

EMPLOYMENT, PRODUCTIVITY AND WAGES IN EUROPEAN REGIONS: ECONOMETRIC MODEL OF 96 NUTS-1 IN YEAR 2010,

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Abstract

We present an analysis of the evolution of employment, productivity and wages in European regions. We estimate an econometric model for the rate of employment and real gross wage with a cross-section of 96 EU27 Regions at NUTS-1 level. We find stagnation in the average evolution of EU and strong inequalities in economic development at regional level. Our conclusions call to improve the EU economic policies in order to foster economic development and to increase productivity, employment rates and real wages particularly in the regions and countries with the lowest levels.

JEL Codes:: E6, F0, I2, O1, O50, O52, O57

Keywords: Econometric Models of Employment and Wages, Productivity, European Economy, Regional Development, Comparison of European Union and the USA.

1. Introduction

The main aim of this article is to call attention on the importance of regional development policies in the European Union in order to overcome the economic crisis of the period 2008-2013 and to get a sustainable growth of production and employment. One of the main causes of the crisis has been the lack of enough economic policies addressed to foster regional development in all the European Union.

Unfortunately for the period 2005-2013 EU economic policies were not able to avoid industrial decline and the increase of trade deficits in many countries. Austerity policies imposed in South European countries for the period 2009-2013, seem addressed to diminish real wages in those countries, which is not a good proposal, and it have not helped to avoid unemployment and public deficits. In the opinion of economists specialized in economic development the solution to the crisis is not the diminution of wages but the increase of industrial development and productivity. We agree with Azariadis et al(2010) that *“development is the only solution”*.

For the last decades many European researchers have contributed with interesting papers and articles to the analysis of the evolution and perspectives of regional development, through ERSA Congresses, with publications on regional development and through other means. Unfortunately the interesting voice of researchers often has not received the due attention in order to contribute to EU development policies. In the next section and in the bibliography we cite some interesting articles in this regard.

Section 2 presents a short summary of comparative studies of European countries and regions with special focus on employment, wages and productivity. Section 3 analyze data of employment, wages and productivity in European countries and regions. Section 4 presents our econometric models for the rate of employment and wage in real 2010. Finally section 5 presents the main conclusions, and the Annex includes more detailed data.

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2. A summary of the literature

The literature, both at country and regional level, shows a positive impact of productivity on real wages, as well as positive impact of industrial production per inhabitant on productivity, production and employment rates. Human capital, through education and research, as well as social capital, are important factors which contribute to increase industrial development and productivity. Some interesting studies related with interregional studies of European regions and countries are the following ones:

Korres (2007), presents an interesting selection of economic integration and regional development in Europe, with focus on labour markets, location, education and research, innovation, local government and other interesting topics.

Guisan (2013) presents the estimation of a macro-econometric model of employment and wages with a panel of 6 OECD countries, including the United States and the 5 major EU economies (France, Germany, Italy, Spain and the United Kingdom), analysing the positive effect of the ratio between Gross Domestic Product per capita (PH) and gross average Wage (W) on the Employment Rate (LTH), and the positive effect of Labour Mean Productivity (PM) on Wages and Employment.

Guisan and Cancelo(2006) conclude that the main emphasis of labour policies in several EU countries seem to have been addressed during the period 1985-2005 to contain the increases of real wages, under the misleading belief that lower wages could lead the policies to get higher employment rates. They show that the best labour policies are those addressed to increase simultaneously labour productivity, wages and employment.

Aguayo, Exposito and Vazquez(2009) analyze the effects of tourism on employment in the accession countries of year 2007. Vazquez and Exposito(2009) analyze the commercial sector in the accession countries of year 2007. Frias, Iglesias and Vazquez(2005) analyze the evolution of Foreign Direct Investment (FDI) in the accession countries of year 2007.

Vazquez(2009) analyses capital movements towards some new members of the European Union, particularly to Czech Republic and Estonia, due to several factors like geographical position, low wages and educational level of workers.

Vieria, Neira and Vazquez(2011) analyze the effects of Research and Development (RD) on Productivity. It is found that the growth rates of productivity (especially between 2000-2004) are higher in the more productive regions , which makes the convergence of less productive regions difficult particularly if they present disadvantages like periphery or lower levels of education and innovation than the most productive.

Vazquez, Gomez and Vieria(2010) analyze the role of entrepreneurship in Spain and Portugal as well as Vazquez and Chasco (2012)

Neira, Portela and Vieira(2010) analyze social capital in EU regions.

Caruso and Palano (2004) analyze the important role of Research and Development (RD) expenditure, in several european regions.

Korres, Chionis, and Staikouras, C.(2004), and Vermeire, B. (2008), among others, analyzes the role of innovation.

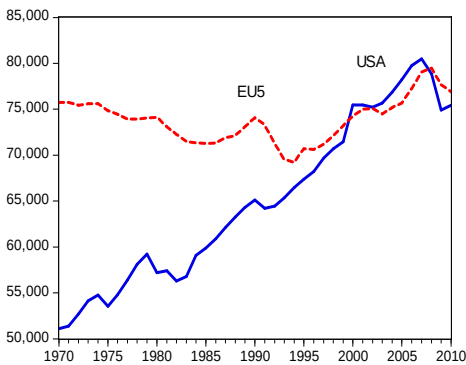
ERSA Conference papers presents many interesting articles related with productivity, employment and development of European regions, like in Guisan, Cancelo and Diaz-Vazquez(1998), Kourliouros et al (2006) and other studies.

3. Employment, wages and productivity in EU countries and Regions, 1970-2012

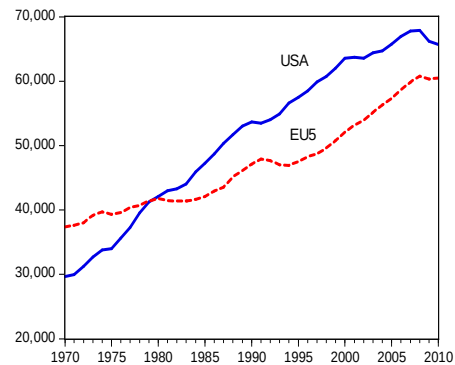
Employment, Wages and Productivity in EU5 countries and the USA, 1970-2012

Graphs 1 and 2 show the evolution of employment by gender in major 5 European Union economies (EU5: Germany, France, Italy, Spain and the United Kingdom), in comparison the United States (USA). Graphs 3 and 4 show the evolution of real gross wages and productivity in each of those 6 countries.

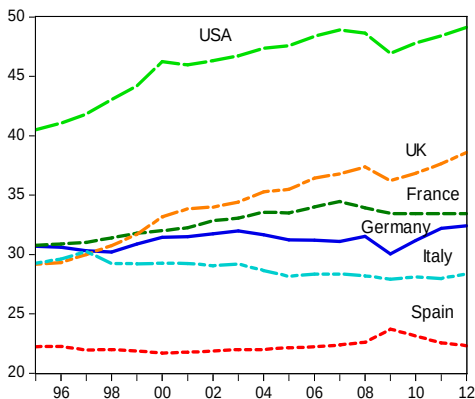
Graph 1. Male employment (th people)



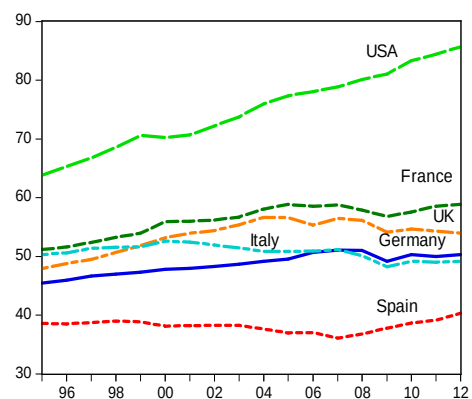
Graph 2-Female employment (th people)



Graph 3. Gross wages (W), th \$2000



Graph 4. Labour Productivity (PM), th \$ 2000

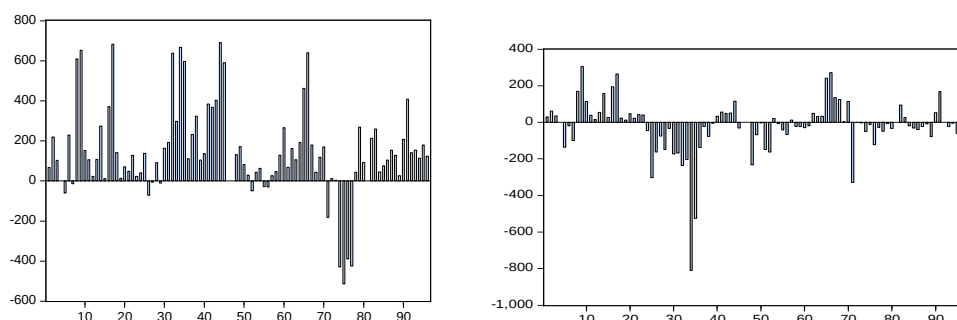


Regarding employment we notice that the number of male workers shows stagnation, with some changes, in EU5 while has experienced an important increase in the USA. Female employment has experienced an important increase in EU5 and the USA.

Employment in EU regions for the period 2000-2011

Graphs 5 and 6 show the changes of employment (thousands) in 96 EU regions for the periods 2000-2011 and 2007-2011. Both for the periods 2000-2007 and 2007-2011 employment increased in the European Union, with 15677 thousand new employments in the period 2000-2007 and 8814 thousand new employments in the period 2007-2011, in spite of the financial and economic difficulties of the last period.

Graph 5. Change for the period 2000-2011 Graph 6. Change for the period 2007-2011



Source: Elaborated by Guisan and Vazquez from Eurostat statistics. Note: The order number of the regions, by country, is: Belgium (1-3), Bulgaria (4-5), Czech R. (6), Denmark (7), Germany (8-23), Estonia(24), Ireland(25), Greece (26-29), Spain (30-36), France (37-44), Italy (45-49), Cyprus (50), Latvia (51), Lithuania (52), Luxembourg (53), Hungary (54-56), Malta (57), Netherlands (58-61), Austria (62-64), Poland (65-70), Portugal (71-73), Romania (74-77), Slovenia (78), Slovakia (79), Finland (80-81), Sweden (82-84), UK (85-96)

In the period 2000-2011 total employment decreased only in 13 out of 96 regions. The highest decreases, with more than 50 thousand employments lost in each region, correspond to one region in Bulgaria (Yugozapadna i Yuzhna Tsentralna), one region in Greece (Voreia Ellada), one region in Portugal (Continente) and the four regions of Romania.

The highest increases, for the period 2000-2011, with more than 500 thousand new employments in each region, correspond to three regions in Germany (Baden-Wurttemberg, Bayern, Nordrhein-Westfalen), three regions in Spain (Madrid, Este and South), one region in France (Mediterranee), one region in Italy (Nord Ovest), and one region in Poland (Poludniowy).

In spite of the strong diminution of employment in the Spanish regions for the period 2007-2011, the total balance for the period 2000-2011 was positive.

While in the period 2000-2007 the majority of the 96 regions experienced a positive evolution, there was a diminution of employment in 51 regions for the period 2007-2011. In 24 regions the diminution was higher than 50 thousand employments, and in 17 regions the diminution was higher than 100 thousand: one in Bulgaria (Yugozapadna i Yuzhna Tsentralna), Denmark, Ireland, two regions of Greece (Voreia Ellada and Attiki), the seven regions of Spain, one region of Italy (Sud), Latvia, Lithuania, one region of Portugal (Continente) and one region of Romania (Macroregiunea trei).

Employment rate, wage and productivity in year 2010.

Table 1 presents a classification of 96 EU regions in 6 groups accordingly to the average wage in year 2010 (gross wage in thousand €). We indicate the total employment (LT) of each group (million).

For a total of 212 million employments 54.5 million (26 %) correspond to the richest regions of Belgium, Denmark, France, Germany, Ireland, Luxembourg, Netherlands,

Austria, Finland, Sweden and the United Kingdom, belonging to groups 1 and 2, with an average wage higher than 40 thousand Euros.

Group 3, with wage between 30 and 40 thousand €, includes 70.8 million employments (33%), Group 4, with wage between 20 and 20 thousand €, includes 40.6 million employments (19%). Groups 5 and 6, with less than 20 thousand € represent 46.1 million employments (22%).

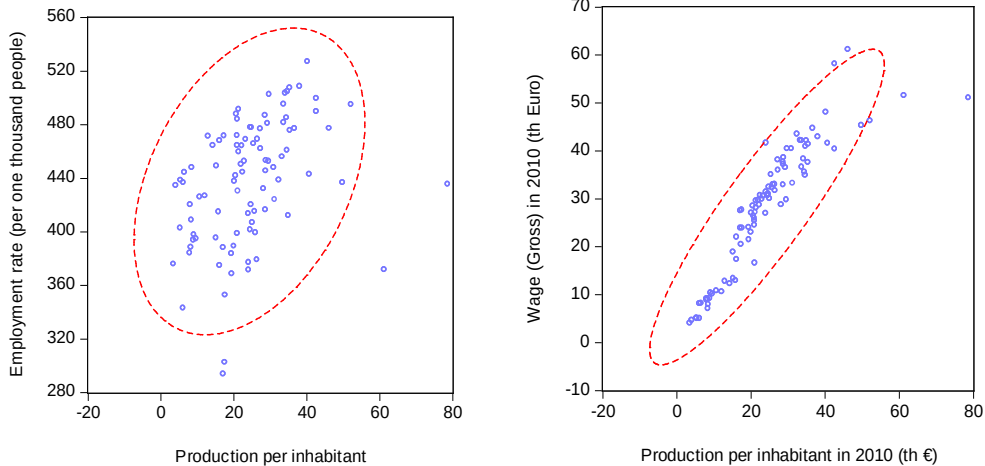
Table 1. Groups of regions, employment: LT in millions and average gross wage in year 2010

Group: LT	Wage (th €)	Regions
G1: 7.2	>50	<i>1 Brussels, 7 Denmark, 53 Luxembourg, 91 London</i>
G2: 47.3	40- 50	<i>2 Vlaams Gewest, 3 Region Wallonne, 8 Baden-Wurttemberg, 9 Bayern, 12 Bremen, 13 Hamburg, 14 Hessen, 17 Nordrhein-Westfalen, 25 Ireland, 37 Ile de France, 59 Oost-Nederland, 60 West-Nederland, 62 Ostosterreich, 80 Manner Suomi, 81 Aland, 82 Ostra Sverige</i>
G3: 70.8	30- 40	<i>10 Berlin, 16 Niedersachsen, 18 Rheinland-Pfalz, 19 Saarland, 22 Schleswig-Holstein, 38 Bassin Parisien, 39 Nord-Pas-de-Calais, 40 Est (FR), 41 Ouest (FR), 42 Sud-Ouest (FR), 43 Centre-Est (FR), 44 Mediterranee (FR), 45 Nord Ovest (IT), 46 Nord Est (IT), 47 Centro (IT), 58 Noord-Nederland, 61 Zuid-Nederland, 63Sudosterreich, 64 Westosterreich, 83 Sodra Sverige, 84 Norra Sverige, 88 East Midlands (UK), 89 West Midlands (UK), 90 East of England (UK), South East (UK), South West (UK), Scotland (UK),</i>
G4: 40.6	20- 30	<i>11 Brandenburg, 15 Mecklenburg-Vorpommern, 20 Sachsen, 21 Sachsen-Anhalt, 23 Thuringen, 30 Noroeste (ES), 31 Noreste (ES), Madrid (ES), Centro (ES), Este (ES), Sur (ES), Canarias (ES), Sud (IT), Isole (IT), 50 Cyprus, 78 Slovenia, 85 North East (UK); 86 North West (UK), Yorkshite and The Humber. (UK), Wales (UK), North Ireland (UK)</i>
G5: 22.7	10- 20	<i>6 Czech R., 24 Estonia, 54 Kozep-Magyarország, 57 Malta, 65 R. Centralny (PL), 66 R.Południowy (PL), 69 R. Południowo (PL), 71 Continente (PT), 72 Azores (PT), 73 Madeira (PT), 79 Slovakia</i>
G6: 23.4	<10	<i>4 Severna i Yugoiztochna (BG), 5 Yugozapadna i Yuzhna Tsentralna (BG), 51 Latvia, 52 Lithuania, 55 Dunantul (HU), 56 Alföld és Észak (HU), 67 R. Wschodny (PL), 68 R. Polnocno (PL), 70 R. Polnocny (PL), 74 Macroegeiunea unu (RO), 75 Macroegeiunea doi (RO), 76 Macroegeiunea trei (RO), 77Macroegeiunea patru (RO)</i>

Source: Guisan and Vazquez-Rozas, from Eurostat Database. More information in the Annex.

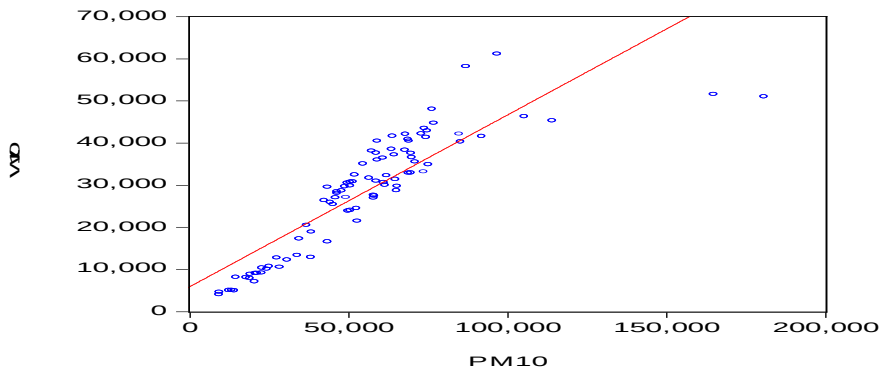
Graphs 7 and 8 show the positive impact of production per inhabitant on the employment rate and average wage in 96 EU regions for the year 2010. The employment rate is the number of employed persons per one thousand people, and the average wage is gross labour cost per employee, in thousand € per year, (including taxes and social security contributions). Net wages values may be obtained after application of taxes and social security contributions which, usually, may account for 30% to 50% of gross wage, depending on the level of gross wage. Graph 9 shows a positive relationship between wage and labour productivity.

Graph 7. Employment Rate and Production per capita Graph 8. Wage and Production per capita



Source. Elaborated by Guisan and Vazquez-Rozas from Eurostat Regional Database, year 2010.

Graph 9. Productivity (PM10) and Wage (W10) in 96 EU regions, year 2010



Source. Elaborated by Guisan and Vazquez-Rozas from Eurostat Regional Database, year 2010.

Average productivity depends on several factors related with industrial development, tourism activity, stock of capital per workers and human capital (education and research expenditure). The EU policies should foster regional development. National, regional and local organizations should also contribute to improve income per capita and well-being. Tables 2 and 3, in the Annex show the values of Wages (W), Production per head (PH) and employment rate (LHT) at regional NUTS1 level in the EU in year 2010.

4. Interregional Econometric models of employment, wage and productivity in EU.

We present our estimations of econometric models that contribute to explain employment and wages at regional level in the European Union. These models are limited to the main explanatory variables, although a deeper study would include other factors. The number of regions is 96, but in some cases the sample has a lower number of observations due to unavailability of data.

Equation 1 shows the relationship between total employment (LT10) and the ratio Production/Wage (Q10/W10).

Equation 1. Relation between Employment (LT) and Production/Wage ratio, year 2010

Dependent Variable: LT10				
Method: Least Squares. Included observations: 94				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	116.6042	75.82888	1.537728	0.1275
QT10/W10	0.479414	0.014244	33.65729	0.0000
R-squared	0.924887	Mean dependent var		2197.776
Adjusted R-squared	0.924070	S.D. dependent var		1544.357
S.E. of regression	425.5536	Akaike info criterion		14.96571
Sum squared resid	16660821	Schwarz criterion		15.01982
Log likelihood	-701.3882	Hannan-Quinn criter.		14.98756
F-statistic	1132.813	Durbin-Watson stat		1.053122
Prob(F-statistic)	0.000000			

The estimation of White-heteroskedascity consistent variances, for equation 1, provided similar results regarding significance of the coefficients, with t student statistic 1.39 for the intercept and 19.47 for the coefficient Q10/W10.

As seen in Guisan(2012) Production/Wage is an important variable to explain the level of employment demanded by firms and organizations, although other variables have also a positive impact on total employment (particularly the lagged value of employment and the increase of the Active Population).

Equation 2a relates regional average Wage per employee (W10), with Labour Mean Productivity) in year 2010 (PM10=GDP10/LT10). Equation 2b relates W10 with its lagged value in year 2005 W05 and the increase in productivity for the period 2005-2010 (DPM). Wages and Productivity are in thousand Euros at current prices. The goodness of fit is much higher in 2b. Equation 3c in the Annex is estimated at constant prices.

Equation 2a. Wage as a function of Mean Productivity, year 2010

Dependent Variable: W10				
Method: Least Squares. Sample: 1 96. Included observations: 94				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.832555	1.513075	3.854768	0.0002
PM10	0.408286	0.024538	16.63905	0.0000
R-squared	0.750581	Mean dependent var		28.27663
Adjusted R-squared	0.747870	S.D. dependent var		13.23621
S.E. of regression	6.646233	Akaike info criterion		6.647024
Sum squared resid	4063.862	Schwarz criterion		6.701137
F-statistic	276.8578	Hannan-Quinn criter.		6.668882
Prob(F-statistic)	0.000000	Durbin-Watson stat		0.988425

Note: t statistics with White consistente variances estimates are 1.89 for the intercept and 6.54 for the coefficient of PM10, and also allow to show significance of coefficients

Equation 2b. Wage as a function of its lagged value and increase of mean productivity

Dependent Variable: W10				
Method: Least Squares. Sample: 1 96. Included observations: 84				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
W05	1.002056	0.009656	103.7759	0.0000
PM10-PM05	0.582314	0.041567	14.00889	0.0000
R-squared	0.968161	Mean dependent var		29.02928
Adjusted R-squared	0.967773	S.D. dependent var		12.78529
S.E. of regression	2.295196	Akaike info criterion		4.523035
Sum squared resid	431.9698	Schwarz criterion		4.580912
Log likelihood	-187.9675	Hannan-Quinn criter.		4.546301
Durbin-Watson stat	1.731352			

Note: The t statistics where 91.11 and 9.89 with White consistent variances estimates.

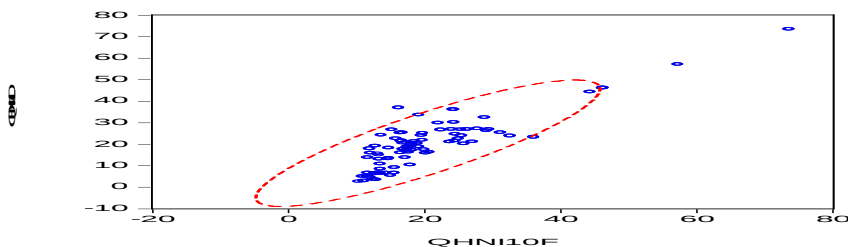
Finally, equation 3 relates the value of non industrial production per head in year 2010 (qhni10) with industrial production per head (qhi10). Besides a common intercept we have added a few dummies to take into account differences in some regions with particular features. The coefficients of the dummy variables are all positive and significant. The effect of QHI10 on QHNI10 is positive and significant. Graph 10 shows a positive relationship between forecasted and actual values of QHNI10.

Equation 3. Relation between non industrial and industrial production per head

Dependent Variable: QHNI10. Least Squares. Sample: 1 96. Included obs. 89				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.319751	1.409876	5.901050	0.0000
QHI10	2.506527	0.303934	8.246944	0.0000
D1: Brussels	39.01045	6.291002	6.200990	0.0000
D13: Hamburg	22.86614	6.318154	3.619117	0.0005
D37: Ile de France	29.11840	6.292976	4.627127	0.0000
D53: Luxembourg	52.39705	6.299385	8.317804	0.0000
D91: London	31.58984	6.328522	4.991661	0.0000
R-squared	0.738694	Mean dependent var		20.46409
Adjusted R-squared	0.719574	S.D. dependent var		11.80967
S.E. of regression	6.253837	Akaike info criterion		6.579654
Sum squared resid	3207.060	Schwarz criterion		6.775389
Log likelihood	-285.7946	Hannan-Quinn criter.		6.658549
F-statistic	38.63477	Durbin-Watson stat		1.374537

Note: Coefficients significant with t statistics based on White consistent method.

Graph 10. Actual and Forecasted values of QHNI in 96 EU regions, 2010



With the exception of a few regions with special features (country capital, tourism, harbour, etc.) the majority of the regions need industrial development to achieve high levels of activity and wages in other sectors.

4. Conclusions

There are important differences in wages and productivity in European Regions. The econometric models show that increases of industrial production at regional level contribute to increase non industrial production as well as employment and real wages.

The economic policies addressed to diminish wages in the South of Europe, imposed for the period 2009-2013, have many drawbacks and are not efficient. They should be substituted by policies addressed to increase the ratio between production and average wage (Q/W) without diminution, and even with increase of real wages, particularly in countries and wages where they are low. We agree with Stafinakis et al (2011) when they declare that: "development is the only solution".

After an unfortunate period of deindustrialization in many European regions, as a consequence of an aggressive globalization which has destroyed good quality industries without supplementary policies in many EU regions, it is time to return to sensible policies of regional development which focus on social and economic progress, in order to avoid economic decay and social frustration in the European Union.

International cooperation through foreign trade between the European Union and other areas should be developed without losses in the quality of life of citizens. The trade policies should avoid strong deficits and allow an even development in both partners. In order to overcome the financial and social crisis in the European Union it should be very important to return to industrial and development policies at regional level.

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¹ <http://www.usc.es/economet/eaat.htm>

² <http://greekeconomistsforreform.com/public-finance/development-is-the-only-solution-seventeen-proposals-for-a-new-development-strategy/>

Table A1. Total Employment(LT), Population (Pop), Wage (W) and Production per head (PH), in 96 EU regions, at NUTS1 level, 2000-2010

Nb	Region	LT 00	LT 10	POB 00	POB 10	LHT 10	W 10	PM 10	PH 10	QHI 10
1	Brussels	346	410	962	1104	372	51.524	164.878	61.275	3.977
2	Vlaams Gewest	2540	2754	5946	6279	439	43.488	73.912	32.417	5.631
3	R. Wallonne	1234	1324	3343	3512	377	41.638	63.934	24.108	3.934
4	Severna i Yugoiztochna	NA	1466	4347	3900	376	4.048	9.282	3.489	0.820
5	Yugozapadna i Yuzhna T.	1595	1587	3824	3634	437	5.008	14.144	6.177	1.025
6	Czech R	4675	4885	10272	10520	464	12.261	30.761	14.285	3.815
7	Denmark	2716	2718	5340	5548	490	58.140	87.017	42.626	6.344
8	Baden- Württemberg	4873	5325	10500	10749	495	42.101	68.006	33.686	9.684
9	Bayern	5836	6321	12193	12525	505	40.905	68.833	34.740	8.306
10	Berlin	1463	1564	3384	3452	453	38.554	63.627	28.834	3.362
11	Brandenburg	1131	1232	2602	2507	491	29.545	43.436	21.344	3.918
12	Bremen	278	293	662	661	443	41.586	92.001	40.755	8.201
13	Hamburg	797	881	1710	1780	495	46.279	105.389	52.177	5.986
14	Hessen	2730	2893	6060	6065	477	44.714	76.862	36.670	6.386
15	Mecklenburg- Vorpo	770	777	1783	1647	472	25.929	44.321	20.909	2.579
16	Niedersachsen	3395	3661	7913	7924	462	35.973	59.163	27.337	6.153
17	Nordrhein- Westfalen	7557	8002	18005	17859	448	40.475	69.085	30.953	6.837
18	Rheinland-Pfalz	1798	1911	4033	4008	477	38.115	57.279	27.312	6.972
19	Saarland	443	454	1070	1020	445	37.204	64.553	28.755	7.483
20	Sachsen	1887	1931	4443	4159	464	28.673	47.879	22.228	4.636
21	Sachsen-Anhalt	1053	1079	2632	2346	460	28.080	46.511	21.386	4.946
22	Schleswig- Holstein	1226	1319	2784	2833	466	35.059	54.612	25.433	4.058
23	Thüringen	1087	1094	2440	2243	488	26.385	42.448	20.710	4.734
24	Estonia	568	571	1370	1340	426	10.739	25.088	10.687	2.098
25	Ireland	1671	1844	3805	4474	412	42.111	84.877	34.974	7.772
26	Voreia Ellada	1307	1346	3512	3590	375	NA	NA	NA	NA
27	Kentriki Ellada	907	964	2425	2483	388	NA	NA	NA	NA
28	Attiki	1445	1642	3885	4112	399	NA	NA	NA	NA
29	Nisia Aigaiou Kriti	430	437	1095	1122	389	NA	NA	NA	NA
30	Noroeste (ES)	1549	1743	4286	4373	399	24.507	52.603	20.969	3.652
31	Noreste (ES)	1678	1896	4089	4388	432	28.735	65.197	28.172	6.463
32	Com Madrid	2178	2875	5230	6353	453	29.773	65.415	29.607	2.757
33	Centro (ES)	1828	2156	5255	5619	384	24.036	50.589	19.408	3.268
34	Este (ES)	4762	5542	11129	13401	414	26.944	58.019	23.993	3.927
35	Sur (ES)	2777	3473	8568	9844	353	23.872	49.894	17.601	1.919
36	Canarias (ES)	667	772	1707	2094	369	21.450	52.823	19.478	1.455
37	Île de France	4970	5161	11061	11819	437	45.300	114.123	49.831	3.534
38	Bassin Parisien	3977	4321	10495	10763	401	30.628	61.124	24.541	3.946
39	Nord-Pas-Calais	1398	1501	4000	4041	371	31.382	64.790	24.067	3.397

40	Est (FR)	2132	2259	5191	5375	420	30.988	58.811	24.718	4.244
41	Ouest (FR)	3102	3488	7863	8573	407	30.008	61.618	25.067	3.309
42	Sud-Ouest (FR)	2461	2857	6256	6883	415	32.270	62.060	25.761	2.994
43	Centre-Est (FR)	2771	3168	7029	7607	416	32.847	68.921	28.698	4.482
44	Méditerranée	2313	2981	7168	7866	379	32.970	69.639	26.396	2.128
45	Nord-Ovest	6252	6813	14912	16068	424	33.195	73.662	31.233	6.477
46	Nord-Est	NA	5032	10666	11514	437	30.258	NA	NA	NA
47	Centro (It)	NA	4826	10789	12004	402	31.666	NA	NA	NA
48	Sud	4050	4168	13952	14176	294	27.430	58.193	17.108	2.006
49	Isole	1863	2034	6624	6721	303	27.651	57.959	17.536	1.520
50	Cyprus	294	385	694	829	464	25.410	45.199	20.986	1.775
51	Latvia	942	941	2373	2239	420	8.874	19.172	8.057	1.342
52	Lithuania	1419	1344	3500	3287	409	7.098	20.546	8.400	1.775
53	Luxembourg	181	221	436	507	436	51.008	180.734	78.710	5.131
54	Közép-Magyar	1180	1229	2839	2961	415	12.894	38.266	15.878	2.546
55	Dunántúl	1222	1180	3123	3036	388	9.122	21.266	8.261	2.686
56	Alföld és Észak	1405	1373	4250	4003	343	8.091	17.830	6.116	1.473
57	Malta	143	165	386	416	395	18.868	38.383	15.178	2.013
58	Noord-Nederland	780	832	1664	1716	485	35.553	70.991	34.440	11.085
59	Oost-Nederland	1641	1771	3332	3524	503	40.441	59.184	29.744	4.568
60	West-Nederland	3709	3968	7422	7804	508	42.893	74.873	38.072	4.347
61	Zuid-Nederland	1730	1799	3508	3572	504	38.299	67.828	34.154	7.159
62	Ostösterreich	1571	1713	3365	3601	476	41.376	74.444	35.416	5.468
63	Südösterreich	760	850	1743	1768	481	36.471	60.948	29.311	6.664
64	Westösterreich	1353	1533	2904	3021	507	37.585	69.755	35.397	8.447
65	Region Centralny	3311	3663	7747	7771	471	12.753	27.512	12.970	2.070
66	Region Poludniowy	2674	3160	7991	7943	398	10.341	22.828	9.081	2.379
67	Region Wschodni	2784	2984	6822	6714	444	8.171	14.625	6.499	1.315
68	Region Północno-Z	2371	2410	6048	6118	394	9.191	22.669	8.929	1.999
69	Region Poludniowo	1390	1543	3987	3907	395	10.098	24.418	9.643	2.899
70	Region Północny	1987	2202	5664	5732	384	9.110	20.789	7.985	1.727
71	Continente	4799	4748	9749	10144	468	17.286	34.474	16.136	2.576
72	Reg Aut Azores	95	110	237	246	449	13.333	33.935	15.240	1.333
73	Reg Aut. Madeira	108	120	240	248	484	16.579	43.464	21.038	NA
74	Macroreg unu	2531	2111	5491	5242	403	5.103	13.314	5.362	1.675
75	Macroreg doi	3352	2831	6761	6515	434	4.636	9.410	4.088	1.103
76	Macroreg trei	2754	2476	5749	5525	448	7.919	18.929	8.482	2.116
77	Macroreg patru	2260	1822	4443	4156	438	5.027	12.387	5.431	1.813
78	Slovenia	894	966	1989	2049	472	20.495	36.860	17.381	3.535
79	Slovakia	2083	2318	5401	5430	427	10.554	28.422	12.130	2.919
80	Manner-Suomi	2367	2433	5151	5336	456	42.188	73.001	33.286	6.248
81	Åland	14	15	26	28	527	48.044	76.395	40.251	3.158
82	Östra Sverige	1628	1799	3305	3601	500	40.328	85.335	42.631	6.393
83	Södra Sverige	1738	1962	3841	4074	482	36.615	70.002	33.712	6.799

84	Norra Sverige	759	785	1727	1704	461	34.893	75.165	34.640	9.128
85	North East UK	1053	1152	2544	2606	442	28.453	46.481	20.542	3.593
86	North West UK	3020	3141	6774	6937	453	29.857	50.569	22.893	3.731
87	Yorkshire and The H.	2243	2388	4963	5301	450	29.655	48.897	22.023	3.686
88	East Midlands UK	1994	2102	4170	4481	469	30.522	49.664	23.290	4.339
89	West Midlands UK	2379	2425	5273	5456	444	30.698	50.593	22.485	3.660
90	East of England	2618	2786	5372	5832	478	32.454	52.014	24.850	3.302
91	London	3418	3740	7237	7836	477	61.113	96.810	46.200	1.794
92	South East UK	4011	4149	7990	8520	487	37.622	58.757	28.610	3.235
93	South West UK	2343	2520	4915	5273	478	30.824	51.377	24.555	3.577
94	Wales	1220	1316	2906	3007	438	27.034	45.965	20.119	3.734
95	Scotland	2293	2451	5066	5223	469	31.695	56.535	26.525	4.544
96	Northern Ireland	672	774	1684	1799	430	27.132	49.179	21.169	3.406

The number of order of the regions, by country, is: Belgium (1-3), Bulgaria (4-5), Czech R. (6), Denmark (7), Germany (8-23), Estonia(24), Ireland(25), Greece (26-29), Spain (30-36), France (37-44), Italy (45-49), Cyprus (50), Latvia (51), Lithuania (52), Luxembourg (53), Hungary (54-56), Malta (57), Netherlands (58-61), Austria (62-64), Poland (65-70), Portugal (71-73), Romania (74-77), Slovenia (78), Slovakia (79), Finland (Suomi) (80-81), Sweden (82-84), UK (85-96)

Table A2. Wages, Production per capita and employment Rate in countries with 2 or more regions

Country	W10 min	W10 max	PH10 min	PH10 max	Lht10 min	Lht10 max
Belgium	41.6	51.5	24.1	61.3	372	439
Bulgaria	4.0	5.0	3.4	6.2	376	437
Germany	25.9	46.3	20.7	52.2	443	505
Greece	21.9	32.9	16.1	26.0	375	399
Spain	21.4	29.8	17.6	29.6	353	453
France	30.0	45.3	24.0	49.8	371	437
Italy	27.4	33.2	17.1	31.2	294	437
Hungary	8.1	12.9	6.1	15.9	343	415
Netherlands	35.6	42.9	34.1	38.1	485	508
Austria	36.5	41.4	29.3	35.4	476	507
Poland	8.2	12.8	6.5	13.0	384	471
Portugal	13.3	17.3	15.2	21.0	449	484
Romania	4.6	7.9	4.1	8.5	403	448
Finland	42.2	48.0	33.3	40.3	456	527
Sweden	34.9	40.3	33.7	42.6	461	500
UK	27.0	61.1	20.1	46.2	430	487

Source: Guisan and Vazquez-Rozas(2013) from Eurostat Regional Database. Notes: Minimum (min) and Máximo (max) values of the country regions in year 2010. Wage (W10) and Production per head (PH10) are in thousand €. Employment rate per one thousand population (LHT10).

Table A3. Wage, Production per capita and Employment Rate in EU countries with only 1 region at NUTS1, year 2010

Country	W10	PH10	LHT10
Czech Republic	12.3	14.3	464
Denmark	58.1	87.0	490
Estonia	10.7	10.7	426
Ireland	42.1	35.0	412
Cyprus	25.4	21.0	464
Latvia	8.9	8.1	420
Lithuania	7.1	8.4	409
Luxembourg	51.0	78.7	436
Malta	18.9	15.2	395
Slovenia	20.5	17.4	472
Slovakia	10.6	12.1	427

Source: Guisan and Vazquez-Rozas from Eurostat Regional Database. Note: Wage (W10) and Production per head (PH10) are in thousand €. Employment rate is the number of employed persons per one thousand people (LHT10).

Groups of EU Nuts1 Regions by gross average annual wage in year 2010 (W10 in Euros)

Group 1. Regions with W10>50 th. Employment in 2011: 7165 th

obs		W10	LT08	LT09	LT10	LT11
1	Brussels	51524	398	404	410	413
7	Denmark	58140	2854	2776	2718	2703
53	Luxembourg	51008	202	217	221	225
91	London	61113	3759	3693	3740	3825

Group 2 Regions with W10 between 40 and 50 th. Employment in 2011: 47317 th

obs		W10	LT08	LT09	LT10	LT11
2	Vlaams Gewest	43488	2727	2715	2754	2760
3	Région Wallonne	41638	1321	1302	1324	1336
8	Baden-Württemberg	42101	5415	5304	5325	5482
9	Bayern	40905	6327	6242	6321	6489
12	Bremen	41586	288	283	293	301
13	Hamburg	46279	867	878	881	904
14	Hessen	44714	2892	2871	2893	3004
17	Nordrhein-Westfalen	40475	8114	8006	8002	8239
25	Ireland	42111	2101	1917	1844	1809
37	Ile de France	45300	5321	5267	5161	5201
59	Oost-Nederland	40441	1828	1814	1771	1770
60	West-Nederland	42893	4056	4082	3968	3976
62	Ostösterreich	41376	1714	1709	1713	1733
80	Manner Suomi	42188	2516	2443	2433	2459
81	Aland	48044	15	14	15	15
82	Ostra Sverige	40328	1788	1784	1799	1841

Group 3. Regions with W10 between 30 and 40 th. Employment in 2011: 70757 th

obs		W10	LT08	LT09	LT10	LT11
10	Berlin	38554	1514	1547	1564	1615
16	Niedersachen	35973	3615	3622	3661	3767
18	Rheinland-Pfalz	38115	1933	1893	1911	1940
19	Saarland	37204	458	450	454	456
22	Schleswig-Holstein	35059	1337	1316	1319	1354
38	Bassin Parisien	30628	4439	4387	4321	4301
39	Nord-Pas-de-Calais	31382	1499	1471	1501	1501
40	Est (FR)	30988	2261	2200	2259	2269
41	Ouest (FR)	30008	3472	3498	3488	3484
42	Sud-Ouest (FR)	32270	2843	2820	2857	2830
43	Centre-Est (FR)	32847	3129	3121	3168	3175
44	Méditerranée	32970	2949	2942	2981	3004
45	Nord-Ovest (IT)	33195	6943	6863	6813	6842
46	Nord-Est (IT)	30258	NA	5042	5032	5091
47	Centro (IT)	31666	NA	4832	4826	4819
58	Noord-Nederland	35553	857	858	832	827
61	Zuid-Nederland	38299	1852	1842	1799	1797
63	Südösterreich	36471	850	841	850	866
64	Westösterreich	37585	1526	1527	1533	1545
83	Sódra Sverige	36615	1997	1937	1962	1998
84	Norra Sverige	34893	808	778	785	804
88	East Midlands (UK)	30522	2158	2142	2102	2123
89	West Midlands (UK)	30698	2471	2437	2425	2406
90	East of England (UK)	32454	2811	2790	2786	2825
92	South East (UK)	37622	4207	4146	4149	4152
93	South West (UK)	30824	2556	2506	2520	2496
95	Scotland	31695	2528	2488	2451	2473

Group 4. Regions with W10 between 20 and 30 th. Employment in 2011: 40596 th

obs		W10	LT08	LT09	LT10	LT11
11	Brandenburg	29545	NA	1223	1232	1238
15	Mecklenburg-V	25929	778	773	777	781
20	Sachsen	28673	1939	1914	1931	1957
21	Sachsen-Anhalt	28080	1084	1081	1079	1101
23	Thüringen	26385	1092	1072	1094	1110
30	Noroeste (Es)	24507	1912	1819	1743	1713
31	Noreste (Es)	28735	2043	1921	1896	1869
32	Madrid	29773	3064	2918	2875	2817
33	Centro (Es)	24036	2320	2199	2156	2125

34	Este (Es)	26944	6231	5689	5542	5429
35	Sur (Es)	23872	3826	3547	3473	3374
36	Canarias (Es)	21450	862	795	772	778
48	Sud (IT)	27430	4391	4231	4168	4181
49	Isole (IT)	27651	2091	2057	2034	2035
50	Cyprus	25410	383	381	385	376
78	Slovenia	20495	996	981	966	936
85	North East (UK)	28453	1152	1140	1152	1129
86	North West (UK)	29857	3151	3134	3141	3124
87	Yorkshire (UK)	29655	2448	2384	2388	2397
94	Wales	27034	1341	1309	1316	1333
96	Northern Ireland	27132	783	755	774	795

Group 5. Regions with W10 between 10 and 20 th. Employment in 2011: 22709 th

obs		W10	LT08	LT09	LT10	LT11
6	Czech R.	12261	5003	4934	4885	4904
24	Estonia	10739	657	596	571	609
54	Közép-Magyarország	12894	1247	1239	1229	1243
57	Malta	18868	160	162	165	169
65	R. Centralny (PL)	12753	3811	3756	3663	3774
66	R. Poludniowy	10341	3143	3153	3160	3314
69	R. Poludniowo	10098	1533	1530	1543	1509
71	Continente (PT)	17286	4968	4823	4748	4618
72	Azores (PT)	13333	111	112	110	107
73	Madeira (PT)	16579	119	119	120	112
79	Slovakia	10554	2434	2366	2318	2351

Group 6. Regions with W10 <10 th Euros. Employment in 2011: 23413 thousand

Nb		W10	LT08	LT09	LT10	LT11
4	Severna i Yugoiztochna (BG)	4048	1632	1572	1466	1415
5	Yugozapadna i Yuzhna Tsentralna(BG)	5008	469	456	429	415
51	Latvia	8874	1125	983	941	971
52	Lithuania	7098	1520	1416	1344	1371
55	Dunántúl (HU)	9122	1220	1181	1180	1194
56	Alfold és Eszak (HU)	8091	1413	1361	1373	1376
67	R Wschodni (PL)	8171	2945	2948	2984	2964
68	R Polnocno (PL)	9191	2280	2301	2410	2415
70	R. Pólnocny	9110	2087	2181	2202	2156
74	Macroregiunea 1	5103	2155	2097	2111	2102
75	Macroregiunea 2	4636	2829	2813	2831	2837
76	Macroregiunea 3	7919	2518	2487	2476	2363
77	Macroregiunea 4	5027	1867	1847	1822	1835

Real Wage equation

Estimation of real wages in 2010 (WR10) as a function of real wage in 2005 (WR05) and the difference between real productivity in year 2010 (PMR10) and year 2005 (PMR05). These variables are a provisional estimation at constant prices of year 2000.

Equation 2c. Wage as a function of its lagged value and increase of productivity

Dependent Variable: WR10				
Method: Least Squares. Sample: 1 96. Included observations: 96				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
WR05	1.027970	0.012133	84.72346	0.0000
PMR10-PMR05	0.617298	0.057358	10.76220	0.0000
R-squared	0.956194	Mean dependent var		21.29949
Adjusted R-squared	0.955728	S.D. dependent var		9.849805
S.E. of regression	2.072488	Akaike info criterion		4.315990
Sum squared resid	403.7493	Schwarz criterion		4.369414
Log likelihood	-205.1675	Hannan-Quinn criter.		4.337584
Durbin-Watson stat	1.484384			

Blog of the Euroamerican Association.

"Development is the only solution. Seventeen Proposals for a New Development Strategy", Azariadis, C.(Washington University, MO, USA), Ioannides, Y. (Tufts University,MD,USA), Pissarides, A. (LSE, London UK) (2010). "Is there a strategy that can free Greece from the grip of today's unprecedented economic and social crisis and place her on a path of sustainable development and solid prosperity? The signers of this article believe that the answer is yes if the country is willing to go beyond the measures of fiscal austerity and market reform advised by the EU-ECB.IMF "troika". *We predict that market reforms will not succeed unless they are supplemented by powerful pro-growth policies.* The real choice of Greece is not between solvency and default or between reform and stagnation; it is between prosperity and underdevelopment".

<http://euroamericanassociation.blogspot.com.es/search/label/Azariadis>

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