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A CONVERGENCE ANALYSIS
OF HUMAN DEVELOPMENT

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Abstract. *The aim of the paper is to try to understand if GDP convergence across the European Union also reflects a convergence in terms of human development. We built a composite index, the RsHdi (Regional specific Human development index), to rank the single regions of Europe in terms of human development and then focused our attention on the existence of convergence in the period from 1991 to 1996 and a possible increase in the dispersion of the RsHdi across the European Union*

Keywords: Human Development, European Union
J.E.L.: O15; O52, R11

Introduction

Is the convergence inside the European Union just monetary or does it involve other aspects such as human Development? The Neo-classical economy theory generally holds that, in a free trade area with capital mobility, less developed and peripheral regions will be able to exploit their comparative advantages of low cost to attract investment thereby producing convergence in output and living standards. Even if disparities remain, the overall rise in prosperity generated by the open market will raise income alongside everyone else's (P. Cecchini: 1988). In terms of GDP, this convergence across the European regions exists as some recent empirical studies (Sala-i-Martin, X. 1996, Barro, R. J. and Sala-i-Martin, X. 1991, 1992), and Armstrong 1996,1997) have shown. This means that with regard to this parameter, disparities in the EU are decreasing. The aim of our work is to point out if a real convergence in terms of standard of living corresponds to the convergence in GDP we have described. In order to achieve this aim we attempt to:

1. Create a composite index based on the idea of the HDI (Human Development Index) which was brought out in 1990 by the United Nations Development Report in order to measure the varying degrees of development in certain countries. The new index, which will be called the RsHdi (Regional specific Human development index), will include components that, on the one hand, reflect national priorities and, on the other, are sensitive to political change. In developed countries such as the members of the European Union, variables like the unemployment rate and

tertiary education enrolment (both comprehensives of the RsHdi) should help us to explain the differences in human development;

2. Measure if the convergence in human development across the European Union exists. Analysis of recent political decisions, formulated according to Maastricht convergence criteria, has brought convergence in GDP terms. The point is to understand if they are really helpful in improving the human development level.

This article will be divided into three sections. Section One explains how the HDI is built, Section Two analyses the need for a specific regional human development index for the European Union and what has been done to improve the UN's HDI and points out the new index ranking and Section Three recalls the idea of β and σ convergence and observes the existence of these convergences for the RsHdi throughout regions in the European Union.

1. How we arrived at the idea of Human Development

"The origin of the critique of the use of GDP per capita for measuring the level of development in different countries can probably be traced back to the pioneering United Nations Reports (United Nations 1954) in which specific recommendation were made against the use of this indicator as a measure of the level of living"[1] (Noorbakhsh,F:3,1996). As a consequence of this criticism, the academic world especially from the 1970s onwards started to look for other kinds of indicator to explain economic development. We can probably regard the 1970s as the decade of socio-economic indicators for measuring development. This was the time when we started to conceptualise such ideas as Basic Needs[2] which were mainly

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[1] Noorbakhsh,F *"Some reflections on the UNDP's Human Development Index"*. Cds occasional paper, n.17,University of Glasgow, April,1996
[2] This approach is characterised by the desire to explain the problem of satisfaction of Basic Needs in a clear and direct way. It wants to condition the choice of national politics in order to resolve this

geared towards human development.

Another important step is to criticise the idea that development means growth according to Amartya Sen (1983,1984,1986,1988, 1992a, 1992b). He provided evidence that included the principal ethics theories of the social assets, from Utilitarian to liberalism and rights theories to Rawls' Theory of Justice but these only gave partial answers to the problem of equity. These theories, in fact, have reduced the problem of equality to "equality of income" or "equality of well being". Equality for one variable can be different for another variable. Sen has substituted the traditional idea of utility with the idea of capabilities and functioning. However, by the mid 1980s, the issue of socio-economic indicators became rather "unfashionable". There may be many reasons for this ranging from the debt crisis to the rise of monetarism in the Western economies and their effects on policy changes, particularly in some of the major international organisations such as the IMF and the World Bank. The surge of the literature in the 1970s, however, resulted in a regular collection and publication of data on an array of socio-economic indicators for a large number of countries, which has been a very useful outcome. With the availability of cross national data, a number of attempts were made to construct composite indices which aimed to reflect the level of development more comprehensively than GDP per capita alone could reveal. The most important attempt is probably the Human Development Report which has been published by the United Nations Development Program (UNDP) annually since 1990.

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problem. The characteristics of politics that directly face problems of Basic Needs of all populations, especially their poorest parts, can be illustrated in four points:

1) To increase the poorest people's chance to produce income;

2) To strengthen the production and the distribution of public services in a way that they can effectively reach the most in need;

3) To improve the production of commodities or services that can directly satisfy the needs of all the members of the "household", that are found in the traditional sector

4) To stimulate the populations' participation in the decision on the nature of Basic needs and the way they can be satisfied.

2. The Human Development Index (HDI)

In May 1990, the UNDP brought out the first Human Development Report (HDR). The main message of this report is the question of how economic growth transfers or fails to transfer into human development. The focus is on people and how development enlarges their choices. In order to do this, the HDR proposes an indicator of development levels: the "Human Development Index"(HDI). What is the HDI? The HDI is a composite index of four indicators. Its components reflect three major dimension of human development: longevity, knowledge and access to resources. These represent three of the essential choices *"for people to lead a long and, healthy life, to acquire knowledge and to have access to resources, needed for a decent standard of living"* (Human Development Report 1990). The components of the HDI that represent these three dimension are income, life expectancy and schooling.

Access to resources was originally represented by the real per capita income, Purchasing Power Parity (PPP$), of countries adjusted with reference to the average of poverty-line income in several developed countries (y*). Since the 1994 report, this threshold value was replaced by the current average global value of real GDP per capita in PPP$. In the 1990 report, income above y* made no contribution to the HDI since a cap at the poverty line was introduced for countries with income higher than y*. In effect, income for countries above the poverty line was reduced to poverty line income. Moreover, the logarithmic of income was used to calculate the HDI. The combination of introducing a cap and taking the logarithmic of income was to reflect, rather sharply, the diminishing marginal contribution of income to the human development (Human Development Report 1991). This practically resulted in the HDI having three components for countries with an income equal or below y* while it had only two components (plus a constant) for countries with an income component for the latter group of countries that remained the same. Subsequent reports accepted that income

above y* would have some effects on the HDI. This modification took into consideration the wider "people's choice" rendered through higher income. This was reflected by using the Atkinson's formulation for the utility of income,

$$W(y) = 1/(1-\varepsilon)y1-\varepsilon$$

where y* is the threshold level and ε is used to measure the extent of diminishing returns and is interpreted as the "elasticity of the marginal utility of income with respect to income"[3]. If $\varepsilon=0$, there will be non-decreasing return, when this approaches unity the equation will become equal to logy[4]. The ε value rises slowly as income rises; for this purpose, the full range of income was divided into multiplies of the poverty line y* Thus, most countries are between 0 and y*, some between y* and 2y*, even fewer between 2y* and 3y*and so on:

if $y\beta<y*$ (a typical case for the less developed countries) we have $\varepsilon =0$ hence there are no diminishing returns here.

if $y*<y<2y*$, $\varepsilon=1/2$;

if $2y*<y<3y*$, $\varepsilon=1/3$

Hence we have:

$ay*\leq y<(a+1) y*$, $\varepsilon=a/(a+1)$ and the income will become:

$=y*$ for $0<y\leq y*$;

$=y*+2(y-y*)1/2$ for $y*<y\leq 2y*$;

$=y*2(y*)1/2+3(y-2y*)1/3$

and so on. Hence the income above the threshold has a marginal effect on the development level of a country. UNDP has showed that this marginal effect is enough to put difference between industrialised countries and therefore we never have $\varepsilon=1$ and it always lies between $0\leq\varepsilon<1$;

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[3] United Nations Development Report (UNDP) "*Human Development Report 1991,".* Oxford University Press.

[4] The logarithmic function is used to describe the money utility function because of its monotonic increase and because it is concave, therefore explicative of the decreasing return.

-A weighted sum of adult literacy rate and mean years of schooling measured the educational attainment between 1990 and 1994. That was:

E=a1 Literacy+a2 Mean years of schooling

The selected weights was:a1=2/3 and a2=1/3.

In 1995, the mean years of schooling was replaced by the combined first, second and third level gross enrolment ratio. However, the weight of this new variable in constructing educational attainment was the same as the one used for the dropped variable;

-The dimension of longevity is directly measured by life expectancy.

The HDI sets a minimum and a maximum for each dimension and then shows where each country stands in relation to these scales expressed as a value between 0 and 1. Each indicator is measured in different units: life expectancy in years of life, schooling in the average years of schooling and income in purchasing power-adjusted dollars. For the calculation of the index, fixed minimum and maximum values have already been established for each of these indicators and each component can be computed according to the general formula (UNDP, 1997):

Index = actual Xi value-minimum Xi value / maximum Xi value-minimum Xi value

The overall HDI will be obtained from the average of these three components and the HDI will have a value between 0 and 1. From 1990 to 1993, the minimum value of each dimension, longevity, educational attainment and income, was set at the level of the poorest-performing country and the maximum at that of the best-performing country. The HDI for any country was thus its position between the best and the worst countries, but maximum and minimum values changed each year following the performance of the countries at the extreme end of the scale. This scaling may produce a frustrating outcome since a country can improve its performance on life expectancy or educational attainment but see its HDI score fall because the top or bottom countries had done even better,

effectively moving the goal posts (HDR 1994). This is shown in Table 1 in the values between 1990 and 1993. In 1994, the value changed and therefore, from this year onwards, the minimum adult literacy rate is 0% and the maximum is 100% and the literacy component of knowledge for a country where the literacy rate is 75% is 0.75. Similarly, the minimum for life expectancy is 25 years and the maximum 85 years and finally, as far as income is concerned, the minimum is $ 200 (PPP) and the maximum is $40000(PPP).

Table 1: Human Development Index for European Countries from 1990 to 1997

Countries	HDI 1990	HDI 1991	HDI 1992	HDI 1993	HDI 1994[5]	HDI 1995	HDI 1996	HDI 1997
Austria	0.965	0.957	0.950	0.952	0.917	0.925	0.928	0.932
Belgium	0.966	0.958	0.950	0.952	0.916	0.926	0.929	0.932
Denmark	0.971	0.967	0.953	0.955	0.912	0.920	0.924	0.927
Finland	0.967	0.963	0.953	0.954	0.911	0.934	0.935	0.94
France	0.974	0.971	0.969	0.971	0.927	0.930	0.935	0.946
Germany	0.967	0.959	0.955	0.957	0.918	0.921	0.92	0.924
Greece	0.949	0.934	0.901	0.902	0.874	0.907	0.909	0.923
Ireland	0.961	0.945	0.921	0.925	0.892	0.915	0.919	0.929
Italy	0.966	0.955	0.922	0.924	0.891	0.912	0.914	0.921
Luxembourg	-	0.954	0.929	0.943	0.908	0.893	0.895	0.899
Netherlands	0.984	0.976	0.968	0.97	0.923	0.936	0.938	0.94
Portugal	0.899	0.879	0.850	0.853	0.838	0.874	0.878	0.89
Spain	0.965	0.951	0.916	0.923	0.888	0.930	0.933	0.934
Sweden	0.987	0.982	0.976	0.977	0.928	0.929	0.933	0.936
UK	0.97	0.967	0.962	0.964	0.919	0.916	0.924	0.931
Germ.Dem.Rep.	0.953							

Source: United Nations Development Program (UNDP) "*Human Development Report 1990-97,*". Oxford University Press

3. Why a regional specific HDI?

What we want to do is find a composite index that summarises the variables implying human development and shows the level of Human Development in the different European regions. We start with the idea of the HDI to build a Regional specific HDI (RsHdi). The RsHdi will have the same ideas as the UN's HDI but with some differences due to the particular

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[5] From 1994 onwards, the Hdi is measured differently

area of study. We will try to insert components that reflect national priorities and are more sensitive to policy changes. The HDI was developed in order to compare the situation in industrialised countries and less industrialised countries. The composition of the index reflected this purpose and the increase in income, life expectancy and education particularly for illiterate people is the first task of LDCs to improve the Human Development in these countries. The first years of this index, in particular, with the level of the industrialised countries as cap, showed that the idea of starting a point of reference for the low development countries (LDCs) was that of industrialised countries. Hence, the composition of this index does not help to show differences between countries that had a similar value of the component in the index. This is shown in the table which lists all the values from the UNDP report of the HDI for EU countries[6]. Hence, I think it is difficult to use the UN's HDI to monitor changes in human development in areas like the European Union. For example, two of its components, namely life expectancy and adult literacy, vary very little and do not register great differences between countries. The main idea of our RsHdi is to replace the HDI components with components that reflect national priorities and are more sensitive to policy changes. One problem that may exist concerns regional data which are not as easily available as national data. We therefore had to choose the variable by following two criteria:

1. availability of data;
2. components that reflect national priorities and are more sensitive to policy changes.

In terms of regional data, we looked at Eurostat publications (Eurostat 1993,1995,1996a,1996b,1997a,1997b) and the Regions-Statistical Yearbook. In these publications we found data on *GDP* in PPS, rate of unemployment and some other social indicators such us enrolment in

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[6] For the value of the Hdi by UNDP for European countries, see Table 1 "Human Development Index for the European Countries from 1990 to 1997"

secondary and third education. So, we chose to replace the components of the HDI in the RsHdi for the EU with GDP in PPS, unemployment rate and enrolment in higher education. Why should these three components explain the human development of industrialised countries in the European Union? In order to explain this, we can recall what the HDR 1990 stated when explaining Human Development (UNDP, 1990 pp.10), defining it as *"a process of enlarging people's choices. The most critical ones are to lead a long and healthy life, to be educated and enjoy a decent standard of living. Additional choice include political freedom guaranteed human rights and self respect".* Using this quotation as a starting point, we think that we can incorporate the same methodology we applied to the components of the global HDI in the specific regional HDI. We choose just three components for the index. As with the HDI, the lack of data is one reason why only three components are available and more indicators could perhaps be added as information becomes available. However, the main point is that more indicators would not necessarily be better. Some may overlap with existing indicators. The components will be income in PPS, higher education and rate of unemployment. We will now try to explain why we chose these components and what the rule will be for computing it inside the RsHdi.

1. As a proxy for access and command over resources (that implies access to land, credit, income and other resources), given the poor availability of data, we will use the income per capita using Atkinson's formulation for the utility. With all the limitations that income has, it is probably the best measure we have to explain access to the resources especially in industrialised countries with monetary economies. This component is the same as that used in the normal HDI but with some difference in the way that we computed it. In order to compute the income inside the RsHdi in the first instance, we tried to use the same idea of threshold as the HDI, the average of all incomes. However, with this kind of threshold, we realised that the income level in EU regions varies very slightly compared with the

difference between developed and underdeveloped countries and we therefore had a problem. The problem was that the adjusted incomes with the Atkinson formula above the threshold were lower for originally higher incomes. If it is true that the marginal utility decreases with a higher income, the fact that total utility decreases is too difficult to believe. Hence, we change the threshold value which is no longer the current average global value of real GDP per capita but with a discretion value at 10000 PPS. The pps value by Eurostat source replaces ppp $ value used in HDI. With this new value, we eliminate all the original problems and we can apply the idea that when the income level increases, the utility also increases but at a slower rate than the income increase.

2. In the HDI the idea of knowledge or capabilities was represented by the literacy rate. The UNDP recognises that this is a crude measure, but because it is basic to virtually all learning, it is a necessary component in human development. We know that across the EU there is little variation in primary and lower secondary enrolment among the regions because this kind of education covers the years of compulsory schooling for most member states (Eurostat, 1995). On the one hand, we saw that there are significant variations in the number of students in higher education in the Member States. Therefore, since we wanted to measure the most important differences in the European regions, we put the higher education enrolment in the RsHdi. In order to compute the higher education enrolment inside the RsHdi, we encountered several problems. Participation rates are calculated by dividing the number of pupils enrolled in a region by the resident population in that region. As some people may be resident in one region and educated in another, this inter-regional movement may influence the result. On the other hand, there were no available data for some kinds of education[7]. Hence, we have used enrolment in tertiary education (Eurostat,

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[7] For instance, in the UK, we did not include data for the Open University, Independent and social schools in Wales and youth training employers, all of which are not available by region and age.

1995) divided by the population aged between 17 and 25 years old (Eurostat, 1995). The maximum value for this component, would be 100%[8] and the minimum value would be 0%. The rate of tertiary education will be incorporated in the HDI as a value between 0 and 1.

3. Finally, we entered the unemployment rate in the RsHdi. First, this is because employment provides people with income that enables them to establish command over a range of goods and services needed to ensure a decent standard of living. Second, employment means all ways of securing a livelihood, not just wage employment. People value their work for a number of reasons beyond income. Work allows them to make a productive contribution to society and to exercise their skills and creativity. It brings strong recognition that fosters self-respect and dignity. It also gives them opportunities to participate in collective effort and interact socially (HDR 1996). A high level of unemployment also means an increase in inequality between people that earn an income and, on the other hand, people that do not have any income. Unemployment is high and growing, particularly in industrial countries. It has been rising in almost all OECD countries and in the European Union, unemployment affects 18 million people. Millions of others are only employed part-time and unemployment is concentrated to a great extent among women and young people. In order to include unemployment in the index, we can imagine that if the rate of employment is selected as a component in regional HDI, for example, then its minimum and maximum values should be fixed for the regions so that the maximum value would be 100% for full employment and the minimum value would be 0%. The rate of employment would then be incorporated in the HDI as a value between 0 and 1. If the minimum rate of employment is 0% and the maximum is 100%, the employment component for a region whose employment rate is 75% would be 0.75.

The overall RsHdi will be given from the average of these three

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[8] We did not include migrant students.

components and the RsHdi will have a value of between 0 and 1.

Table 2: RsHdi in European Regions in 1996 (EUR15)

rank	Regions	RsHdi96	GDP	Un	GDP rank minus RsHdi rank
1	Brussels	0.8192134	30524.9	13.3	+1
2	Hamburg	0.7574946	32686.7	8.1	-1
3	Berlin	0.7472689	17252.8	11.7	+23
4	Emilia Romagna	0.73652676	21296.7	5.3	+4
5	East Austria	0.73539051	20344.5	4.7	+7
6	Île-de-France	0.73387265	26875.3	10.7	-2
7	Bremen	0.72730568	25937.4	11.4	-2
8	South Holland	0.72547443	16730	5.8	+21
9	Hessen	0.71483641	25305.9	6.5	-3
10	Lazio	0.71227014	19809.2	13.2	+4
11	Central Italy	0.7110998	17782.6	8.1	+11
12	North Rhine - Westphalia	0.70997235	18620.6	8.4	+8
13	West Netherlands	0.7069917	18769.4	6.2	+6
14	Baden-Wurttemberg	0.70320149	20928	5.5	-3
15	Denmark	0.70194947	19049	7.4	+3
16	Bavaria	0.700926	21255.9	5.3	-7
17	Saarland	0.69836134	17695.3	9.3	+5
18	Lombardy	0.69828426	21779	6.3	-11
19	Scotland	0.69755226	16277.5	7.9	+16
20	South West France	0.69672461	15463.5	11.5	+19
21	Continental Finland	0.6966505	15132.3	15.8	+22
22	Rhineland-Palatinate	0.69519152	16608.6	6.4	+10
23	Centre-East (France)	0.693484	16947.8	10.7	+5
24	East (France)	0.69088084	16650.7	9.6	+7
25	South Austria	0.69079429	14443.9	5.5	+26
26	South-East (UK)	0.68975192	19509.9	7.3	-11
27	North Netherlands	0.68960097	17023.3	8.3	--

Source: our elaboration on Eurostat data

rank	Regions	RsHdi96	GDP	Un	GDP rank minus RsHdi rank
28	**Flemish Region**	0.68771561	19206.5	6.9	-11
29	**North East (Italy)**	0.68717489	19810.7	5.3	-13
30	**Yorkshire and Humberside**	0.68526248	14561.5	8.1	+19
31	**North West (Italy)**	0.68427379	19322.2	8.6	-15
32	**Sweden**	0.6830696	16372.9	10	+1
33	**North West (UK)**	0.68291744	14687.9	7.9	+15
34	**Madrid**	0.68273028	15840.1	20.6	+2
35	**East Netherlands**	0.68242425	15424.2	5.9	+5
36	**Lower Saxony**	0.68195063	17493.3	8.5	-11
37	**Wales**	0.68167833	13438.8	8	+18
38	**West (France)**	0.68166591	15219	10.8	+3
39	**Walloon Region**	0.68142434	15105.5	12.9	+5
40	**Schleswing-Holstein**	0.68091906	17634.6	6.6	-16
41	**East Midlands**	0.67956096	15465.1	6.7	-3
42	**West Austria**	0.67887189	18245.6	3.8	-21
43	**West Midlands**	0.67886125	14956.4	7.5	+2
44	**South-West (UK)**	0.67660491	15836.5	6.5	-29
45	**Mediterranean**	0.67554029	15172.1	16.1	-3
-	**Eur 15[9]**	0.67429086	16508.5	10.7	--
46	**Portugal**	0.67258201	11197.7	7.4	+17
47	**Abruzzo Molise**	0.67227148	14546.2	11.5	+3
48	**Ireland**	0.67002368	14704.6	11.8	-1
49	**North (UK)**	0.66979685	14184.8	9.6	+5
50	**East Anglia**	0.66576018	16717.2	5.9	-20
51	**Paris Basin**	0.66265218	16294.4	12.6	-17

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[9] The RsHdi for Eur 15 is without Departements d'outre-mer

rank	Regions	RsHdi96	GDP	Un	GDP rank minus RsHdi rank
52	North-East (Spain)	0.66175504	14804.2	17.9	-6
53	Luxembourg	0.65953811	28069.3	3.2	-50
54	Northern Ireland	0.65320755	13254.5	11.5	+2
55	East (Spain)	0.64471229	14357	19.4	-2
56	Aland Islands	0.64425881	20979.2	4.7	-46
57	Aegean Islands, Crete	0.64081221	11167	4.4	+7
58	North-West (Spain)	0.64027275	10694.5	20.4	+8
59	Northern Greece	0.63296034	10367.3	9.4	+10
60	Sardinia	0.63035277	13032.8	21.8	-3
61	Attica	0.62793509	12091.2	11.9	-2
62	Centre (Spain)	0.6273582	10848.8	22.2	+3
63	Saxony	0.62616409	9919.8	15.1	+8
64	Canary Islands	0.62362253	12532.8	21.7	-6
65	Sicily	0.62083755	11699	24	-5
66	South (Italy)	0.61524107	11375.2	20.2	-5
67	Nord/Pas-de-Calais	0.60884304	14437.2	16.8	-16
68	Thuringia	0.60845634	9924.2	15.8	+1
69	Campania	0.60665658	11409	25.5	-9
70	Saxony-Anhalt	0.60634915	10030.9	17.8	-2
71	Central Greece	0.58795521	9470.4	8.4	+1
72	South (Spain)	0.57486098	9699.3	31.3	-1
73	Mecklenburg-Western Pomerania	0.5739202	9461.4	16.6	--
74	Brandenburg	0.5531272	10599.7	15.3	-8
75	French Overseas Departments	0.380474	7343	31.1	--

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Table 3: RsHdi in European Countries in 1996 (EUR15)

rank	Countries	RsHdi96	GDP	Un	HDI rank minus RsHdi rank	GDP rank minus RsHdi rank
1	Austria	0.70419942	18292.7	4.5	+5	+4
2	The Netherlands	0.7041645	17447.5	6.2	+1	+5
3	Denmark	0.70194947	19049	7.4	+7	-1
4	Belgium	0.69757951	18928.4	9.4	+3	-1
5	Finland	0.69655496	15161.2	15.7	-3	+6
6	France	0.69032724	17920.2	12	-5	--
7	Germany	0.68981939	18325.4	8.8	+4	-3
8	Sweden	0.6830696	16372.9	10	-4	+2
9	United Kingdom	0.68106646	16406	8.3	-1	--
-	Eur 15	0.679118	16508.5	10.7	--	--
10	Italy	0.67343463	17059.2	12.1	+3	-2
11	Portugal	0.67258201	11197.7	7.4	+4	+3
12	Ireland	0.67002368	14704.6	11.8	-3	--
13	Luxembourg	0.65953811	28069.3	3.2	+1	-12
14	Spain	0.63841891	12667.7	22.3	-9	-1
15	Greece	0.62886689	10799	9.7	-3	--

Source: our elaboration on Eurostat data

The distance in RsHdi between the last region in the EU, Brandenburg, with a value of 0.55 and the first one, Brussels, with a value of 0.81 is much greater than the distance between nations, Greece (0.62) and Austria (0.70) which confirms that regional disparities are more complex than differences between countries. If, on the one hand, the *"core-Periphery"* patterns help us explain the RsHdi distribution, we have to understand that there are significant differences between Northern and Southern Europe. All Southern European countries are below average. In the RsHdi trend there is also empirical evidence of the role held by capital cities in terms of business and culture. In fact, in the first ten positions, five regions are capital city regions

(Brussels, Berlin, Vienna, Paris, and Rome). We can therefore observe that the RsHdi ranking has pointed to three main trends that explain the disparities among the European regions: *Core-Periphery, north-south, capital city.*

4. RsHdi convergence analysis

Economic literature makes a distinction between two concepts of convergence. The first, termed β [10]convergence, measures the rate at which GDP per capita converges. It reflects the extent to which the growth rate of poorer countries grows faster than that of wealthier ones. The second, termed σ convergence, involves a decline over time in the cross-country or cross regional dispersion of GDP per capita. The idea that we will use in our study is the same except that we will use our RsHdi to replace the idea of income per capita. The new definition of β convergence will be to measure the rate at which RsHdi converges which reflects the extent to which the growth rates of poorer countries grow faster than that of wealthier ones in terms of human development. The σ convergence implies a decline over time in regional dispersion of RsHdi.

Starting from Barro and Sala-i-Martin's basic concept of convergence (Barro, and Sala-i-Martin, 1991, 1992), we adopted the same model to estimate the convergence of HDI across a sample of 67 regions[11] over the period from 1991 to 1996. We implicitly replaced the concept of income proposed by the authors with our RsHdi. We therefore adapted their model to consider how the transitional growth process in human development can be approximated:

$(1/T)\log (RsHdi_t / RsHdi_{t-T}) = a - \log(RsHdi_{t-T})(1-e^{-\beta T})/t$

where $RsHdi_{t-T}$ is the Regional specific Human development index at the

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[10] This terminology was first introduced by Sala-i-Martin (1990)

[11] From our sample the data for Departement d'outre-mer are missing as well as the regions in countries that joined after the 1995 enlargement: Finland (Manner-Suomi and Ahvenanmaa/Aland), Austria (Ostosterreich, Sudosterreich and Westosterreich) and Sverige,

beginning of the interval, RsHdi$_t$ is the Regional specific Human development index at time t, RsHdi* is the steady-state growth rate and T is the length of the observation interval. Hence, with our sample equation, 1 becomes equal:

$$(1/5)\log (RsHdi96/RsHdi91) = a-\log(RsHdi91)(1-e^{-\beta T})/5 \qquad (1)$$

In our regression, we utilised this simplified version of the model proposed by Sala I Martin. Hence, the steady state value is replaced by the starting value. Nevertheless, it is important to bear in mind that such an assumption implies that human development across the European Union is constant on a long-term basis. In our case, we can sum up the Sala-i-Martin observation that there are the same social policies in regard to education (in the index) across the EU. The idea is that if the value of the Regional specific Human development Index is identical across a group of economies in steady state, a positive β coefficient does not imply that cross sectional dispersion of per capita output diminishes over time.

4.1 β convergence

To find β convergence we ran regression on our model.

**Table 4: RsHdi convergence in EU with and without new länder**

Regressor	Coefficient	Coefficient[12]
β	-0.0463 (4.63%)	0.0641 (6.41%)
R-Squared	0.84541(84,54%)	0.45229 (45.22%)
S.E.of Regression	.0043056	.0022501

We found a value of β equal to -0.0463. The coefficient β measures how

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[12] without new länder

much human development growth (RsHdi96/RsHdi91) is influenced by the starting value of human development. An estimated negative value means that there is convergence in human development in the sample. A positive value of β means the opposite. Hence, this means that there is convergence at a rate of about 4.6% per year in our regression. In this first regression, we estimated convergence on a sample including the former five East Germany länder. However, as in Figure 1, the plotting shows that the former five East German länder have had a much greater value of human development growth (X_{9691}) than the other regions. This is due to the fact that in these regions the 1991 value was very low compared with the other regions. The five distinct points, on the right, in Fig.1 show this influence. Although all the regions have quite close values, the values for Thuringia, Mecklenburg-Western Pomerania, Saxony-Anhalt, Saxony and Brandenburg have a completely different position. These value trends biased the result of our regression and it is not possible to tell if there is or there is not true β convergence across the European Union with this kind of sample.

Figure 1: Convergence of RsHdi over the period 1991-1996
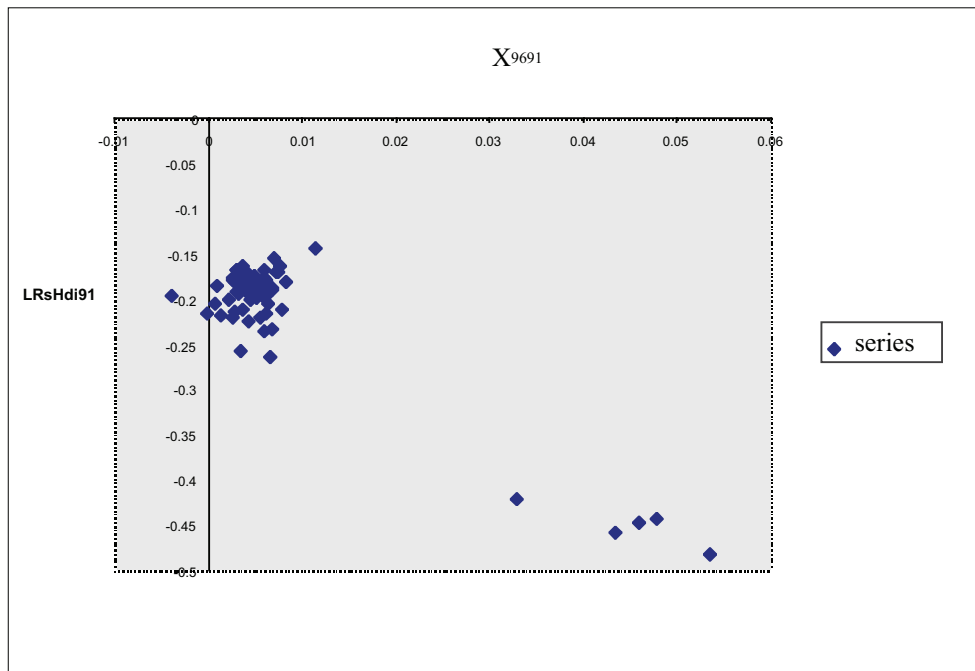
The significant influence of the five länder in former East Germany now helps to point out some significant results: we want to try and run a regression on a restricted sample that does not include these five regions.

In the restricted sample, the estimated coefficient β is equal to 0.0641. The coefficient now has a positive sign: this means that there is a divergence in human development in the sample and the rate of divergence is about 6.4% per year. If we exclude the German regions, the result of our regression shows that in terms of RsHdi (the years of the monetary convergence criteria), the gap between the rich parts and poor parts of Europe has grown between 1991 and 1996. This is due to the fact that the rich part of Europe grows faster that the poor part. If the first regression could bring us to think that across the European Union there was convergence as far as income, the second one shows that if we omit the outstanding results of the former East German länders, the rich part of

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Europe grows faster than the poor part. Hence, disparities will tend to increase. From the plotting, another interesting case can be observed: with a different rate of growth, all regions in EU have a higher RsHdi value than in 1991. However, there are two regions, Nord Pas de Calais and Campania, that have lower values than 1991. Nord/Pas-de-Calais is the region furthest to the left on the graph. The Campania region is quite close to zero. In both regions, this result is the result of a big rise in the unemployment rate and a decrease in higher education enrolment. These two examples, which are extremes, represent the synthesis of the problem of divergence in the RsHdi.

4.2 σ convergence

The existence of β convergence tends to reduce dispersion. By contrast, a negative trend tends to raise the level of dispersion. The existence of this relationship between β and σ convergence is confirmed by our result of σ convergence. In the unrestricted sample where β convergence was present, the RsHdi dispersion[13] across the regions of the EU result declined from 0.00664519 in 1991 to 0.00210424 in 1996. In the restricted sample, without the former East German länder, where there is no presence of β convergence, the dispersion had not declined but increased. It had increased from 0.00102219 in 1991 to 0.00168788 in 1996. To have a clearer idea of this, we can have a look at Table 5 and Fig.2.

Table 5:RsHdi dispersion in EU countries.

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[13] For a sample of n economies, the cross-regions variance for RsHdi will be equal:

$\Theta = (1/n) \sum (RsHdiit - \overline{RsHdit})^2$. Where RsHdiit denotes the RsHdi in the regions i at time t and $\overline{RsHdiit} = \sum RsHdit$

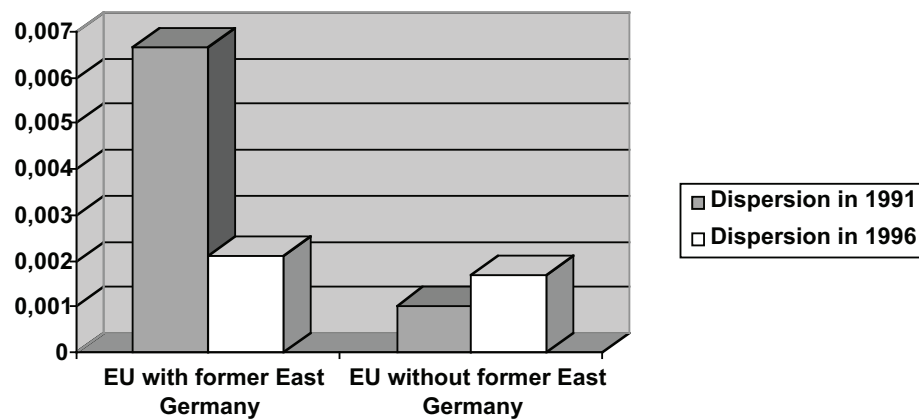| Countries	dispersion in 1991	dispersion in 1996
EU With former East Germany	0,00664519	0,00210424
EU[1] Without former East Germany	0,00102219	0,00168788
Belgium	0,00143412	0,00605285
France	0,00016572	0,00126678
Germany	0,02390238	0,00377741
Greece	0,0010915	0,00055587
Italy	0,00079038	0,00183739
Netherlands	2,8746E-05	0,00036994
Spain	0,00117263	0,00115092
UK	0,00011369	0,0001447

Figure 2: RsHdi dispersion in EU countries.

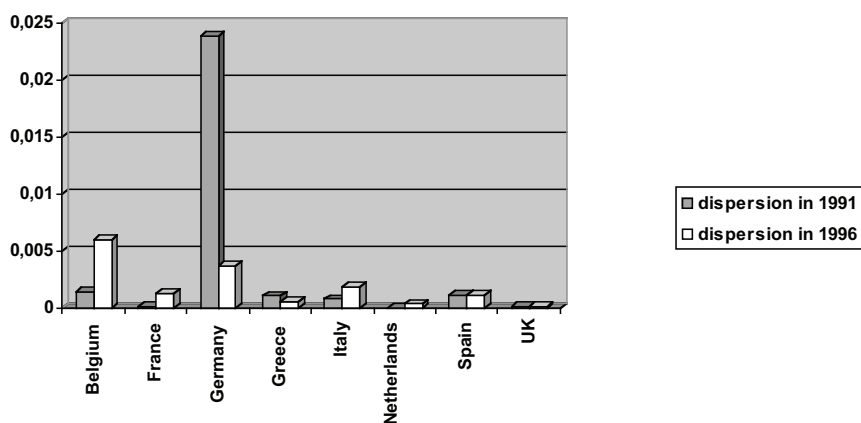**Figure 3: Dispersion across European Union countries**

Figure 2 shows the different levels of dispersion across the EU (with and without the East German länder), between 1991 and 1996. On the left side of Figure 2, we can see that the level of dispersion in EU in 1996 has decreased compared with 1991. But on the right side we can see that dispersion has increased without the East German länder. Like the β convergence shown, the high value of the dispersion in 1991 was biased by the low level of RsHdi for the länder in the former Democratic Republic of Germany[14]. The high value for the RsHdi dispersion in 1991 was a consequence. This means that the difference between the rich core of Europe and the poor periphery has not declined but has increased from 1991 to 1996. Figure 3 reveals more interesting points about dispersion analysis. If we have a look at how this level of dispersion is distributed across the single countries, we can see that there are different trends. We will try to understand the difference between countries and regions in Europe.

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[14] The average in human development in these regions went from 0.00102219 in 1991 to 0.00168788 in 1996.

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Dispersion analysis will help us to understand, for example, whether the difference between the Italian "Mezzogiorno" and the rich north has increased or not, if the difference between former East Germany and West Germany is now greater than before, etc. From the data we had, in fact, some surprises confirm that Germany is the country with the highest value of dispersion (due to East Germany) and that there is a chronic difference between North and South in Italy.

In Belgium, the dispersion value increased from 0.00143412 in 1991 to 0.00605285 in 1996 in Belgium's three regions. If it is true that the differences between Brussels and the Wallone region are clear, it is significant to know that the very high value of dispersion is biased due to the equally high value in Brussels.

Across the sixteen German *länder*, there was a big decline in dispersion in the last five years. The dispersion declined from 0.02390238 in 1991 to 0.00377741 in 1996. The difference between the two German dispersions was much greater than that in other Member States. However, it is important to observe that Germany made a great effort to increase the levels of income and human development in East Germany. German regional policy faced a pressing need to develop the economy of the eastern region in a way that would maximize local job opportunities. The rationale behind this was not achieved quickly.

Across the eleven Italian regions, the dispersion value shows that the difference in human development between the rich north and the poor *"mezzogiorno"* has also increased. The dispersion value in 1991 was 0.00079038 and five years later, the value was f 0.00183739 for Northern and Southern Italy. We need to make some observations about the trend of dispersion. For instance, it is impossible to have a look at Italy without considering the Campania trend. In 1991, there was a significant difference between the former länder of the Deutschland Democratic Republic (DDR) and the Italian regions. The five German Democratic länder accounted for

the last five ranking positions. Five years later, Saxony and Thuringia are ranked on top of the Campania region. This enables us to make a number of observations. The Italian social policies made a big cut in order to meet the Maastricht monetary criteria. Therefore, if the restrictive monetary policy in relation to the Maastricht criteria had worked, Italy would have enjoyed being in the EU. It did not help that there was a reduction in the gap in human development between Northern and Southern Italy. In Italy more than any other country, there is a serious risk that Europe will not arrive for everybody.

The United Kingdom, with its eleven regions, is the country in the sample with the lowest value in dispersion in RsHdi. It is true that the variance level has increased in these years from 0.00011369 to 0.0001447 but the increase is negligible and the value is almost the same as in 1991.

Finally, we can observe that σ convergence analysis confirms the trend that we observed with β convergence. Country analysis has shown that the phenomena of dispersion is not the same in all the Member States and presents some differences among single realities. The worst performance was in countries such as Italy and Belgium where an excessive effort was produced in order to meet Maastricht criteria. Countries like Greece and the United Kingdom, that will not join the monetary union, showed good performance.

Conclusion

The initial question and aim of our work was to see whether there was actual convergence across the EU regions or whether it was merely a monetary one. At the end of our work, we can say that the answer is, unfortunately, purely monetary. With our analysis throughout the RsHdi ranking, the disparities across the European Union were confirmed. We have seen that the patterns that describe the human development confirm the

broad *"center-periphery"*, the difference between northern and southern Europe and the division between bigger and smaller cities. The index level has shown that in developed countries like those in the EU, there is the possibility of improving the situation in human development. However, the main point we have made is that the disparities between the poor and rich part of the EU have increased between 1991 and 1996. Analysis of β and σ convergence has confirmed this trend. The β convergence analysis shows that, if we do not consider the outstanding results of the former East German länder, the disparities have increased at a rate of almost seven per cent per year. The σ convergence analysis shows that the dispersion of RsHdi across the EU is now greater than five years ago. Although the phenomena are different, the trend is quite clear if we consider a different level of explanation. We have seen, on one hand, the results of the former East German länder, and on the other hand, regions such as Campania and Nord/Pas-de-Calais where the situation is worse than five years ago. Quite clearly, the analysis trend shows that the countries that faced more hardships to respect EMU criteria, for example, Italy and Belgium, have now shown a higher rate of disparity of human development than five years ago. In countries such as the UK and Greece, that decided, for different reasons, not to join the EMU, the trend in the dispersion in human development is better (Eurostat, 1996). All of these results show that recent development of the EU politics focusing on the monetary union cast the human aspect of the union into shadow. We should not forget that the EU's final aim, as Jean Monnet reminds us, is to build a union among people.

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