

world development report

2009

*Reshaping Economic Geography*



**BACKGROUND PAPER**

---

**EUROPEAN GROWTH IN THE AGE OF  
REGIONAL ECONOMIC INTEGRATION:  
CONVERGENCE BIG TIME?**

**NICHOLAS CRAFTS**

University of Warwick

Current version: December 2007

**EUROPEAN GROWTH IN THE AGE OF REGIONAL ECONOMIC  
INTEGRATION: CONVERGENCE BIG TIME ?**

**NICHOLAS CRAFTS**

**(University of Warwick)**

Background note for 2009 World Development Report, December 2007

## **1) Catch-Up Growth in Post-War Europe**

Western Europe experienced a Golden Age of economic growth from the early 1950s to the early 1970s during which the average rate of growth of real GDP per person was just over 4 per cent per year. Since then growth has slowed down and has been similar to the United States at a little under 2 per cent per year. Within western Europe in both periods, countries with initially lower income levels grew faster on average and over time the coefficient of variation of real GDP per person has fallen steadily so that the picture has been one of unconditional  $\beta$ -convergence and of  $\sigma$ -convergence (Tables 1 and 2).

When viewed through the lens of growth accounting the fast growth of the Golden Age was based on catch-up both through capital deepening and very strong TFP growth. Subsequently both these contributions, but especially TFP growth, slowed down (Table 3). The TFP gap between European countries and the United States in 1960 was largely due to inefficient use of resources in Europe rather than the unavailability or inappropriateness of American technology. Over time, growth in European TFP involved keeping abreast of OECD technological progress, largely through technology transfer, and eliminating much of the inefficiency of the early post-war years (Table 4). As many authors have noted, this was strongly related to structural change, as in models in the labour-surplus tradition, such that the exodus of labour from agriculture appears to have been highly conducive to productivity growth within the agricultural sector (Tables 5 and 6).

Rapid catch-up growth that Europe was not automatic but was founded on strong institutions and good policies which underwrote a large volume of high-quality investment and which encouraged innovation and real cost reduction. Among the most important policy moves was the general abandonment of the protectionism of the interwar period. European countries participated fully in the GATT process of multilateral tariff reductions and also pursued regional economic integration through the Treaty of Rome, EFTA, the Single Market etc.. Clearly, this process was incomplete as evidenced, for example, by the Common Agricultural Policy and the failure fully to implement service sector reforms since 1992 but, nevertheless, Badinger (2005) estimates that policy barriers to trade had fallen to 50 per cent of the early 1950s level by 1970 and 13 per cent by 2000 and that the overall implication was that EU income levels in 2000 were 26.1 per cent higher than in the counterfactual world of no trade liberalization.

Economic integration in Europe stimulated growth in a number of ways and its positive effects went well beyond traditional welfare triangle gains. The impacts of reducing barriers to trade included facilitating the gains from structural change, speeding up technology transfer (Madsen, 2007), underwriting market-size effects on R & D spending (Chou et al., 1995), and stimulating investment and innovation through reducing mark-ups (Griffith and Harrison, 2004; Griffith et al., 2006).

## **2) Regional Aspects of European Catch-Up and Convergence**

Thus far, the description of European growth appears to be consistent with a basically neoclassical view of the world. A closer look suggests that this is too simple and that there were important spatial aspects of European growth and integration. Table 7 reports the results of convergence regressions for the set of European regions for which data exist for 1950. It provides evidence of unconditional convergence both before and after 1973 but in

the latter period this is quite weak. Whilst peripherality per se does not seem to retard growth, population density is an advantage. EU regional policies have had a very limited impact on this picture (Rodriguez-Pose and Fratesi, 2004).

Reductions in the dispersion of real GDP per person across European regions have reflected reductions in core-periphery inequality between countries rather than within countries (Table 8). Table 9 re-runs regressions performed in Venables (2005) for a common set of regions across three cross-sections. The results show that real GDP per person is always higher in more densely populated regions and is always lower in regions relatively far away from the centre of Europe. Interestingly, however, both the disadvantages of peripherality and the advantages of density were greater in the dis-integrated Europe of the 1950s.

European integration has been accompanied by the patterns of spatial disparity highlighted by the new economic geography. Not only are there are agglomeration effects on productivity (Ciccone, 2002) but there is also clear evidence that market access, which, of course, exhibits a strong core-periphery profile, has a strong positive impact on levels of regional GDP per person. Breinlich (2006) found a crude elasticity of about 0.25 or about 0.07 controlling for human and physical capital stocks and density; using the latter estimate implies that moving the Algarve to Cologne would raise its labour productivity by 20 per cent.

New economic geography models suggest that reductions in trade costs may lead to industry to move to locations with proximity to markets because they permit realization of economies of scale or because it is advantageous to locate close to either customers or suppliers. Empirical evidence suggests that market access has mattered for industrial location, becoming more important for industries with strong backward and forward linkages and less important for increasing returns industries during the late twentieth century (Midelfart-Knarvik et al., 2000).

The implication has been a mixed pattern of spatial concentration and dispersion across different industries. Overall, EU countries have become slowly more specialized in production over time as economic integration has progressed, although industries in the EU remain less spatially concentrated than in the United States (Midelfart et al., 2003). The general tendency has been for manufacturing to become less concentrated topographically and to move away from regions of high employment density (Brulhart and Traeger, 2005). By contrast, service sector employment remains concentrated in high-density (urban) areas.

### **3) Equilibrium Regional Disparities**

The remaining inequality of regional GDP per person in Europe is largely a within-country phenomenon. This does not necessarily connote market failure and it could be consistent with reasonably well-functioning markets in which real income levels for each type of worker tend to equalize. Rice and Venables (2003) describe a model of this kind to address the issue of within-country regional inequality which seems relevant for countries like the UK which exhibit large and persistent regional disparities of GDP per person.

The model has several regions in which there are two types of labour, skilled and unskilled, which are mobile between locations, and four outputs, a sector that is skilled-labour intensive and internationally-traded, a domestically-traded sector, non-transportable services and housing. One region acquires a productivity advantage from agglomeration in the

internationally-traded sector. The implications (summarized in Table 10) are that the favoured region experiences a rise in money wages, in-migration, a rise in the share of skilled workers, rises in the price of housing and non-traded services while the domestically-traded sector moves to other regions. Real wages increase in all locations but are kept equal by migration. This matches the stylized facts quite well taking Greater London to be the favoured region with an unmatched agglomeration advantage in financial and business services: the correlations highlighted in Table 10 do show up – London has higher everything relative to the other UK regions.

If the model fits, it should also be the case that real incomes are much less disparate across regions than nominal GDP per person. That is indeed the case, as Table 11 reports. Regions with higher GDP per person have higher prices and more labour force participation. In fact, the remaining differences in regional real income levels are very largely explained by differences in human capital. And econometric analysis shows that real wages for each skill level in the UK show strong convergence tendencies across regions (Duranton and Monastiriotis, 2002).

#### **4) The Celtic Tiger**

Since the mid-1980s, Ireland has enjoyed outstanding growth performance. Real GNP per head has grown at 5.4 per cent per year and Ireland has now caught up the European leaders after falling behind in the Golden Age. Irish growth has been based both on strong productivity performance (cf. Table 3) and also on rapid employment growth based on an elastic labour supply as unemployment fell and migration flows reversed. This represents a transformation of an economy which was very much peripheral within Europe – market potential in 1973 has been estimated at 17.4% of the highest regional level in the then EU9 (Keeble et al., 1981).

Ireland's Celtic Tiger phase of growth is firmly located in an era of globalization and regional economic integration. It has been based on export-platform foreign direct investment. The stock of inward-FDI per person is about 6 times the average of the other EU15 countries and virtually all the output of foreign-owned manufacturing firms is exported. Ireland's revealed comparative advantage is now found in new sectors like office machinery and pharmaceuticals rather than traditional ones like clothing & footwear and food, drink and tobacco.

Ireland's ability to attract FDI has been based especially on its generous tax regime (Gropp and Kostial, 2000) but also on its location inside the EU (Slaughter, 2003). Pro-active policies have been co-ordinated by the Industrial Development Agency and has centred on complementary investments in telecoms infrastructure and, especially, college education. EU Structural Funds have been helpful at the margin but probably raised the Irish growth rate by about 0.5 percentage points (Barry et al., 2001).

The sectoral allocation of FDI employment reported in Table 12. In 2000, 52 per cent was in chemicals (pharmaceuticals), office & data processing, radio, TV & telecoms and in medical & optical instruments. On a European-wide basis, none of these sectors was becoming more spatially concentrated and three were classified as CD by Midelfart-Knarvik et al. (2000). Compared with industry in general these sectors are high-skilled but are not ones with high linkage effects. Analysis of the location decisions of American multinationals suggests that

agglomeration benefits have been important in terms of knowledge spillovers and thick labour markets but also that there has been a demonstration effect – initial success provided a strong signal for other firms to follow (Barry et al., 2003).

Thus, the Irish experience reflects several themes from earlier sections. It clearly shows that peripherality does not preclude economic success in an era of integrating markets. It also underlines the attractiveness of peripheral regions with good policies for an important sub-set of manufacturing. And it suggests that successful catch-up growth does not result primarily from access to EU Structural Funds.

Admittedly, there are some special features of the Irish case, most obviously, the very high fraction of the economy which is devoted to ICT production by multinationals – gross output was 22.5 per cent of GDP in the late 1990s. Given that TFP growth in this sector was a complete outlier, Ireland's productivity growth would not be matched by countries with a less favourable composition of manufacturing output. Nevertheless, it is interesting to note, as Table 13 reports, that the 2004 Accession transition economies which have been out-performing in terms of catch-up growth are the small peripheral Baltics rather than the larger Central European countries.

## References

- Badinger, H. (2005), "Growth Effects of Economic Integration: Evidence from the EU Member States", *Review of World Economics*, 141, 50-78.
- Barry, F., Bradley, J. and Hannan, A. (2001), "The Single Market, the Structural Funds, and Ireland's Recent Economic Growth", *Journal of Common Market Studies*, 39, 537-552.
- Barry, F., Gorg, H. and Strobl, E. (2003), "Foreign Direct Investment, Agglomeration and Demonstration Effects: an Empirical Investigation", *Weltwirtschaftliches Archiv*, 139, 583-600.
- Barry, F. (2004), "Export–Platform Foreign Direct Investment: the Irish Experience", *EIB Papers*, 9(2), 9-37.
- Bairoch, P. (1968), *The Working Population and Its Structure*. Brussels: Institut de Sociologie.
- Bosworth, B. P. and Collins, S. M. (2003), "The Empirics of Growth: an Update", *Brookings Papers on Economic Activity*, 2, 113-206.
- Breinlich, H. (2006), "The Spatial Income Structure in the European Union – What Role for Economic Geography?", *Journal of Economic Geography*, 6, 593-617.
- Broadberry, S. N. (1998), "How Did the United States and Germany Overtake Britain? A Sectoral Analysis of Comparative Productivity Levels, 1870-1990", *Journal of Economic History*, 58, 375-407.
- Chou, C., Kimura, F. and Talmain, G. (1995), "R and D Effort: Domestic and International Scale Effects", paper presented to Seventh World Congress of the Econometric Society, Tokyo.
- Brulhart, M. and Traeger, R. (2005), "An Account of Geographic Concentration patterns in Europe", *Regional Science and Urban Economics*, 35, 597-624.
- Ciccone, A. (2002), "Agglomeration Effects in Europe", *European Economic Review*, 46, 213-227.
- Department of Trade and Industry (2007), *Competitiveness and the State of the Regions*. London.
- Duranton, G. and Monastiriotis, V. (2002), "Mind the Gaps: the Evolution of Regional Earnings Inequalities in the UK, 1982-1997", *Journal of Regional Science*, 42, 219-256.
- Griffith, R. and Harrison, R. (2004), "The Link Between Product Market Regulation and Macroeconomic Performance", Economic Papers No. 209, European Commission DG for Economic and Financial Affairs.
- Griffith, R., Harrison, R. and Simpson, H. (2006), "Product Market Reform and Innovation in

- the EU", Institute for Fiscal Studies Working Paper No. 06/17.
- Groningen Growth and Development Centre (2007), *Total Economy Database*.
- Gropp, R. and Kostial, K. (2000), "The Disappearing Tax Base: Is FDI Eroding Corporate Income Taxes?", IMF Working Paper No. 00/173.
- Jerzmanowski, M. (2007), "Total Factor Productivity Differences: Appropriate Technology vs. Efficiency", *European Economic Review*, 51, 2080-2110.
- Keeble, D., Owens, P. L. and Thompson, C. (1981), *The Influence of Peripheral and Central Locations on the Relative Development of Regions*. Cambridge University: Department of Geography.
- Madsen, J. B. (2007), "Technology Spillover through Trade and TFP Convergence: 135 Years of Evidence for the OECD Countries", *Journal of International Economics*, 72, 464-480.
- Martinez-Galarraga, J. (2007), "New Estimates of Regional GDP in Spain, 1860-1930", paper presented to Workshop on Historical Economic Geography of Europe, 1900-2000, Madrid.
- Midelfart, K. H., Overman, H. G. and Venables, A. J. (2003), "Monetary Union and the Economic Geography of Europe", *Journal of Common Market Studies*, 41, 847-868.
- Midelfart-Knarvik, K. H., Overman, H. G., Redding, S. J. and Venables, A. J. (2000) "The Location of European Industry", Economic Papers No. 142, European Commission DG for Economic and Financial Affairs.
- Molle, W. (1980), *Regional Disparity and Economic Development in the European Community*. Farnborough: Saxon House.
- Nordhaus, W. D. (1972), "The Recent Productivity Slowdown", *Brookings Papers on Economic Activity*, 3, 493-531.
- OECD (2001), *Historical Statistics*. Paris.
- OECD (2005), *OECD in Figures*. Paris.
- Rice, P. and Venables, A. J. (2003), "Equilibrium Regional Disparities: Theory and British Evidence", *Regional Studies*, 37, 675-686.
- Rodriguez-Pose, A. and Fratesi, U. (2004), "Between Development and Social Policies: the Impact of European Structural funds in Objective 1 Regions", *Regional Studies*, 38, 97-113.
- Slaughter, M. J. (2003), "Host Country Determinants of US Foreign Direct Investment into Europe", in H. Hermann and R. Lipsey (eds.), *Foreign Direct Investment in the Real and*



*Financial Sector of Industrial Countries*. Berlin: Springer, 7-32.

van Ark, B. (1996), "Sectoral Growth Accounting and Structural Change in Postwar Europe", in B. van Ark and N. Crafts (eds.), *Quantitative Aspects of Postwar European Economic Growth*. Cambridge: Cambridge University Press, 215-243.

Venables, A. J. (2005), "European Integration: a View from Geographical Economics", *Swedish Economic Policy Review*, 12, 143-169.

Wingfield, D., Fenwick, D. and Smith, K. (2005), "Relative Regional Consumer Price Levels in 2004", *Economic Trends*, 615, 36-46.

**Table 1. Unconditional Convergence Regressions: Eastern and Western Europe**

	<i>1820-1870</i>	<i>1870-1913</i>	<i>1913-1950</i>	<i>1950-1973</i>	<i>1973-2005</i>
<i>Western Europe</i>					
Constant	0.580 (1.614)	1.394 (6.100)	1.100 (1.877)	6.340 (14.519)	4.091 (9.450)
Initial GDP/P % Leader	0.005 (0.905)	-0.002 (-0.530)	-0.00004 (-0.004)	-0.045 (-5.572)	-0.030 (-4.898)
R <sup>2</sup>	-0.012	-0.050	-0.071	0.667	0.605

*Note:* leader is defined as UK in 1820 and 1870 then USA.

*Source:* own calculations based on GGDC (2007).

**Table 2. Coefficient of Variation of Real GDP/Person.**

	<i>Western Europe</i>
1820	0.27
1870	0.35
1913	0.33
1950	0.41
1973	0.25
2005	0.15

*Source:* derived from GGDC (2007)

**Table 3. Contributions to Labour Productivity Growth: Western Europe, USA, East Germany and USSR (% per year)**

	<i>Capital- Deepening</i>	<i>Human-Capital Deepening</i>	<i>TFP</i>	<i>Labour Productivity Growth</i>
<b><i>1960-1970</i></b>				
Austria	2.39	0.18	2.90	5.47
Belgium	1.36	0.42	2.33	4.11
Denmark	2.15	0.13	1.25	3.53
Finland	1.66	0.37	2.64	4.67
France	2.02	0.29	2.62	4.93
West Germany	2.10	0.23	2.03	4.36
Greece	3.63	0.26	4.45	8.34
Ireland	1.78	0.22	2.21	4.21
Italy	2.39	0.36	3.50	6.25
Netherlands	1.43	0.74	0.89	3.06
Norway	1.18	0.48	1.80	3.46
Portugal	2.05	0.35	3.99	6.39
Spain	2.45	0.38	3.73	6.56
Sweden	1.34	0.19	2.40	3.93
Switzerland	1.40	0.40	1.37	3.17
UK	1.45	0.17	1.24	2.86
<b><i>1970-1990</i></b>				
Austria	1.32	0.22	1.00	2.54
Belgium	0.96	0.18	1.38	2.52
Denmark	0.82	0.24	0.02	1.08
Finland	0.98	0.62	0.90	2.50
France	1.28	0.36	0.84	2.48
(W) Germany	0.79	0.40	0.69	1.88
Greece	1.24	0.50	0.06	1.80
Ireland	1.47	0.38	1.18	3.03
Italy	0.98	0.32	1.22	2.52
Netherlands	0.72	0.25	0.65	1.62
Norway	0.90	0.70	0.84	2.44
Portugal	0.90	0.44	1.01	2.35
Spain	1.54	0.37	1.13	3.04
Sweden	0.67	0.36	0.27	1.30
Switzerland	0.72	0.30	-0.38	0.64
UK	0.83	0.32	0.74	1.89
<b><i>1990-2003</i></b>				
Austria	0.86	0.27	0.37	1.50
Belgium	0.76	0.25	0.26	1.27
Denmark	0.72	0.19	0.95	1.86
Finland	0.49	0.31	1.49	2.29
France	0.58	0.27	0.13	0.98
Germany	0.76	0.17	0.60	1.53
Greece	0.61	0.35	1.25	2.21

Ireland	0.49	0.26	2.24	2.99
Italy	0.60	0.38	0.14	1.12
Netherlands	0.26	0.28	0.07	0.61
Norway	0.31	0.21	1.81	2.33
Portugal	1.13	0.47	-0.31	1.29
Spain	0.63	0.37	-0.37	0.63
Sweden	0.73	0.44	1.16	2.33
Switzerland	0.60	0.08	-0.23	0.45
UK	0.91	0.41	0.74	2.06

*Notes:* all estimates based on  $\Delta(Y/L)/(Y/L) = \alpha\Delta(K/L)/(K/L) + \beta\Delta(HK/L)/(HK/L) +$  TFP growth assuming  $\alpha = 0.35$ ; for USSR human capital deepening subsumed in TFP.

*Sources:* estimates from Bosworth and Collins (2003) updated from website (2007). Irish estimates adjusted to GNP basis.

**Table 4. TFP Performance**a) Components of TFP Levels, 1960 and 1995 (USA = 1.00)

	<i>1960</i>			<i>1995</i>		
	<i>TFP</i>	<i>E</i>	<i>T</i>	<i>TFP</i>	<i>E</i>	<i>T</i>
Austria	0.60	0.64	0.94	0.72	0.80	0.90
Belgium	0.65	0.64	1.01	0.80	0.88	0.91
Denmark	0.69	0.68	1.01	0.81	0.89	0.91
Finland	0.62	0.60	1.04	0.64	0.71	0.90
France	0.72	0.71	1.01	0.77	0.87	0.89
Greece	0.49	0.57	0.86	0.56	0.58	0.97
Ireland	0.51	0.55	0.93	0.74	0.76	0.98
Italy	0.67	0.71	0.94	0.84	0.88	0.96
Netherlands	0.77	0.74	1.04	0.75	0.81	0.93
Norway	0.54	0.63	0.86	0.70	0.83	0.84
Portugal	0.57	0.66	0.87	0.77	0.87	0.89
Spain	0.64	0.74	0.86	0.76	0.85	0.90
Sweden	0.73	0.72	1.01	0.78	0.81	0.96
Switzerland	1.05	1.00	1.05	0.77	0.88	0.87
UK	0.85	0.89	0.95	0.82	0.85	0.97

b) Sources of TFP Growth, 1960-1995 (% per year)

	<i>TFP Growth</i>	<i>E</i>	<i>T</i>
Austria	1.37	0.64	0.73
Belgium	1.47	0.92	0.55
Denmark	1.33	0.78	0.55
Finland	0.92	0.47	0.45
France	1.10	0.57	0.53
Greece	1.22	0.04	1.18
Ireland	1.95	0.92	1.03
Italy	1.54	0.60	0.94
Netherlands	0.80	0.25	0.55
Norway	1.59	0.80	0.79
Portugal	1.74	0.80	0.94
Spain	1.38	0.39	0.99
Sweden	1.08	0.35	0.73
Switzerland	-0.02	-0.36	0.34
UK	0.77	-0.14	0.91

*Note:* TFP = E\*T where E is efficiency and T is technology.

*Source:* derived from Jerzmanowski (2007)

**Table 5. Sectoral Employment Shares**

	<i>Agriculture</i>	<i>Industry</i>	<i>Services</i>
<b>1950</b>			
Austria	32.3	37.1	30.6
Belgium	12.2	48.9	38.9
Denmark	25.1	33.3	41.6
Finland	46.0	27.7	26.3
France	31.5	31.8	36.7
Germany	23.2	42.9	33.9
Greece	48.2	19.3	32.5
Ireland	39.6	24.4	36.0
Italy	42.2	32.1	25.7
Netherlands	17.8	38.4	43.8
Norway	25.9	36.9	37.4
Portugal	48.4	25.1	26.5
Spain	48.8	25.1	26.1
Sweden	20.3	40.9	38.8
Switzerland	16.5	46.6	36.9
UK	5.3	48.8	45.9
<b>1974</b>			
Austria	13.0	44.8	42.2
Belgium	3.8	41.0	55.2
Denmark	9.6	32.3	58.1
Finland	16.3	36.1	47.6
France	10.6	39.4	50.0
Germany	7.0	46.7	46.3
Greece	36.0	27.8	36.2
Ireland	22.8	32.6	44.6
Italy	17.5	39.3	43.2
Netherlands	5.7	35.9	58.4
Norway	10.6	34.3	55.1
Portugal	34.9	33.8	31.3
Spain	23.2	37.2	39.6
Sweden	6.7	37.0	56.3
Switzerland	7.5	44.3	48.2
UK	2.8	42.0	55.2
<b>2004</b>			
Austria	5.0	27.8	67.2
Belgium	2.0	24.9	73.1
Denmark	3.1	23.7	73.2
Finland	4.9	25.7	69.4
France	3.5	23.0	73.5
Germany	2.4	31.0	66.6
Greece	12.6	22.5	64.9
Ireland	6.4	27.7	65.9
Italy	4.5	31.0	64.5
Netherlands	3.0	20.3	76.7
Norway	3.5	20.9	75.6

Portugal	12.1	31.4	56.5
Spain	5.5	30.5	64.0
Sweden	2.1	22.6	75.3
Switzerland	3.7	23.7	72.6
UK	1.3	22.3	76.4

*Sources:* Bairoch (1968), OECD (2001) (2005)



**Table 6. Contribution of Structural Change to Labour Productivity Growth, 1950-1973**  
(% per year)

	<i>Orthodox Measure</i>	<i>Broadberry Measure</i>
Denmark	0.24	1.10
UK	-0.12	0.31
Sweden	0.00	0.60
Netherlands	-0.31	0.29
France	0.00	0.52
West Germany	0.18	0.77
Italy	0.83	1.77
Spain	0.80	1.77

*Note:* the orthodox approach considers the contribution of structural change equals  $\Delta A_0/A_0 - \sum \Delta A_i/A_i * A_i/A_0 * S_i$  where A is labour productivity, S is share of employment, and subscripts o and i stand for the whole economy and sector i, respectively (Nordhaus, 1972). Broadberry (1998) modified this so that labour productivity growth in the case of declining sectors was measured using the overall rate of labour force growth not the sectoral rate.  
*Source:* derived from data in van Ark (1996) using a three sector (agriculture, industry, services) de-composition where agriculture is deemed to be the declining sector.



**Table 7. Unconditional Convergence Regressions: Western European Regions**

	<i>1950-73</i>	<i>1950-73</i>	<i>1950-73</i>	<i>1973-2005</i>	<i>1973-2005</i>	<i>1973-2005</i>
Constant	6.660 (39.755)	5.292 (17.567)	5.633 (13.926)	3.218 (19.608)	2.340 (9.731)	2.419
Initial GDP/P %Leader	-0.051 (-14.487)	-0.029 (-7.521)	-0.035 (-6.294)	-0.019 (-7.870)	-0.008 (-3.396)	-0.011 (-3.396)
Spain		0.920 (3.537)	0.826 (2.975)		0.793 (4.243)	0.660 (3.350)
West Germany		1.046 (4.346)	0.917 (3.683)		-0.229 (-1.247)	-0.265 (-1.514)
UK		-0.833 (-3.539)	-0.798 (-3.198)		0.195 (1.088)	0.082 (0.469)
France		0.169 (0.766)	0.167 (0.765)		-0.044 (-0.263)	-0.028 (-0.176)
Italy		0.716 (3.017)	0.645 (2.661)		0.085 (0.492)	0.023 (0.131)
Density			0.0002 (1.895)			0.0002 (2.930)
Distance to Luxembourg			-0.0001 (-0.462)			0.0001 (0.807)
R <sup>2</sup>	0.713	0.870	0.873	0.420	0.662	0.696

*Sources:* own calculations based on GDP per person relative to national average for France, Italy, Netherlands, Spain, UK and West Germany for set of same 85 regions obtained from Molle (1980), Martinez-Galarraga (2007) and Eurostat, *Regional Statistics*, various issues. These relativities were then applied to national estimates for real GDP per person reported in GGDC (2007). Density (= population/land area) calculated from same sources. Distances to Luxembourg from [www.mapcrow.info](http://www.mapcrow.info) plus intercept of 100 km.

**Table 8. Regional GDP/Person: Theil Index of Inequality**

	<i>Between Countries</i>	<i>Within Countries</i>	<i>Total</i>
1950	0.055	0.036	0.091
1973	0.013	0.034	0.047
2005	0.002	0.038	0.040

*Note:* the between countries Theil Index for 16 western European countries is 0.069 in 1950, 0.016 in 1973 and 0.007 in 2005.

*Sources:* as Table 7.

**Table 9. Geography and Real GDP/Person Regressions**

	<i>1950</i>	<i>1973</i>	<i>2005</i>
Constant	10.032 (19.196)	10.646 (24.422)	10.678 (23.835)
Log Density	0.206 (4.318)	0.122 (3.178)	0.103 (2.633)
Log Distance to Luxembourg	-0.407 (-5.816)	-0.306 (-5.231)	-0.208 (-3.477)
R <sup>2</sup>	0.802	0.652	0.327

*Note:* dependent variable is the log of real GDP/Person, country dummies included but not reported and density instrumented using land area as in Ciccone (2002).

*Sources:* own calculations based on data from sources for Table 8.

**Table 10. Correlations When One Region Has Higher Productivity**

	<i>GDP/L</i>	<i>Skills</i>	<i>Wage Rates</i>	<i>Density</i>	<i>House Prices</i>
<i>GDP/L</i>	1	+	+	+	+
<i>Skills</i>		1	+	+	+
<i>Wage Rates</i>			1	+	+
<i>Density</i>				1	+
<i>House Prices</i>					1

*Source:* Rice and Venables (2003)

**Table 11. UK Regional GDP and Gross Disposable Household Income, 2005 (UK = 100)**

	<i>Nominal GDP per Head</i>	<i>Real GDP per Head</i>	<i>Nominal GDHI per Head</i>	<i>Real GDHI per Head</i>
North East	79.5	84.4	85.5	90.8
North West	87.7	90.5	91.8	94.7
Yorkshire & Humbs.	87.2	92.6	91.9	97.5
East Midlands	93.1	95.6	94.3	96.8
West Midlands	89.4	91.4	91.4	93.4
East of England	95.6	94.6	106.9	105.8
London	153.2	139.7	119.6	109.0
South East	107.3	101.9	112.5	106.9
South West	94.4	93.2	99.8	98.6
Wales	78.1	83.9	89.2	95.9
Scotland	95.9	101.5	94.5	100.0
Northern Ireland	80.3	83.8	87.1	90.9

*Sources:* nominals from DTI (2007), reals obtained using consumer price index in Wingfield et al. (2005)

**Table 12. Sectoral Allocation of FDI Employment in Ireland, 2000**

	<i>Jobs in FDI Firms</i>	<i>FDI/ Total (%)</i>	<i>Location</i>	<i>IRS</i>	<i>S/L</i>	<i>Linkages</i>
Food, Drink & T.	13170	27.4	CD	L	M	H
Textiles, Clothing	3703	33.7	DC	L	L	M
Wood	1111	17.8	DD	L	L	M
Paper & Printing	7457	31.3	DD	M	H	M
Chemicals	17874	77.0	R	H	H	M
Rubber & Plastics	3951	36.4	R	L	M	M
Non-M Minerals	1584	14.2	DD	M	M	M
Metal Products	3554	21.0	DD	M	L	M
Machinery	6436	44.7	CD	M	H	M
Office & Data Pr.	18303	88.3	CD	M	H	L
Electrical App.	9438	62.3	CC	M	M	M
Radio, TV	12785	85.3	CD	M	H	L
Instruments	15335	84.7	CD	M	H	L
Transport Equip.	5365	55.8	DC	H	M	M
Other	2912	25.5	R	L	L	L
Total	122978	48.1				

*Sources:* Barry (2004) based on Census of Production; Midelfart-Knarvik et al. (2000) classify industries as C is spatially concentrated, D is spatially dispersed, R is residual with first letter referring to 1970 and second letter to 1997, and allocated industries by top (H), middle (M), or bottom third (L) according to scale economies (IRS), skill-intensity (S/L), and linkages.



**Table 13. Labour Productivity Growth in TEs (% per year)**

	<i>Labour Productivity Growth, 1995-2005</i>	<i>Predicted Labour Productivity Growth</i>
Czech Republic	2.75	5.02
Estonia	7.72	4.70
Hungary	3.35	5.09
Latvia	6.18	5.32
Lithuania	6.36	5.56
Poland	4.71	5.33
Slovakia	4.24	4.93
Slovenia	3.86	4.26

*Note:* predicted labour productivity growth based on the following estimated equation for Golden-Age western Europe:  $\text{LabProdGr} = 7.168 - 0.065 \text{ Y/L\%US}$ ,  $R^2 = 0.833$   
(19.815) (-8.718)

*Source:* GGDC (2007) and own calculations.