EMPLOYMENT AND REGIONAL DEVELOPMENT IN GERMANY GUISAN, M. Carmen^{*} AGUAYO, Eva

Abstract

We present an econometric analysis, with a cross section sample of 16 German regions, that shows the significant impact of several factors on regional development. The main factors here considered are industry, tourism and public sector activities. The article also analyses the evolution of employment rates in Germany, in comparison with European Union and USA, as well as the regional distribution of those economic activities that favour employment and economic development. The period of analysis is 1960-2000 for national data and 1985-98 for regional data.

JEL classification: C5, E24, J2, 018, 052, R23

1.- Employment and population in German regions

In this article we present an analysis of regional development and employment in Germany, and some econometric models that explain the evolution of non-agrarian Value-Added and employment.

This work forms part of a research project on regional development in European Union countries, like our previously published study on French regions, and the forthcoming studies about other countries. This approach is based on our previous experience in interregional models of EEC12 countries published in Guisan et al(2001).

In this section we present an overview of the evolution of employment in Germany, in comparison with European Union and

^{*} Faculty of Economics, University of Santiago de Compostela, Spain. Emails: eccgs@usc.es and eaguayo@usc.es

USA, as well as an analysis of the regional distribution of rates and densities of non agrarian employment.

Employment and GDP in Germany, EU, Japan and USA

Graph 1 shows the evolution of the total employment rate by one thousand inhabitants in Germany, in comparison with the European Union, the USA and Japan during the period 1960-2000, and graph 2 presents the comparison of the productivity of labour in Germany, USA and Japan.

Graph 1. Rate of employment in Germany, EU, Japan and USA



Graph 2. Labour Productivity of Germany, Japan and USA



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We can see that the employment rate of Germany has been superior to that of European Union, but generally lower than the value of Japan, during the period 1960-2000.

In comparison with the USA Germany has shown a higher rate of employment before 1985 but a lower one after that year, because the labour policies has been much more effective in the USA than in European Union countries, as generally these countries have developed policies more focused on the increase of productivity by worker than to the improvement of employment rates.

Graph 2 shows that the productivity of labour in Germany has experienced an important increase during the period 1960-97, reaching the level of the USA from the end of that period.

In spite of the declining trend in employment rates of Germany and EU, the real value of Gdp and production by inhabitant have experienced important increases during the last decades of the 20^{th} century, as it is shown in the next graphs.

Graph 3 presents the evolution of Gdp by inhabitant, expressed in thousands of dollars at 1990 prices and exchange rates, and the ratio between this variable in Germany and European Union.

In this graph, the right scale corresponds to ph values and the left one to the ratio of this variable between Germany and EU. There we wee that Real Gdp has experienced important increases in the three cases, with the highest average rate of growth in the case of USA. Graph 3. Gdp by inhabitant (ph) in Germany, EU and USA (thousands of US\$90 at exchange rates) and ratio Germany/EU



Now we will analyse the regional distribution of production, employment and population at regional level.

Regional rates of agrarian and non agrarian employment in Western Germany

Table 1 presents the rates of employment, by one thousand inhabitants, in agrarian (lha) and non-agrarian activities (lhna) in Western Germany, as well as the population (thousands of people) the increase in lhna during the period 1985-95, the value of production by inhabitant, ph, and the position in the ranking of 103 European regions. In the case of Berlin the data of 1995 include the Eastern part.

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	Рор	Ph	Rph	Lha	Lhna	Δ Lhna%			
39.Schleswig-Holstein	2707	20.9	31	20	472	39.61			
40.Hamburg	1705	38.6	1	5	659	26.47			
41.Niedersachsen	7711	20.7	34	21	475	36.09			
42.Bremen	680	30.4	5	4	636	31.32			
43.Nordrhein-Westfalen	17806	22.4	21	9	493	28.31			
44.Hessen	5977	29.7	6	9	532	30.50			
45.Rheinland-Pfalz	3949	19.5	38	18	443	23.19			
46.Baden-Württemberg	10267	24.9	14	15	542	26.35			
47.Bayern	11916	25.0	13	28	537	35.29			
48.Saarland	1084	21.4	26	3	490	24.94			
49.Berlin	3470	20.8	32	3	368	-20.80			

Table 1. Population, Ph and Employment in 1995

Note: Lha and Lhna are the rates of agrarian and non-agrarian employment; Δ Lhna% is the percentage of increase in Lhna during 1985-95; Pop is population (thousands), Ph is Gdp per head at market prices (thousands of dollars at 1990 prices and exchange rates) and rph is the ranking position of ph, in descending order, among 108 EU regions.

The most outstanding regions in employment level are *Bayern* and *Baden-Württemberg*, with population higher than 10 millions inhabitants each of them and high rates of employment. These regions, with more than 500 non-agrarian employments by one thousand inhabitants are among the top positions of EU regions, and have experienced an increase in the rate of non-agrarian employment higher than 25% during the period 1985-95.

These regions have devoted important budgets to improve education and research and, as a consequence, they have been very successful to move from an agrarian economy to a highly industrialized one during the second century. The development of industry and social services have influence very positively the high values that they have reached in market services.

Hamburg, *Bremen*, *Hessen*, *Baden Württemberg* and *Bayern* have very high rates with more than 500 employments by one thousand inhabitants. The harbours have a great importance in the

cases of *Hamburg* and *Bremen* to explain the high value-added in transport services.

In the case of *Berlin*, the data of non-agrarian employment in 1995, after unification and important immigrations movements from eastern regions and countries, the rate of non-agrarian employment was lower than that corresponding to the West Berlin in 1985, what explains a reduction of this rate by a little more than 20%.

However *Berlin* has overcome many of the difficulties of economic adaptation to the new circumstances and has experienced an increase in lhna during the period 1995-2000.

Five out of the eleven regions in table 1 have had a value of Gdp by inhabitant, ph, higher than the EU average in 1995 that was 23.4 thousand dollars at 1990 prices and exchange rates, according to OECD.

On the other hand tables 2 and 3 present, respectively, the levels and rates of employment in Agriculture, Industry, Building, Services, non-agrarian and total of 16 German regions in 1998, including the new *länder* after unification.

The order of the regions, from higher to lower levels of total employment in 1998 is:1)Nordrhein-Westfalen, with 7962, 2) Bayern with 6023, 3)Baden-Württemberg with 5078, 4)Niedersachen with 3342, 5)Hessen with 2890, 6)Sachsen with 1972, 7)Rheinland-Pfalz with 1689, 8)Berlin with 1541, 9)Schleswig-Holstein with 1200, 10) Sachsen-Anhalt with 1086, 11)Brandenburg with 1064, 12)Thüringen with 1063, 13)Hamburg with 1013, 14)Mecklenburg-Vorpommern with 755, 15)Saarland with 485, and 16)Bremen with 381.

In eastern regions the data of Ph, Gdp per head, shown levels lower than German and Eu averages, with the following estimated values for the year 1995: *Branderburg* and *Sachsen-Anhalt* with 14.4 thousands of dollars at 1990 prices and exchage rates, *Thüringen* with 14.6, and *Meclenburg-Vorpommern* and *Sachsen* with 14.9 each. The ranking positions of these regions, among 108 EU regions in descending order, were in 1995 between 78 for *Sachsen* and 84 for *Brandenburg*.

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Region	LA	LI	LB	LS	LNA	LT
1.Baden-Württemberg	120	1578	307	3073	4958	5078
2.Bayern	232	1548	411	3832	5791	6023
3.Berlin	8	194	122	1217	1533	1541
4.Brandenburg	49	155	167	693	1015	1064
5.Bremen	2	75	19	285	379	381
6.Hamburg	6	136	49	822	1007	1013
7.Hessen	49	643	165	2033	2841	2890
8.Mecklenburg-Vorpommern	39	86	112	518	716	755
9.Niedersachsen	125	724	232	2261	3217	3342
10.Nordrhein-Westfalen	125	2006	463	5368	7837	7962
11.Rheinland-Pfalz	54	399	115	1121	1635	1689
12.Saarland	4	129	27	325	481	485
13.Sachsen	56	360	299	1257	1916	1972
14.Sachsen-Anhalt	43	168	177	698	1043	1086
15.Schleswig-Holstein	44	198	86	872	1156	1200
16.Thüringen	38	198	152	675	1025	1063
Total Germany	994	8597	2903	25050	36550	37544

Table 2. Levels of employment by sector in 16 German regions, 1998 (thousands of employments)

The rates of total employment of German regions are over EU average, even in the case of the eastern regions. This is rather surprising as these eastern regions have a value of Gdp by inhabitant lower than EU average, and probably this is a special feature of the transition process that probably will change in the future, well with an increase in production by inhabitant or with a reduction in the rate of employment. Map: Regions of Germany



Region	LAH	LIH	LBH	LSH	LNAH	LTH			
1.Baden-Württemberg	11	150	29	293	472	484			
2.Bayern	19	127	34	314	475	494			
3.Berlin	2	58	36	361	455	457			
4.Brandenburg	19	60	64	267	391	410			
5.Bremen	3	114	29	433	576	579			
6.Hamburg	3	80	29	481	589	592			
7.Hessen	8	106	27	336	469	478			
8.Mecklenburg-Vorpommern	22	49	63	292	404	426			
9.Niedersachsen	16	92	29	286	407	423			
10.Nordrhein-Westfalen	7	112	26	299	436	443			
11.Rheinland-Pfalz	13	99	29	279	406	420			
12.Saarland	4	121	25	305	451	455			
13.Sachsen	13	82	68	285	434	447			
14.Sachsen-Anhalt	16	64	68	268	400	416			
15.Schleswig-Holstein	16	71	31	313	415	431			
16.Thüringen	16	82	63	278	423	438			
Total Germany	12	105	35	305	446	458			

Table 3. Rates of employment by sector in 16 German regions, 1998 (employments by one thousand inhabitants)

There are important differences in the rates of industrial employment, from the lowest value of *Mecklenburg-Vorpommern*, with 49 industrial employments by one thousand inhabitants, to the highest one of *Baden-Württemberg* with 150.

Building activities have relatively high rates of employment in eastern regions, mainly because of the refurbishing and rebuilding programs, with values higher than 60 in these five regions: *Brandenburg*, *Mecklenburg*-Vorpommern, Sachsen, Sachsen-Anhalt and Thüringen.

The highest rates of employment in services sectors correspond to *Hamburg* and *Bremen*, with rates higher than 400. In great part due to the high level of employment in transport related with their harbour activities.

The following regions in descending order of this rate are under 400 but over 300 employments by one thousand inhabitants in services sectors: *Bayern*, *Berlin*, *Hessen*, *Saarland* and *Schleswig-Holstein*. The other regions have a rate of employment in services under 300, with the lowest value in 1998 corresponding to *Brandenburg* with 267.

Graphs 5 and 6 present, respectively, the rates of agrarian and non-agrarian employment of Western Germany regions in 1985-95. The order of the regions in these graphs is the same æ in table 1, although the number of each regions correspond to the source of data cited at the foot.

On the other hand Graph 9 shows the important positive relation between the densities of employment and population, and graph 10 presents the relation between the rate of total employment and the level of production by inhabitant, in the 16 regions included in table 2. In this graph we can see the high positive correlation that exists between production and employment.

Economic policies to improve economic development and employment are convenient for avoiding stagnation and economic problems in some regions. In the next sections we will analyse the effects of some factors that have important influence on regional development.





Graph 6

Rate of non-agrarian employment in W. German regions, 1995 (employment per one thousand inhabitants)



Eastern Berlin and the 5 new länder after unification have values of ph lower than EU15 average. So in EU(2001) these regions appear with the following percentages relative to EU average, for Gdp by inhabitant in purchasing power parities: *Eastern Berlin* 77, *Brandenburg* 73, *Mecklenburg-Vorpommern* 72, *Sachsen* 74, *Sachhen-Anhalt* 68, and *Thüringen* also 68.

Density of non-agrarian employment

Table 4 presents the relation between density of population and density of non-agrarian employment.

Table 4. Density of non-agrarian employment and population, 1995

		DENSITY OF POPULATION BY KM ²						
		>300	200-300	100-200				
N EMPLOYMENT	> 300	Berlin (1433/3894) Bremen (1069/1682) Hamburg(1489/2257)						
		Nordrhein-Westfalen (257/523) Saarland(206/421)	Baden-Württemberg (156/287) Hessen(150/283) Sachsen(104/240)					
OF NON AGRARIA	75-100			Bayern (91/169) Niedersachsen (77/162) Rheinland-Pfalz (88/199) Schleswig-Holstein (81/172)				
DENSITY	25-75			Brandenburg (34/88) Mecklenburg-Vor. (31/76) Sachsen-Anhalt (51/128) Thüringen(63/150)				

Note: Data for Eastern regions: Brandenburg, Mecklengburg-Vorpommern, Sachsen, Sachsen-Anhalt and Thüringen, correspond to 1998.

Graphs 7 and 8 show, respectively, the density of nonagrarian employment and population by Km^2 , while graph 9 show the great positive correlation between both variables.

A first group of regions is formed by the 3 top regions with a density of non-agrarian employment higher than 1000 by Km^2 , much higher than German average of 136 non agrarian employments by squared kilometre, which are *Berlin, Bremen* and *Hamburg*.

Hamburg is the most outstanding with 1489 non agrarian employments by Km^2 , followed by *Berlin* with 1433 non agrarian employments by km^2 . The third position corresponds to *Bremen* with 1069 non agrarian employments by Km^2 .

There are also another 5 regions with density of non-agrarian employment over German average of 103 by Km². Four of these regions are western regions with values higher than 150: *Nordrhein-Westfalen* with 257, *Saarland* with 206, *Baden-Württemberg* with 156 and *Hessen* with 151. The fifth region in this group is the eastern region of *Sachsen* with 104.

A third group is formed by regions with density of nonagrarian employment higher than 75 and below German average: *Bayern* with 91, *Rheinland-Pfalz* with 88, *Schleswig-Holstein* with 81 and *Niedersachsen* with 77.

A fourth group is formed by 4 eastern regions with density of non-agrarian employment below 75: *Brandenburg* with 34, *Mecklenburg-Vorpommern* with 31, *Sachsen-Anhalt* with 51 and *Thüringen* with 63.



Graph 7. Density of non agrarian employment in regions of Germany, 1995 (employed per Km2)

Graph 8. Density of population in regions of Germany, 1995 (inhabitants per Km2)



Graph 9. Density of non agrarian employment and population in regions of Germany, 1995



The correlation between density of employment and density of population is positive and very high, like it happens usually in regional studies of another countries, and it is shown in graph 9.

In some cases the rate of population is higher/lower than expected as the distribution of dwellings in the territory is somehow different to the distribution of jobs. Families usually like to live in resident areas in the neighbourhood of their employments, and it happens that sometimes the residential areas chosen do not belong to the same region but to a near region.

On the other hand graph 10 shows the high positive correlation that exists between production per head and the rate of employment.



Graph 10. Rate of employment and production per head, 1998.

Density of population

The highest values of density of population by squared kilometre correspond to the regions with the highest values of production by Km^2 . The highest densities correspond to *Berlin*, with 3894 inhabitants by Km^2 , *Hamburg* con 2258 and *Bremen* con 1682.

A second group, with a density over the German average of 270 inhabitants by Km² includes the following regions: *Nordrhein-Westfalen*(523), *Saarland*(421), *Baden-Württemberg*(287) and *Hessen*(283).

A third group, with density below 200 inhabitants by Km² includes the following regions: *Rheinland-Pfalz*(199), *Schleswig-Holstein*(172), *Bayern*(169) and *Niedersachsen*(162).

The density of population depends on the regional distribution of employment and income, and thus it is important to analyse the impact of some factors, like industry, tourism and sector public activities on regional development. We analyse some more data on regional distribution of economic activities in sections 2 and 3, and devote section 4 to present our interregional econometric models for German regions.

2.- Regional Tourism

Table 5 present some data corresponding to tourism activities by region and the rankings of German regions among 100 European regions of former CEE12 countries.

There we include the following data of tourism in west German regions:

Ons = overnight stays in thousands.

Onsh = overnight stays, in units, by one thousand regional inhabitants.

Onshn = equal to Onsh, but only from national origin.

Onshx = equal to Onsh, but only from foreign origin.

Onskm = overnight stays, in units, by squared kilometre.

The highest values of overnight stays in hotels in 1995, among German regions, correspond to *Bayern* with 46 million and the 3rd position in the EU ranking, *Baden-Württemberg* with 22 millions and the 12th position in that ranking, *Nordrhein-Westfalen* with more than 20 and ranking 13th, *Niedersachsen* with more than 15 millions and ranking 21st, and Hessen with 14 millions and ranking 23rd.

The high position of *Bayern* in the number of overnight stays at hotels is only surpassed, among EU regions, by South-East in UK and the Balearic Islands in Spain.

A feature of German tourism is that in all the regions the main intensity of tourism indicators correspond to tourism from national origin, which is much higher than the tourism from foreign origin.

						U	
Region	ons	onsh	onshn	onshx	onskm	rons	ronsh
Schleswig-Holstein	6947	2567	2380	187	442	41	36
Hamburg	3892	2283	1782	501	5155	60	46
Niedersachsen	15023	1948	1770	179	317	21	54
Bremen	978	1439	1144	295	2421	93	69
Nordrhein-West	20699	1162	911	252	608	13	80
Hessen	14670	2454	1825	629	695	23	40
Rheinland-Pfalz	9520	2411	1929	481	480	31	43
Baden-Württemberg	22364	2178	1799	380	626	12	47
Bayern	46434	3897	3352	545	658	3	16
Saarland	834	770	662	108	324	95	98
Berlin	6720	1937	1441	496	7542	45	55

Table 5. Hotel Tourism indicators in W.German Regions, 1995 (overnight stay total, per one thousand inhabitants, national, foreing and density)

Note: "onsh" is the ratio between overnight stays and population, while onshn and onshx are similar ratios for "ons" from national and foreign origin. "onskm" is the number of overnights by Km² in the year 1995. "rons" is the ranking position in overnight stays and "ronsh" the position in onsh, in descending order, among 100 regions.

The information available on tourism indicators for eastern regions show a low intensity of overnight stays from foreign origin in those regions in comparison with the general values of the western ones.

At European Union level the average number of overnight stays per one thousand inhabitants (onsh) at hotels of each region in 1995 was 1943, with the minimum value being 163 and the maximum 17840, from national origin.

The corresponding figures from foreign origin are 2221 for European Union average, 49 for the minimum value and 56554 for the maximum. The total rate of overnight stays from both origins was 4175 on average, with 599 as the lowest value and 64491 as the highest.

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	POP98	TOUR	TOURH	TOURNH	TOURXH
1.Baden-Württemberg	10495	10416	992	794	199
2.Bayern	12196	17141	1405	1098	307
3.Berlin	3373	3363	997	744	254
4.Bradenburg	2595	1891	729	674	55
5.Bremen	658	574	872	695	177
6.Hamburg	1710	2428	1419	1124	295
7.Hessen	6051	7420	1226	866	360
8.Meckelenburg-Vop.	1771	2372	1339	1275	65
9.Niedersachsen	7904	6308	798	710	88
10.Nordrhein-Westfalen	17960	10677	594	473	121
11.Rheinland-Pfalz	4024	4356	1083	850	232
12.Saarland	1066	473	444	378	65
13.Sachsen	4414	3792	859	794	65
14.Sachsen-Anhalt	2608	1696	651	606	44
15.Schleswig-Holstein	2782	2400	863	753	110
16.Thüringen	2424	2132	880	829	51

 Table 6 Population and Tourists Arrivals in 1998

(Population, tourists arrivals total, per one thousand inhabitants, national and foreign)

In section 4 we will include a variable related with tourism, tourh, as one of the explanatory variable in an econometric model explaining real value-added of Services. The significant and positive influence of this variable on production also implies a positive influence in employment.

Before that we present in the next section the regional distribution of another variables that influence positively regional development, which are industry and public services, as those sectors will also be included in the econometric analysis of section 4.

3.- Regional distribution of industry and government services.

Graphs 11 to 16 present the distribution of regional valueadded by sector per head in Germany in the year 1998.

The order of the regions in these graphs is the same of tables 2 and 3, as to say the alphabetical order of both western and eastern länder.

First of all, graphs 11 and 12 present the value-added per head of agriculture and non-agriculture activities.

Graph 11. Value-added of German regions in 1998: Agriculture (dollars by inhabitant at 1990 prices and exchange rate, \$90)



Graph 12. Value-added of German regions in 1998: Non-Agrarian activities (\$90 by inhabitant)



Graph 13. Value-added of German regions in 1998: Industry (\$90 by inhabitant)



Graph 14. Value-added of German regions in 1998: Building (\$90 by inhabitant)







Graph 16. Value-added of German regions in 1998: Non-market Services (\$90 by inhabitant)



There are important differences in the degree of industrialization between Western and Eastern Germany with much higher levels in the West. The lowest levels of Value-added by inhabitant in Industry correspond to the 5 eastern regions: *Brandenburg*, *Mecklenburg-Vorpommern*, *Sachsen*, *Sachsen-Anhalt* and *Thüringen*. Another region with relatively low level of industrial value-added by inhabitant is *Berlin*, in comparison with German average.

The distribution of non-market services depends heavily on Government activities, which have important positive effect on regional development, as the increase in these activities usually implies an increase in market services and building sector.

The highest levels of Value-added by inhabitant in nonmarket services correspond to *Berlin*, *Bremen* and *Hamburg*.

These three regions are among those with highest levels of Research and Development, RD, expenditure by inhabitant, together with *Bayern* and *Baden-Württemberg*, as it is shown in Guisan et al(2001).

4.- An econometric analysis of regional employment and Valueadded by inhabitant.

First of all we present some single equation models, estimated by least squares, LS, and secondly we present a multiple equations model, estimated by TSLS, for having into account possible interdependence existing among some endogenous variables.

The sample correspond to the 16 German regions in the year 1998. When some dummies are included for having into account some regional differences the order of the regions is the same that in tables 2 and 3.

The variables corresponding to Value-Added by inhabitant are the following:

Vai98h = Sum of Agriculture and Industry

Vaims90h = Sum of Agriculture, Industry and Market Services

Vb98h = Building

Vg98h = Government sector

Vms98h = Market Services

Vng98h = Non Government sectors

Vna98h= Non-agrarian sectors

Besides these variables, the model includes the explanatory variable Tourxh, got dividing by one thousand the variable Tourh from table 6, which expresses the number of tourists arrivals by inhabitant.

Dependent Variable: LNA98H											
Method: Least Square	Method: Least Squares										
Sample(adjusted): 1 1	Sample(adjusted): 1 16										
Included observations: 16 after adjusting endpoints											
Variable	Coefficient	Std. Error	t-Statistic	Prob.							
VNA98H	9.406714	0.935942	10.05053	0.0000							
С	235.2047	22.65841	10.38046	0.0000							
DEAST	41.52558	12.18345	3.408359	0.0052							
D5	58.96002	17.12711	3.442498	0.0049							
R-squared	0.944471	Mean depen	dent var	450.3001							
Adjusted R-squared	0.930589	S.D. depend	lent var	58.19780							
S.E. of regression	15.33277	Akaike info	Akaike info criterion 8								
Sum squared resid	2821.126	Schwarz criterion 8.7033									
Log likelihood	-64.08144	F-statistic 68.0347									
Durbin-Watson stat	1.774355	Prob(F-stati	stic)	0.000000							

Equation 1: Model for regional rate of non agrarian employment

Equation 1 shows the relation between the regional rate of non agrarian employment of German regions in 1998 and the value of production in non agrarian sectors.

This equation includes an intercept and two dummy variables for having into account some small and negative differences in this parameter in Eastern regions (Deast) and Bremen (D5).

Equation 2 shows the relation between Value-Added by inhabitant in Market Services and another sectors such as the sum of Agriculture and Industry and Government sector, represented by Value-Added of non-market Services. It includes also tourh and dummies for regions 6, 7 and 11.

Equation 2. Model for Valued-Added of Market Services
Dependent Variable: VMS98H

Dependent variable: vMS98H										
Method: Least Squares										
Sample(adjusted): 1 16										
Included observations: 16 after adjusting endpoints										
Variable	Coefficient	Std. Error	t-Statistic	Prob.						
VAI98H	0.582043	0.106974	5.440971	0.0004						
VG98H	1.860889	0.203235	9.156360	0.0000						
TOURH	0.044853	0.776364	0.057774	0.9552						
VB98H	-1.906062	0.417525	-4.565138	0.0014						
D6	7.603794	0.912039	8.337140	0.0000						
D7	4.681086	0.759363	6.164490	0.0002						
D11	-2.410493	0.721736	-3.339853	0.0087						
R-squared	0.987932	Mean depen	ident var	10.10076						
Adjusted R-squared	0.979887	S.D. depend	4.614882							
S.E. of regression	0.654489	Akaike info	2.289713							
Sum squared resid	3.855208	Schwarz criterion 2.627								
Log likelihood	-11.31771	Durbin-Wat	son stat	2.389964						

Equation 3 present a model for Value-Added by inhabitants fo Building Sector and equation 4 presents a model for Value-Added of Non-Market Services.

Equation 5. Wodel for	value-added	of Dunuing								
Dependent Variable: V	√B98H									
Method: Least Square	Method: Least Squares									
Sample(adjusted): 1 16	б			I						
Included observations:	: 16 after adjust	ting endpoints	,	I						
Variable	Coefficient	Std. Error	t-Statistic	Prob.						
VAIMS98H	0.011503	0.003730	3.083742	0.0274						
VG98H	0.160726	0.012640	12.71611	0.0001						
TOURH	0.094840	0.035585	2.665159	0.0446						
DEAST	1.056563	0.027372	38.60016	0.0000						
D1	0.100330	0.035919	2.793253	0.0383						
D5	-0.174541	0.034428	-5.069672	0.0039						
D6	-0.552226	0.038060	-14.50916	0.0000						
D7	-0.127626	0.038781	-3.290957	0.0217						
D11	-0.060156	0.031225	-1.926507	0.1120						
D14	0.160671	0.033587	4.783790	0.0050						
D16	-0.109468	0.032083	-3.411986	0.0190						
R-squared	0.998548	Mean deper	ident var	1.325613						
Adjusted R-squared	0.995644	S.D. depend	lent var	0.417517						
S.E. of regression	0.027555	Akaike info	criterion	-4.133402						
Sum squared resid	0.003796	Schwarz cri	terion	-3.602248						
Log likelihood	44.06722	Durbin-Wat	son stat	2.736361						

Here, as well as in another countries studies, we have found that Building sector seems to be more a consequence than a cause of development of Value-Added of Market Services sector.

Although the coefficient of VB98H is negative, showing some substitution relations between expenditure in Services and Building sectors, we think that in a dynamic model there could be some positive effects of Building on Services, so this relation should be considered in a wider approach when more data will be available.

The single equation model for Government Services and the multiple equation models that we will see next show that a high part of VG98H is homogeneous among regions and that it does not depend wholly on regional development, but it generally influences positively the process of regional development.

The value of the intercept, around 2.1 is very high for a variable that has a mean of 4.8, showing that almost 50% of Value-Added of Government Services does not depend on regional production.

Equation 4. Model for Value-Added of Non-Market Services Dependent Variable: VG98H Method: Least Squares Sample(adjusted): 1 16

	-							
Incl	udec	l c	observ	ations:	16 after	r adj	usting	endpoints

included observations.	. TO after aujust	ing enupoints		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VNG98H	0.177199	0.004919	36.02099	0.0000
С	2.102114	0.085215	24.66848	0.0000
D1	-1.320635	0.104303	-12.66156	0.0000
D2	-0.797847	0.103885	-7.680094	0.0003
D3	1.378016	0.101994	13.51075	0.0000
D7	-1.268464	0.106282	-11.93488	0.0000
D8	0.638264	0.105726	6.036995	0.0009
D9	-0.397483	0.101902	-3.900652	0.0080
D10	-0.614380	0.102335	-6.003633	0.0010
D12	-0.583814	0.101905	-5.729023	0.0012
R-squared	0.996163	Mean deper	ndent var	4.843998
Adjusted R-squared	0.990406	S.D. depend	lent var	0.980839
S.E. of regression	0.096070	Akaike info	criterion	-1.578305
Sum squared resid	0.055377	Schwarz cri	terion	-1.095437
Log likelihood	22.62644	F-statistic		173.0602
Durbin-Watson stat	3.082104	Prob(F-stati	stic)	0.000001

We also present TSLS estimations of equations 2, 3 and 4.

TSLS-Equation 2							
Dependent Variable: VMS98H							
Method: Two-Stage Least Squares							
Sample(adjusted): 1 16							
Included observations: 16 after adjusting endpoints							
Instrument list: VA98H VI98H TOURH C DEAST D1 D2 D3 D5 D6							
D7 D8 D9 D10 D11 D12 D14 D16							
Variable	Coefficient	Std. Error	t-Statistic	Prob.			
VAI98H	0.582043	0.106974	5.440971	0.0004			
VG98H	1.860889	0.203235	9.156360	0.0000			
TOURH	0.044853	0.776364	0.057774	0.9552			
VB98H	-1.906062	0.417525	-4.565138	0.0014			
D6	7.603794	0.912039	8.337140	0.0000			
D7	4.681086	0.759363	6.164490	0.0002			
D11	-2.410493	0.721736	-3.339853	0.0087			
R-squared	0.987932	Mean dependent var		10.10076			
Adjusted R-squared	0.979887	S.D. dependent var		4.614882			
S.E. of regression	0.654489	Sum squared resid		3.855208			
Durbin-Watson stat	2.389964	_					

TSLS- Equation 3								
Dependent Variable: VB98H								
Method: Two-Stage Least Squares								
Sample(adjusted): 1 16								
Included observations: 16 after adjusting endpoints								
Instrument list: VA98H VI98H TOURH C DEAST D1 D2 D3 D5 D6								
D7 D8 D9 D10 D11 D12 D14 D16								
Variable	Coefficient	Std. Error	t-Statistic	Prob.				
VAIMS98H	0.011503	0.003730	3.083742	0.0274				
VG98H	0.160726	0.012640	12.71611	0.0001				
TOURH	0.094840	0.035585	2.665159	0.0446				
DEAST	1.056563	0.027372	38.60016	0.0000				
D1	0.100330	0.035919	2.793253	0.0383				
D5	-0.174541	0.034428	-5.069672	0.0039				
D6	-0.552226	0.038060	-14.50916	0.0000				
D7	-0.127626	0.038781	-3.290957	0.0217				
D11	-0.060156	0.031225	-1.926507	0.1120				
D14	0.160671	0.033587	4.783790	0.0050				
D16	-0.109468	0.032083	-3.411986	0.0190				
R-squared	0.998548	Mean dependent var		1.325613				
Adjusted R-squared	0.995644	S.D. dependent var		0.417517				
S.E. of regression	0.027555	Sum squared resid		0.003796				
Durbin-Watson stat	2.736361							

TSLS- Equation 4								
Dependent Variable: VG98H								
Method: Two-Stage Least Squares								
Sample(adjusted): 1 16								
Included observations: 16 after adjusting endpoints								
Instrument list: VA98H VI98H TOURH C DEAST D1 D2 D3 D5 D6								
D7 D8 D9 D10 D11 D12 D14 D16								
Variable	Coefficient	Std. Error	t-Statistic	Prob.				
VNG98H	0.177199	0.004919	36.02099	0.0000				
С	2.102114	0.085215	24.66848	0.0000				
D1	-1.320635	0.104303	-12.66156	0.0000				
D2	-0.797847	0.103885	-7.680094	0.0003				
D3	1.378016	0.101994	13.51075	0.0000				
D7	-1.268464	0.106282	-11.93488	0.0000				
D8	0.638264	0.105726	6.036995	0.0009				
D9	-0.397483	0.101902	-3.900652	0.0080				
D10	-0.614380	0.102335	-6.003633	0.0010				
D12	-0.583814	0.101905	-5.729023	0.0012				
R-squared	0.996163	Mean dependent var		4.843998				
Adjusted R-squared	0.990406	S.D. dependent var		0.980839				
S.E. of regression	0.096070	Sum squared resid		0.055377				
F-statistic	173.0602	Durbin-Watson stat		3.082104				
Prob(F-statistic)	0.000001							

5.- Conclusions

Regional unemployment, migration and productivity are questions that provoque very often public concern on public opinion and political campaigns. In this regard we present our main conclusions from the comparisons that we have performed between German regions development and another regions and countries of European Union, USA and Japan:

1) The rates of employment by one thousand inhabitants in Germany are high, among EU countries, although below USA and Japan averages. This conclusion implies the convenience of

reconsidering some EU policies that focus more on labour productivity increases than on fostering employment rates.

2) German productivity of labour have experienced an important increase in the period 1960-97, and from then onwards show a level similar to the USA and Japan.

3) The evolution of Gross Domestic Product has been positive during the period 1960-2000, although there are important differences among regions and it seems convenient to improve production by inhabitant and rates o employment in the eastern regions, which show the lowest densities of population and non-agrarian employment, with the only exception of *Sachsen* that show a better position in these variables.

4) The top positions on total employment in 1998, among German regions, correspond to Northrein-Westfalen, with almost 8 millions of people, Bayern with a little more than 6 millions, and Baden-Württemberg with a little more than 5 million. These important European regions have high levels of industrial development, tourism indicators, research and development expenditure, educative level of population and another variables that influence positively regional development.

5) In section 4 we have present the estimation of equations for Value-Added in Market Services, Building and Non-Market Services, with a cross-section of 16 German regions, using LS and TSLS for having into account possible interdependences. Among the main conclusions we would like to emphasize the positive impact of industry, tourism and Government activities for fostering Market Services at regional level.

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