directly, but also by supporting the services necessary for their development, as well as improvements in infrastructure, especially those aimed at increasing accessibility and energy supply. In addition, growing attention will be focused on the competitiveness of firms.

3. The Convergence Pattern in Europe

3.1 Testing Hypotheses Concerning the Catching-up Process of Cohesion Countries

To test hypotheses concerning the catching-up process of cohesion countries, we analyzed inter-temporal differences in GDP per capita (calculated in Purchasing Power Parity) of each cohesion country to the European average from 1960 to its admission date, and from this date to 2001. All the data are derived from Chelem-CEPII (2001). Recall also that the admission date corresponds to the implementation of regional assistance in the considered country, as the cohesion countries received this help from the very first year of their membership.

The convergence measure adopted here is based on a relationship that describes the dynamics of the differentials of the respective GDP per capita. That is to say, for a cohesion country *i* with observations spanning over *t* time periods, as the system is as follows:

$$(X_{i,t} - \overline{X}_t) = \alpha_i + \phi(X_{i,t-1} - \overline{X}_{t-1}) + \mu_{i,t} \tag{1}$$

where $\overline{X_t}$ is the log of the yearly Community average, calculated according to the method of the European Commission (ration of the total UE12 GDP in PPP on the total UE12 population), $X_{i,t}$ is the cohesion country i's log of income per capita in year t, α_i is the constant and $\mu_{i,t}$ is an error term. Adding a constant suggests that each country shifts to its own steady state, reflecting the differences in investment rates, public expenditure, opening rates, and in education levels. Cadoret and Tavéra (1999) evaluated European convergence by formalizing their model with a constant that is justified in this way as well.

Convergence in the above context requires that the differentials in the respective variables become smaller and smaller over time. For this to be true, ϕ must be less than one. On the contrary, if ϕ is greater than one, this indicates a divergence of this differential. The value of ϕ itself represents the degree of convergence. From the construction of the test, it follows that, as the value of the statistically significant coefficient ϕ approaches zero, the convergence effect becomes greater. Implicitly, as the value of the statistically significant coefficient ϕ approaches unity, the convergence effect decreases and vanishes. The interest focuses on the value of ϕ after joining the EU, in comparison with its value prior to membership. If the first one is higher than the second one, it would imply that convergence prior to membership was less strong than the convergence after membership, in other words that catching-up has occurred.

The convergence coefficient ϕ for a particular group of countries can be obtained using the Dickey and Fuller test (1979) on the estimates of equation (1). The augmented version of this test (ADF) is used in order to remove possible serial correlation from the data. Denoting the differential of variable $X_{i,t}$ as $d_{i,t} = X_{i,t} - \overline{X_t}$, and its difference as $\Delta d_{i,t} = d_{i,t} - d_{i,t-1}$, the equation for the ADF test is written:

$$\Delta d_{i,t} = a_i + (\phi - 1)d_{i,t-1} + \sum_{j=1}^{k} \gamma_j \Delta d_{i,t-j} + z_{i,t} \qquad (2)$$

where the subscript $j = 1, \ldots, k$ indexes the number of lagged differences, a_i is the constant and $z_{i,t}$ is a white noise.

Equation (2) then permits tests for existence of a unit root in the differentials of variables. The null hypothesis of a unit root is rejected in favor of the alternative of level stationarity if (ϕ-1) is significantly different from (less than) zero. In the current context, this tests whether the convergence coefficient ϕ is significantly different from (less than) one. To evaluate the statistical significance of the convergence coefficient ϕ, the critical values for unit-root tests tabulated by Dickey and Fuller (1979) were used. The number of lagged differences (k) in equation (2) is determined using the parametric method proposed by Campbell and Perron (1991) and Ng and Perron (1995). An upper bound of k_{max} is initially set at 4 ($k_{max} = 4$) because of the relatively short studied period. The regression is estimated and the significance of the coefficient γ_k is determined. If the coefficient is not found to be significant at the 10% level, then k is reduced by one and the equation (2) is re-estimated. This procedure is repeated with a diminishing number of lagged differences until the coefficient is found to be significant. If no coefficient is found to be significant in conjunction with the respective k, then $k = 0$ and a standard form of the Dickey-Fuller test is used in the analysis. The advantage of the recursive t-statistic method over alternative procedures lies in its simplicity, its applicability to relatively short groups of countries, and its utility to compare the results of different periods of time.

The second step is to test for each country whether the values of the unit-roots are significantly different from each other. This test can be written in the following form:

$$ t = \frac{\phi_1 - \phi_2}{\sqrt{\left(\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2} \right)}} \qquad (3) $$

where ϕ_1 is the value of the unit root before membership, σ_1 the standard deviation and n_1 the number of observations (similarly, the index 2 denotes the period after membership).

3.2 Empirical Results

The results are presented in table 1. Recall that the closer ϕ is to zero, the stronger the convergence, and conversely the more ϕ tends to one, the less strong the convergence of GDP per capita is between the studied cohesion country and the Community average (EU 12). If membership to the EU favors convergence, then ϕ must be lower after joining the Union than before.

Table 5- Conditionnal β-convergence of GDP per capita of cohesion countries with the European average

		k	ADF					DF				
			alpha	talpha	ϕ	t	T	alpha	talpha	ϕ	t	T
Spain	1960-2001	4	-0.056	-3.413	**0.782**	-3.496	-15.957	-0.065	-5.465	**0.748**	-6.038	-10.342
Spain	1960-1985	4	-0.049	-2.640	**0.806**	-2.685	-8.979	-0.062	-4.180	**0.753**	-4.812	-6.177
Spain	1986-2001	0	/	/	/	/	/	-0.141	-3.448	**0.461**	-3.516	-8.088
Portugal	1960-2001	4	-0.042	-2.476	**0.885**	-3.255	-2.700	-0.025	-1.744	**0.930**	-2.527	-2.852
Portugal	1960-1985	4	-0.074	-2.020	**0.829**	-2.600	-1.736	-0.043	-1.515	**0.906**	-1.995	-2.354
Portugal	1986-2001	0	/	/	/	/	/	-0.137	-5.369	**0.635**	-5.651	-5.468
Greece	1960-2001	3	-0.042	-2.184	**0.903**	-2.258	-6.073	-0.047	-2.794	**0.887**	-3.219	-4.646
Greece	1960-1980	1	-0.016	-0.652	**0.911**	-1.733	-1.021	-0.023	-0.959	**0.912**	-1.834	-1.756
Greece	1981-2001	0	/	/	/	/	/	-0.044	-2.109	**0.918**	-1.752	-1.643
Ireland	1960-2001	0	/	/	/	/	/	0.051	4.858	**1.099**	3.846	4.086
Ireland	1960-1972	0	/	/	/	/	/	-0.176	-1.548	**0.633**	-1.529	-4.399
Ireland	1973-2001	0	/	/	/	/	/	0.048	4.158	**1.081**	2.558	2.265

Source: Chelem-CEPII (2001)
Note: Calculations of the author, k is the significant lagged difference, / show that *k* is null, the results are then estimated according to DF. The ADF results are significant at 10% level according to Dickey and Fuller tables
Note: The same test has been performed without considering the studied cohesion country in the EU average. This second test eliminates the autocorrelation effect due to the presence of the studied country in the EU average. The results are not significantly different from these ones, which may be justified by the fact that cohesion countries are small countries that have little influence on the value of the EU average.

The results of this test are presented in table 5 and show that the value of the unit root after membership is significantly different form the one prior to membership for the three cohesion

countries, but not Greece[7]. Interpretation of the results suggests that convergence increases after 1986 for Spain and Portugal, as the value of ϕ diminishes strongly after they joined the EU. The membership and the reforms associated with the Single Market increased the attractiveness of Spain and Portugal for industry location and foreign direct investments.

As regards Greece, there is no evidence of stronger convergence to the European average. The value of ϕ is not significantly different prior to and after membership. Greece seems handicapped by its lack of competitiveness and geographical proximity with the EU. The degree of peripherality of this country increases with economic integration, since the potential of the center increases, almost by definition, faster than any other with the enlargement of the integrated area. Moreover Greece joined the EMU later (January 1, 2001) and this may have delayed potential investments until now.

A strong and increasing presence of multinational firms that occurred in Ireland over the last two decades enhanced its catching-up to the EU average. The country also took advantage of its strong trade relation with the United-Kingdom (UK) and of the fact that free trade with the UK was established a long time before free trading with the European Community. Ireland had a GDP per capita that was very low before joining the EU in 1973. The value of ϕ after membership is greater than one, but it is due to the specification of the model, which measures β-convergence but does not consider σ-convergence (decrease in variances). Ireland does not only converge to the European average, but has exceeded it, reaching 102% of the EU in 1997, and increased even more after this time. As a result of this impressive catching-up Ireland is no longer eligible for the allocation of cohesion funds. However, cohesion funds have already been allocated to it for the 2000-06 programming period in order to sustain long-run investment and because the methodology of the European Commission bases the calculation of the European per capita GNP on the Community data of the three previous years. For example, when the allocation decision was made at the end of 1999, the EU average was based on 1996-1998 data[8].

---

[7] For Spain: $t = 6{,}50808$; for Portugal: $t = 2{,}89575$; for Greece: $t = -0{,}03603$; for Ireland: : $t = -3{,}21592$.

[8] The European Commission, which also uses a per capita GDP in PPP, concludes that there has been a catching-up of Ireland, Spain and Portugal and divergence for Greece. The manner in which the purchasing power parity is estimated is however fragile. If the Greek PPP GDP appears relatively stable in comparison with that of the EU over a decade after its adhesion, it corresponds to an 11% appreciation of the Greek Standard of Purchasing Power (SPP) rate, because of a deep modification in the price structure. That counterbalances a decrease of the Greek GDP per capita to 7 percentage points over 1981-1991. The convergence process of Ireland is partially due to a very favorable evolution of its relative prices as well. For Spain and Portugal, their catching up occurs after 1986 even if

Joining the EU generated a series of changes in macro-economic policies, trade, in the production and investment structures, that have interfered with the efficiency of the European structural assistance and have generated important changes in production levels in peripheral countries. These effects are more fully discussed in Baldwin and Seghezza (1998). On the other hand, dynamic effects depending on human and physical capital accumulation and on technical progress are more difficult to measure because of the short period of time since the countries of interest joined the EU.

3.3 Lack of Cohesion within Each Country

The previous results highlight one aspect of the convergence process that has been occurring in cohesion countries for more than fifteen years; a closer look into the convergence process among regional incomes within each cohesion country is necessary. Figure 1 represents the evolution of the dispersion of regional per capita GVA (Gross Value Added), at 1990 million euro, within each cohesion country; the data considered are at the NUTS II level. Convergence occurs among regions of a particular country whether the dispersion of the distribution reduces over time. All the regions of Ireland, Portugal and Greece have been financed as objective 1 targets for the period 1989-1999, i.e. they had a per capita GDP below 75% of the European average. For Spain, only 7 regions out of 18 had a per capita GDP beyond this threshold, the others being also financed, but as objective 2 targets.

---

their SPP rate depreciated. As a conclusion, if domestic prices were evaluated in another way, the estimations of PPP GDP could be different. In the present case, the same conclusions are drawn when GDPs are estimated in

Figure 1- Evolution of regional income disparities within each cohesion country
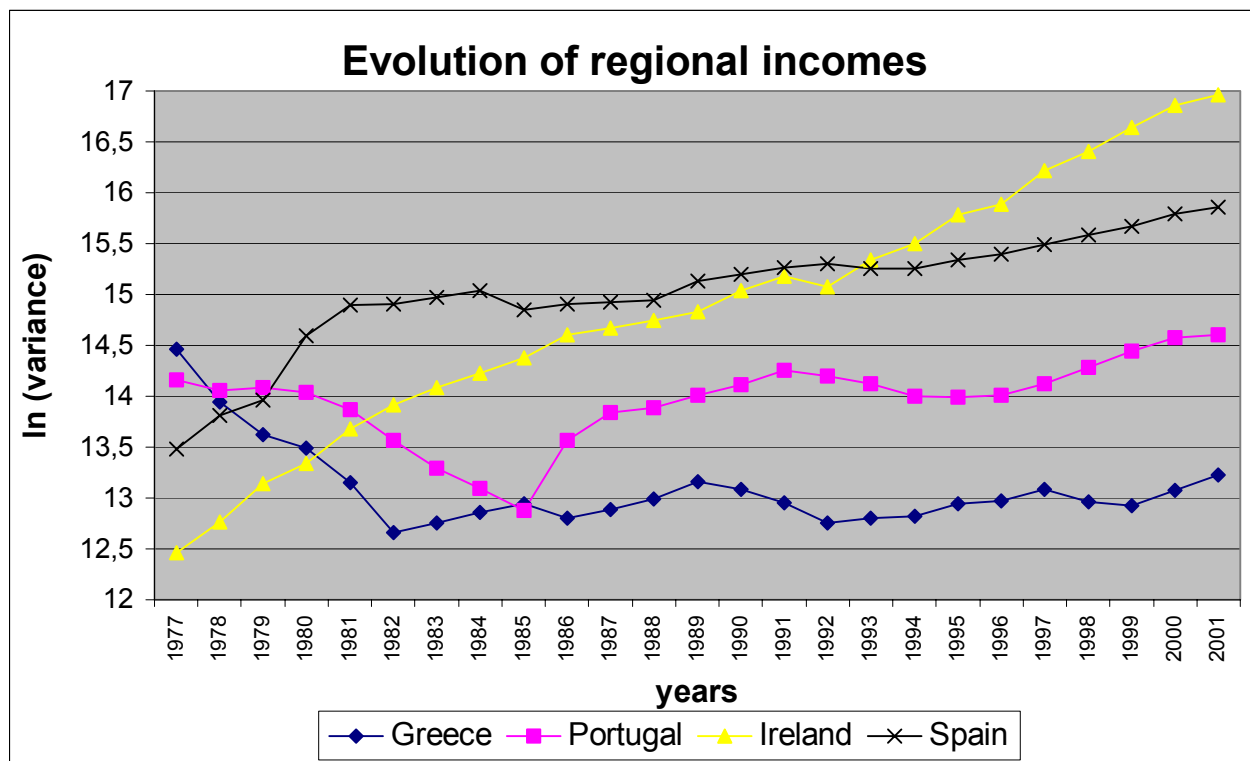
Source: Cambridge Econometrics (2001)

Regional inequalities have increased in Spain: the European integration has benefited at first the relatively prosperous regions. Except for the regions of Melilla and Baleares, there is no net relation between the development gap and the catching-up speed. The region of Extremadura, for instance, is the poorest one and its regional income has been around 65% of the national average for more than fifteen years. On the other hand, Rioja, Aragon, Madrid and Cataluna have established a significant gap. In Portugal, regional inequalities increase strongly too: the regions of Madeira and Azores have not caught up with the country average, while the regions of Norte, Centro and Algarve have developed rapidly. In Ireland, inequalities seems to have increased, but it should be noted that Ireland is composed of only two NUTS II regions, Border and Southern and Eastern. Thus, when the share of the regional income in the national one

constant dollars.

18

decreases for one region (Border), it automatically increases the share of the other region (Southern and Eastern). Concerning Greece, regional income disparities have been constant over time. The region of Ipeiros has remained the poorest one over time, whereas both Notio Aigaio and Kriti have dramatically increased their regional income. The convergence pattern described above confirms the results of Esteban (1994), Neven and Gouyette (1995), Quah (1996), and more recently Martin (1999) and Fayolle and Lecuyer (2000).

The increase in regional inequalities is not a phenomenon specific to the poorer countries. Regional disparities have increased in almost all the European countries, at different rates. Italy is the country where they are the greatest. The Mezzogiorno has failed to catch up with the dynamic and developed regions of the north-eastern part of the country. In France, Ile-de-France maintains its great distance from the other French regions. In the UK, regional inequalities seem to decline, but this result is due to the decline of manufacturing industry decline in almost all the regions of the country. Only in Germany, Netherlands and Belgium have regional disparities decreased.

4. What May Explain this Particular Convergence Pattern?

4.1 Existence of Additional Funds

By law, regional or national co-financing must accompany structural funds dedicated to particular projects (this is the principle of additionality that reduces the temptation of regions to present non viable projects as they have to finance a part of the total costs[9]). Therefore it turns out that co-financing doubles the European aid in poor regions, whereas it can triple or quadruple funds in regions with medium or high income levels, as they are more able to accompany structural funds (Fayolle and Lecuyer, 2000). As the co-financing is adopted for all regions, one

---

[9]   Funds devoted to Objective 1 financed over 1994-99 a maximum 75% of the total cost, but 80% in cohesion countries and 85% in the most remote regions and the outlying Greek islands. The other Objectives financed a maximum 50% of the total cost. For the current programming period, the differentiated ceilings are maintained, but the rate of assistance also depends on the Community interest in term of environmental protection and of the promotion of equality between men and women. Lower ceilings are specific to the case of investment in business or infrastructure generating revenue (respectively up to 35% and 40% in Objective 1 areas, and 15 and 25% in Objective 2 areas).

can also add that a region that has already attracted numerous firms enjoys higher tax revenues, and these additional sources of revenue allow it to sustain continued development initiatives more easily. Higher public expenses may then attract more firms and foster industry concentration again. Until now, the European Commission has adopted no measure to reduce this "anti-redistributive" bias, but one could imagine structural funds might be allocated under the constraint that national governments reduce regional divergence inside their country through additional funds.

4.2 Lack of Labor Mobility

Low labor mobility, due to linguistic and cultural barriers, is equally a factor that does not favor reduction in spatial inequalities in income in Europe. Only about 1.5% of European inhabitants live in a country different from their country of birth, a strong contrast with the interstate mobility within the United-States. However, the lack of international labor mobility may be protecting the economic advantage of lower real wages in Southern countries. International labor mobility could reduce the extent of wage differentials and increase concentration in and market size of the core (Krugman and Venables, 1996). However, the lack of labor mobility is also found within countries, and this may prove to be just as a much handicap in smoothing regional income inequalities. In Europe, the wage structures that characterize the labor markets are more rigid within each country than between countries, due to laws that prevent wage differentials in a single sector at the national level. Therefore, if wage differentials do not reflect the economic standing of a region, then unemployment rate differentials do (Puga, 1999). Moreover, a high national unemployment rate that reduces the probability of finding a job and unemployment insurance payments do not provide enough incentive to move outside one's own region.

4.3 Characteristics of Transportation Infrastructures

Transportation infrastructures improvement plays a key role in efforts to reduce regional and social disparities according to the European Commission. Recall that regional funds devoted to transportation infrastructures represent respectively 30% and 60% of structural and cohesion

funds. From a theoretical as well as empirical point of view, their impact on regional development is not clear. On the one hand the endogenous growth models *à la* Aschauer (1989) and Barro (1990) predict that if public infrastructures are an input in the production function, then policies financing new public infrastructures increase the marginal product of private capital, fostering thus capital accumulation and growth. On the other hand, the economic geography theoretical works developed by Martin and Rogers (1995) and Martin (2000) demonstrate when transportation infrastructures are financed, they affect the process of industry location and lead to involuntary effects: financing intra-regional transport infrastructures in the poorest regions increases the probability of firms locating there, but reduces the country's aggregate growth rate and increases regional income inequalities, whereas interregional transport infrastructures foster the aggregate growth, but lead to greater concentration in the core (Dall'erba and Hewings, 2002).

More precisely, the impact of regional funds on regional development has to be seen in the light of changes in the field of transport. An increasing part of the new transport infrastructures planed for the development of the trans-European network tends to be built within and between core regions, where transport demand is the highest (Vickerman, 1991, 1996). Only the regions that belong to the main network will gain in accessibility, whereas the regions that do not belong to it or are located at the edge of it will not. Vickerman *et al*. (1999) show that this is particularly relevant in a transport network composed of hub-and-spoke interconnections, like the high-speed rail network[10]. The relationship between gain in accessibility and economic development in peripheral regions is not clear and requires further research, since it depends on the specific requirement in transport cost of each singular sector. It is stated however that gains in accessibility due to interregional transport infrastructures will always be relatively higher in the core region than in the peripheral one. Venables and Gasiorek (1999) give an empirical evaluation of it. They use a general equilibrium approach to evaluate the impact of several road projects financed by the Cohesion Fund. The main advantage of this approach is the detailed microeconomic structure included in the analysis. A first case study is the Tagus Crossing in Lisboã (Portugal). This infrastructure may favor regional development since it acts as a public

---

[10] The role of railways in the TEN-T is increasing. Funds devoted to railways are respectively twice and six times as important as those devoted to roads and airports.

infrastructure capital, but its benefits concern mainly local transport costs since they are small outside the region of Lisboã. This can be explained by the peripheral location of this region, and by the fact that this infrastructure does not improve the access to the main network, of which Madrid is the hub. Their analysis provides another example, but this one has large positive spillovers: the Madrid Ring Road enhances Madrid's hub position whereas the main Spanish motorways are spokes. In this particular framework, there is primarily an increase in the access of Madrid itself, which benefits from its central location, and of the cities on the spokes (the motorways), while the areas located far from the motorway network do not benefit of it.

Another aspect to consider is the requirements in the transport sector for each individual sector. Since they are different across sectors, it reduces the possibility of drawing lessons for regional development policies. Consequently, current research focuses on measuring empirically these effects. Some examples of empirical studies are given here. Starting with Lafourcade (1998) who notices that for certain products transport costs are so high that the market potential is more or less limited to the demand within the region of production, whereas other products, which are less sensitive to transportation costs, can assemble an overall market potential across many regions. She provides an example of the influence of transportation costs on different goods, focusing on goods with high/low quality. Her analysis suggests that developing an infrastructure network induces a decrease in unitary transport costs and in delivery delays as well. She shows for instance that constructing a highway in France considerably reduces unitary transport costs (about 15%), while gains are weaker for the other types of road. The influence of transport costs depends in her model on the nature of the goods sold (equipment good, usual consumption good, heavy industry…). An implication of this dependency is that transport costs are less important as the transported good has a superior quality (or is more expensive) such that other factors become much more important in location decision-making.

The model of Midelfart-Knarvik *et al.* (2000) is more sophisticated in so far as it includes etimates of how in 33 industries in 14 EU countries industry and country characteristics counteracted to determine the location of production over 1980-97. (Note that they assume all industries to be perfectly competitive, which is not a current assumption of economic geography models). Their calculations show evidence that the backward linkage has become less strong

through time, while the forward linkage has become stronger. This implies that sectors highly intensive in intermediate goods are moving towards central locations to obtain better access to these goods. Industries intensive in labor tend to locate in peripheral countries where the labor is cheaper. The coefficient on market potential interacts with transport costs; this suggests that industries intensive in transport costs tend to locate in countries with higher market potential.

5.- Conclusion

The convergence process in Europe is characterized by the catching-up of the poorest countries, but also by an increasing divergence among regions within a country. The gains of integration have thus benefited mainly the richest regions within the poorest countries. Regional development funds did not succeed in impeding the occurrence of this pattern. One reason is given by the characteristics of public infrastructures they finance: the European Commission says that the improvement of transport infrastructures plays a key role in efforts to reduce regional and social disparities, but current and new transport infrastructures planed for the development of the trans-European network tend to be built within and between core regions, because it connects the major centres of population and activity, where transport demand is highest. An increasing part of these new infrastructures also increases hub-and-spoke interconnections, leading to a higher agglomeration in the hub, since accessibility to any spoke location is made easier than from one spoke to another. In terms of accessibility changes, only the regions that belong to the network will gain in accessibility, whereas the regions that do not belong to it or are located at the edge of it will not. The relationship between gain in accessibility and economic development in peripheral regions has been advanced theoretically but still requires considerable empirical investigation especially given the variations in transportation demands by sector. It is stated however that gains in accessibility due to interregional transport infrastructures will always be relatively higher in the core region than in the peripheral one. Peripheral regions have generally lower unit costs than core regions that may attract activities to locate there. However, this also depends on the supply of transport infrastructure, the lack of which impedes the development of growth potential in periphery, but the improvement of which does not necessarily promote its growth. Transportation infrastructures thus promote the country's aggregate growth but cannot always be seen as an

efficient instrument to reduce interregional disparities in Europe. The European Commission should therefore focus on the other aspects of regional policies since transportation infrastructures are only one part of the program for balanced regional development. Cohesion countries also call for a reform of the objectives and criteria of regional policy, otherwise the future enlargement to the poor Central and East European countries will considerably modify the map of less developed regions.

Acknowledgements

References:

Aschauer D. (1989), Is Public Infrastructure Productive?, *Journal of Monetary Economics*, 23, 177-200.

Baldwin, R. and Seghezza E. (1998), Regional Integration and Growth in Developing Nations, *Journal of Economic Integration*, 13, 367-399.

Barro R. J. (1990), Government Spending in a Simple Model of Endogenous Growth, *Journal of Political Economy*, 98, 103-S125.

Campbell, J.Y. and Perron, P. (1991), Pitfalls and Opportunities: What Macroeconomists Should Know About Unit Roots, *NBER Macroeconomics Annual.*

Charpin J-M. (1999), L'élargissement de l'Union européenne à l'est de l'Europe: des gains à escompter à l'Est et à l'Ouest, Commissariat Général du Plan.

Dickey D. and Fuller W.A. (1979), Distribution of the Estimators for Time Series Regressions with a Unit Root, *Journal of the American Statistical Association,* 74, 427-431.

Dall'erba S. and Hewings G.J.D. (2002), European Regional Development Policies: the Trade-off Between Efficiency-Equity Revisited. *Discussion Paper REAL 03-T-02*, University of Illinois at Urbana-Champaign.

Esteban J-M. (1994), La Desigualdad Interregional en Europa y en Espana: Descripcion y Analisis, in *Crecimiento y Convergencia Regional en Espana y en Europa*, II, IAE, Barcelona.

European Commission (1996), *First Report on Economic and Social Cohesion*, Office des publications officielles des Communautés européennes, Luxembourg.

European Commission (1999), Second *Report on Economic and Social Cohesion*, Office des publications officielles des Communautés européennes, Luxembourg.

Fayolle J. and Lecuyer A. (2000), Croissance Régionale, Appartenance Nationale et Fonds Structurels Européens, un Bilan d'Etape, R*evue de l'OFCE*, 73, 165-196.

Krugman P. (1991), *Geography and Trade*, Cambridge MA, the MIT Press.

Krugman P. and Venables A. (1996), Integration, Specialization, and Adjustment, *European Economic Review*, 40, 959-967.

Lafourcade M. (1998), *L'Impact des Infrastructures de Transport sur la Localisation des Activités et la Croissance Locale : vers les Fondements Economiques d'une Politique des Investissements Publics*, Thèse de Doctorat de l'Université Paris I Panthéon-Sorbonne.

Martin P. (1998), Can Regional Policies Affect Growth and Geography in Europe?, *The World Economy*, 21, 757-774.

Martin P. (1999), Public Policies, Regional Inequalities and Growth, *Journal of Public Economics,* 73, 85-105.

Martin P. (2000), The Role of Public Policy in the Process of Regional Convergence, *EIB Papers*, 5, 69-79.

Martin P. and Rogers C.A. (1995), Industrial Location and Public Infrastructure, *Journal of International Economics*, 39, December.

McQuaid R. (2000), Regional Development and EU Enlargement, Employment Research Institute, Napier University Edinburgh, EH 10 5 BR.

Midelfart-Knarvik K., Overman H. and Venables A. (2000), Comparative Advantage and Economic Geography: Estimating the Location of Production in the EU, *CEPR Discussion Paper Series*, n°2618, November.

Neven D. and Gouyette C. (1995), Regional Convergence in the European Community, *Journal of Common Market Studies*, 33, 47-65.

Ng S. and Perron P., (1995), Unit Root Tests in ARMA Models with Data-Dependent Methods for the Selection of the Truncation Lag, *Journal of the American Statistical Association* 90, 268-281.

Puga D. (1999), The rise and fall of regional inequalities, *European Economic Review*, 43, 303-334.

Quah D. (1996), Empirics for Economic Growth and Convergence, *European Economic Review*, 40, 1353-1375.

Solow R. (1956), A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*, 70, 65-94.

Venables A. (1996), Equilibrim Locations of Vertically Linked Industries, *International Economic Review*, 37, 341-359.

Venables A. and Gasiorek M. (1999), Evaluating Regional Infrastructure: a Computable Equilibrium Approach. In *Study of the Socio-economic Impact of the Projects Financed by the Cohesion Fund – A Modelling Approach*, vol. 2. Luxembourg: Office for Official Publications of the European Communities.

Vickerman R.W. (1991), *Infrastructure and Regional Development*, Pion, London.

Vickerman R.W. (1996), Location, Accessibility and Regional Development: the Appraisal of Trans-European Networks, *Transport Policy*, 2, 225-234.

Vickerman R., Spiekermann K. and Wegner M. (1999), Accessibility and Economic Development in Europe, *Regional Studies,* 33, 1-15.