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What can the EMU's peripheral counties learn from regional growth?

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Abstract

Karl Aiginger, Matthias Firgo, Peter Huber: **What can the EMU's peripheral counties learn from regional growth?**

The experiences of 259 regions in 21 European countries with within country GDP per capita and labour productivity growth suggest that variables associated with pro-active, growth oriented strategies are consistently more important predictors of successful regional development than variables related to austerity for a range of measures of successful development. Since regions are the only historical examples of restructuring in currency unions, we therefore also argue for a more growth oriented strategy to solve the problems of the European periphery and outline some features of such a strategy.

Key words

convergence, within-country growth, peripheral countries

JEL: O52, R11, R58

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1 Introduction

The recent financial and economic crisis has drawn renewed attention to the substantial national and regional disparities in competitiveness in the European Monetary Union (EMU). After a bumpy but successful catching-up of the periphery countries in the last decades, several southern European countries faced a severe setback, leading to twin deficits in the public sector and the current account. This led to these countries becoming a drag on stability and growth in Europe, with high unemployment and low growth. Many authors (e.g. Aiginger 2013, Bertola 2013) have noted the role of low levels of labour productivity, high unit labour costs, and large current account deficits leading to the current economic problems of some of the peripheral EU countries such as Greece, Portugal and Spain (the P3), as well as the challenges the development of these countries poses to both European cohesion and the monetary union. The response of policy makers and advisors to these challenges, - based on the experiences in other countries, - was to call for reform programs that aim to re-establish competitiveness and budgetary control through a combination of expenditure cuts, internal devaluation and institutional reform. These programs were successful in reducing balance of payment deficits and unit labour costs in the P3, but have not succeeded in reducing budget deficits and government debt and have also resulted in negative growth and soaring unemployment in particular youth unemployment rates in the countries affected (Aiginger et al, 2012).

In this paper we argue that, while re-establishing competitiveness and regaining control over the budget and public debt is indeed paramount to solving the problems of the P3, the fact that they are members of the European Monetary Union (EMU) adds complexity to the task of designing appropriate strategies. This arises because first of all, in a currency union individual countries, by definition, cannot devalue their currency. Second of all, because in a monetary union important interdependencies in terms of relative competitiveness exist between the centre and the periphery and third of all, because in contrast to solitary states monetary unions are also typically characterized by multi-level governance issues. One consequence of this is that standard national reform programs using devaluation strategies to regain competitiveness are likely to have high social and political costs, because the only way such countries can devalue in currency unions is through internal devaluation (i.e. wage restraints).

Policy makers could probably be better advised if historical experiences of successful restructuring of countries within a currency union were available. This is, however, not the case. We therefore turn to the experiences of regions within countries as the only historical examples of restructuring available in a currency union and ask first of all what were the main predictors for regional development in

lagging regions in national currency unions in the last two decades and second of all what can be learned from their experiences for the potential reform strategies in peripheral countries of the EU. Using data on 259 regions in 21 European countries, two measures of welfare and competitiveness (GDP per capita and labour productivity) and three measures of successful development, we find a marked difference between the factors that predict successful regional catching-up to country averages and the current policy prescriptions to periphery countries. Variables that are associated with pro-active growth oriented development strategies (such as education and productive investments) are consistently more important predictors of successful catching-up both for GDP per capita and productivity than variables that are related to strategies focusing on internal devaluation or austerity (such as unit labour costs). In our conclusions we therefore argue for a more growth oriented strategy to solve the problems of the European periphery and outline some features of such a strategy that could augment current austerity based policies.

2 European Convergence Experience 1991-2009

The data we use were collected from the EUROSTAT, OECD and Cambridge Econometrics databases for 259 NUTS 2 regions in the 21 EU countries with two or more NUTS 2 regions and excluding overseas regions of France and Portugal (due to a lack of data) for the period from the reunification of Germany in 1991 to 2009. We use data on real GDP per capita (based on year 2000 prices), wages (compensation per employee) as well as on productivity (i.e. GVA per employed) from the Cambridge econometrics database as an indicator of regional development.

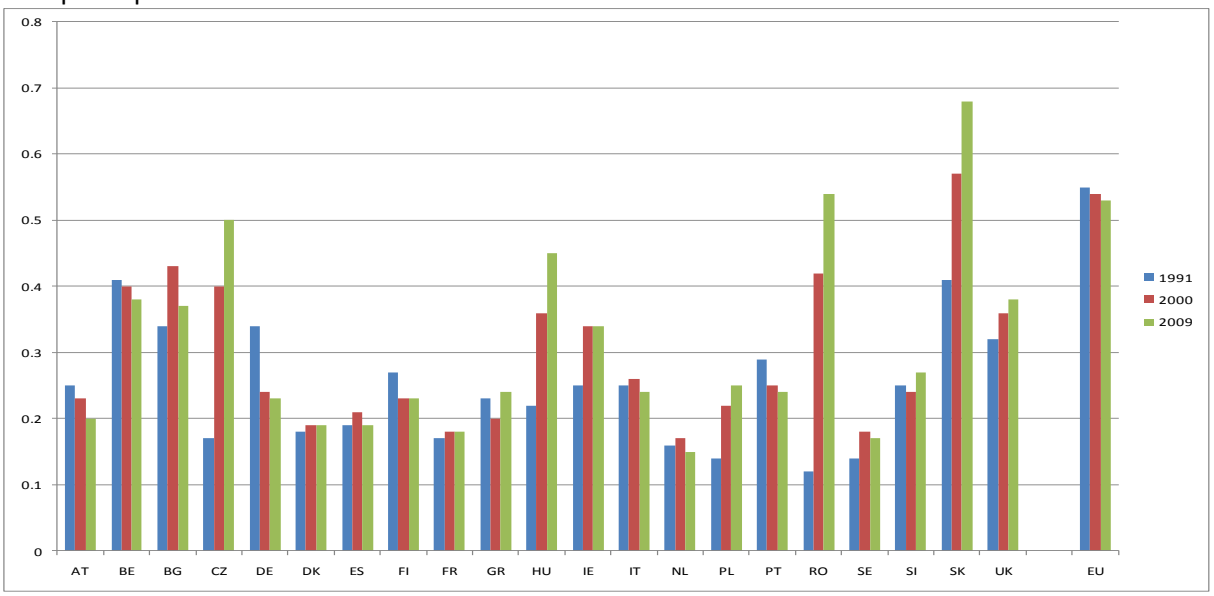
Figure 1 presents some evidence on the development of regional disparities in Europe in the last two decades taken from this data, by reporting the coefficient of variation[1] of our two variables of interest for three points in time. As can be seen across all EU regions modest convergence prevailed in both variables in the time period considered. The coefficient of variation in GDP per capita among all EU regions fell from 0.55 to 0.53, that of productivity from 0.48 to 0.43 and that of compensation per employee from 0.58 to 0.48 between 1991 and 2009. This EU-wide convergence, however, seems to have been primarily carried by cross-country convergence and there is a huge variation among countries in terms of convergence and divergence in the two decades analysed (see also Crespo-Cuaresma et al. 2011, 2012). Among the EU-member states that joined the EU in 2004 and 2007, regional disparities within countries increased in all indicators at all points in time in the Czech

[1] We give preference to the coefficient of variation (i.e. the standard deviation relative to the average) as a measure of dispersion, because it is has no dimension and is therefore less sensitive to the scale of measurement.

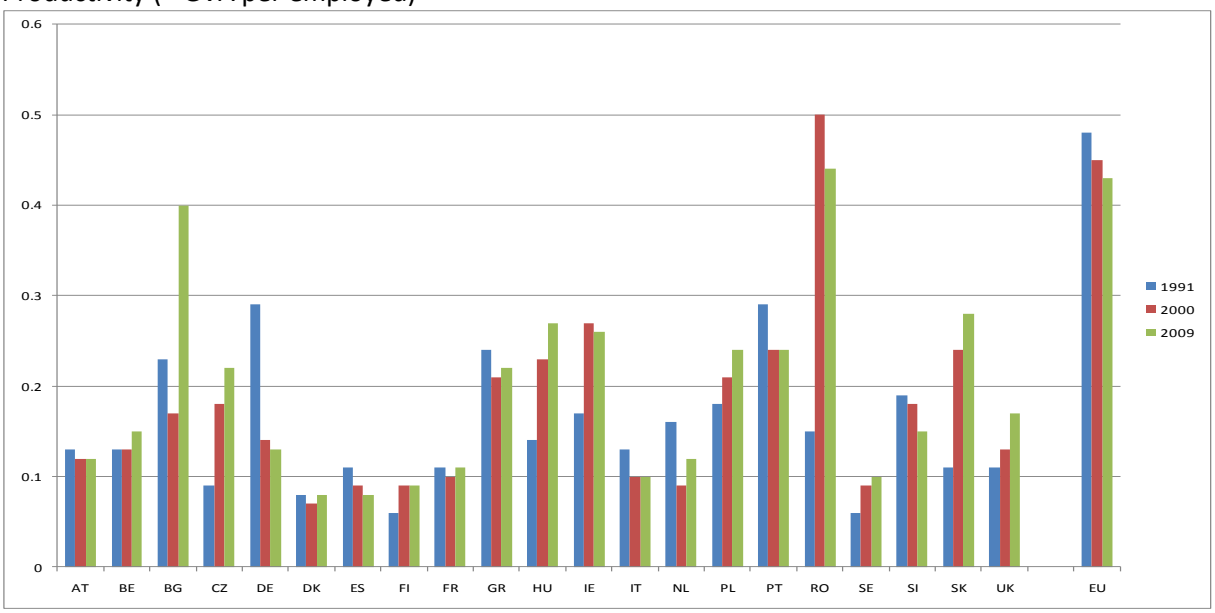
Republic, Hungary, Poland and Romania. Among the EU15 countries as well as Slovenia and Bulgaria all countries experienced at least one period of divergence for at least one of the variables considered. The only country where convergence applies to both indicators in all periods is Germany. While convergence in the EU progressed slowly but steadily over the last two decades, therefore, convergence within countries has been rather bumpy and far from ubiquitous.

Figure 1: Coefficient of variation in GDP per capita and labour productivity across NUTS2 regions of the EU countries (1991, 2000 2009)

GDP per capita



Productivity (= GVA per employed)



Source: EUROSTAT; OECD, CE.

Furthermore, convergence has also differed substantially over time periods and indicators. While the coefficient of variation in GDP per capita converged in only 7 countries between 1991 and 2000 but in 11 between 2000 and 2009, the opposite applies to productivity. Here 11 countries converged

between 1991 and 2000 but only 5 between 2000 and 2009. This highlights in particular the 2000's as a period of divergent productivity but convergent GDP per capita in many countries. This could potentially have given rise to macro-economic imbalances such as those found in the P3 countries, in many regions.

The heterogeneity among EU countries in convergence experiences over the last two decades, becomes even more compelling when considering individual regions. To highlight this we calculated three measures of region specific convergence and divergence in the EU. In the first of these we follow Faini (2003) and (for each country and time period) divide regions into four groups, depending on, whether they had GDP per capita or productivity levels below or above the median of the respective country at the beginning of a period, and on whether their average growth in these variables was above or below the respective country's median throughout the period. This gives us four types of regions:

- Regions with below median levels of GDP per capita or productivity at the beginning of the period that grew below the national median in the subsequent period (poor diverging regions).
- Regions with below median levels of GDP per capita or productivity at the beginning of the period that subsequently grew above the national median (poor converging regions).
- Regions with above median levels of GDP per capita or productivity at the beginning of the period with growth below the national median after this (rich converging regions).
- Regions with above median levels of GDP per capita or productivity at the beginning of the period that grew above the national median (rich diverging regions).

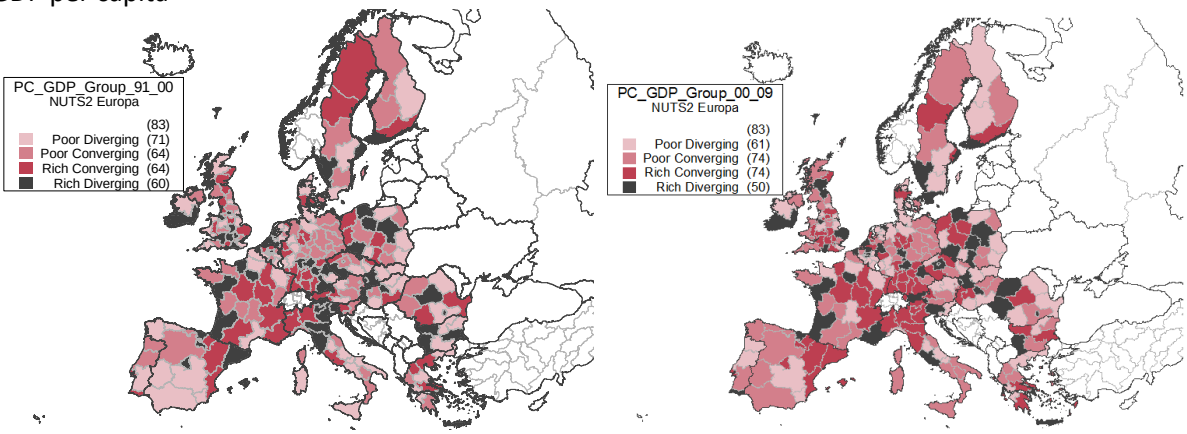
To construct the second measure, by contrast, following for instance Quah (1996a), Le Gallo (2004) or Bosker (2009) we sort all regions of a country in an ascending order and assign the regions to two groups according whether their rank within the country was below or above the median in the years 1991, 2000 and 2009, respectively. Based on this division, we then consider those regions which moved between the lower and the upper half of the distribution of GDP per capita or productivity between two periods of time. In this way we are again able to define 4 types of regions:

1. Regions which started in the lower half of their country's distribution in the first period and stayed in the lower half (permanently poor regions).
2. Regions which started in the lower half of their country's distribution in the first period but moved up the distribution (upwardly mobile regions).
3. Regions which started in the upper half of their country's distribution in the first period but moved down the distribution (downwardly mobile regions).

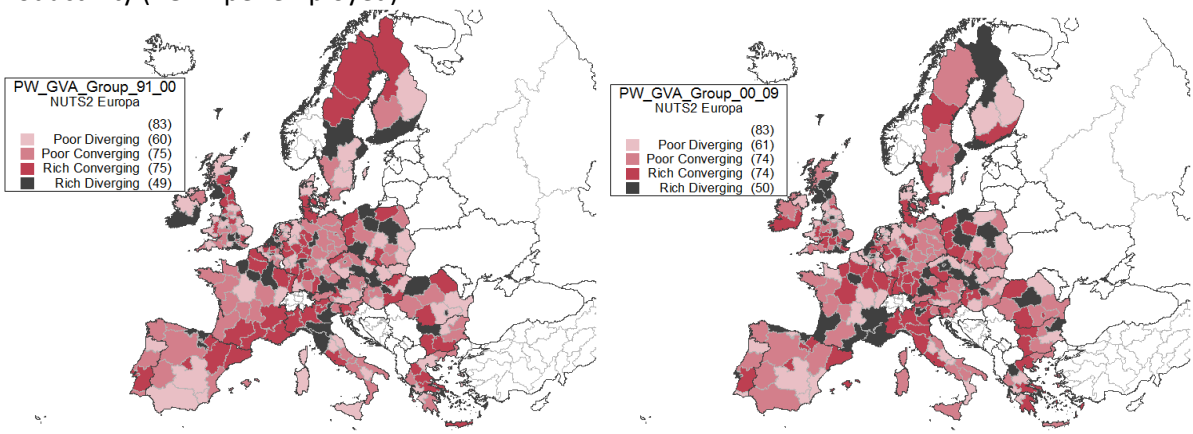
4. Regions which started in the upper half of their country's distribution in the first period and stayed there in the last period (permanently rich regions).

Figure 3: Within-Country convergence/divergence in GDP per capita, productivity and wages 1991-2000 and 2000 to 2009

GDP per capita



Productivity (=GVA per employed)



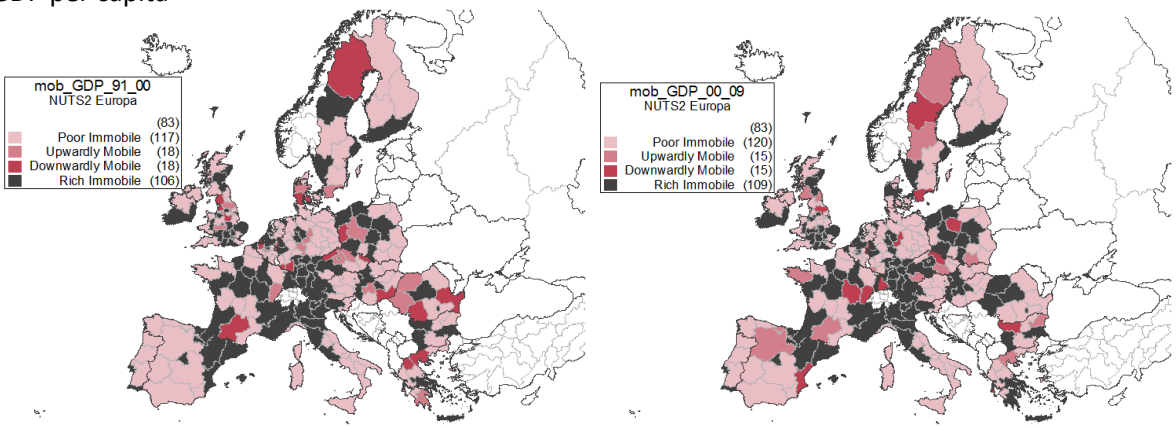
Source: Cambridge Econometrics, own calculations

Finally, as a third measure of regional success or failure we follow the literature on extreme growth events (e.g. Hausmann et al. 2005, Berthelémy 2006, Easterly 2006, Aizenman and Spiegel 2010) and focus on regions with rapid growth over a protracted period of time, a phenomenon we call a growth take-off. In particular for a region to experience such a growth take-off we require that it had growth levels of at least 2% per year for five consecutive years and that it outperformed the annual growth rate of the country average in each year of the period.[2]

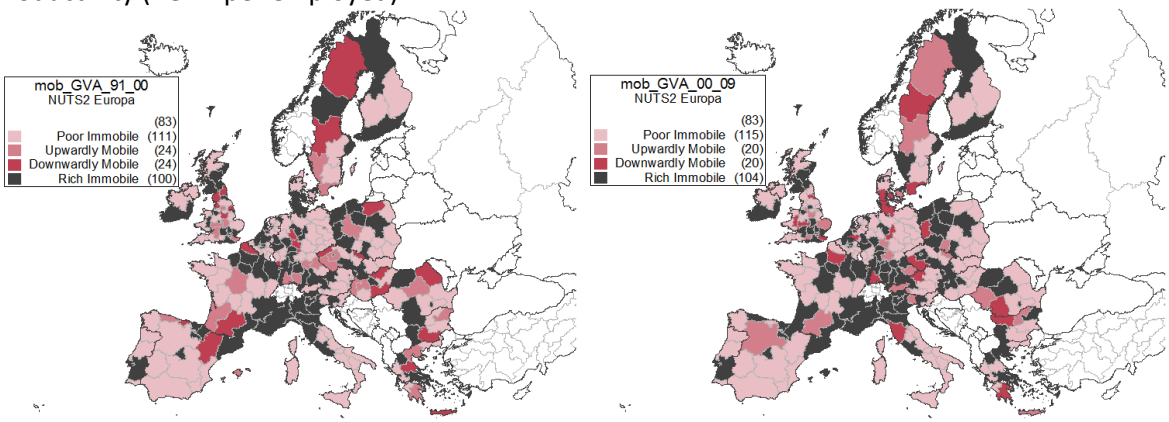
[2] The first criterion assures that regions are in a period of stable growth. The second criterion makes sure that this growth is not induced by national factors.

Figure 4: Upward and downward mobility of regions in the GDP per capita, productivity and wage distributions 1991-2000 and 2000 to 2009

GDP per capita



Productivity (=GVA per employed)



Source: Cambridge Econometrics, own calculations

Figures 3 to 4 and Table A1 in the appendix display the geographic distribution of the different region types. Thus as can be seen from figure 3, which considers the different convergence types for the two time periods considered. Out of the poor regions, i.e. regions with GDP levels below the country median, in 1991 around 47% were converging until 2000 and in the period from 2000 to 2009 this applied to 55%. The same applies productivity for which around 55% of the regions with levels of productivity below the country median in the initial years of 1991 and 2000 were converging in both periods. In the upper part of the distribution, by contrast, for GDP per capita 52% (in the 1991 to 2000 period) and 60% (in the 2000 to 2009 period), of the initially rich regions were converging. For productivity this applied to around 60% (in both periods) of the regions, respectively. Furthermore, for each variable considered, almost in every country and time period, poor and rich converging regions co-existed with poor and rich diverging regions.

Unconditional convergence as measured by this indicator is therefore not an automatic process taking place in all regions. Only about half of the initially poor and less than two-thirds of the initially

rich regions converge over a 10 year period. Furthermore, convergence has low persistence and is often temporal in nature only. For both indicators only around half of the poor converging regions in the 1991 to 2000 period continued to converge in the later period and the same applied to slightly less than 50% of the rich converging regions in the 1991 to 2000 period. Similarly, in almost every country there is at least one region that converged in one decade but diverged in the other.

Figure 4 by contrast reports the regional distribution of different mobility types in the countries analysed. The central stylized facts emerging from this figure are the low degree of mobility and the lacking persistence of mobility. Thus of the 135 regions starting in the lower half of their country's GDP per capita level distribution in 1991 only 18 managed to cross the median GDP levels by 2000. In the period 2000 to 2009 again only 15 regions were upwardly mobile (and the same number was downwardly mobile). Furthermore of the 18 upwardly mobile regions between 1991 and 2000 in terms of GDP per capita, 7 fell back to levels below the national average in the following decade. Once more these stylized facts also apply to measures of productivity where in the 1991 to 2000 period only 24 regions (of which only 18 remained in the upper part of the distribution until 2009) were upwardly mobile, and in the 2000 to 2009 period this applied to only 20 regions.

Finally, Table A1 in the appendix provides a summary of the time period in which regions experienced a growth take-off. These regions were mainly located in East Germany, and Central and Eastern Europe during the 1990s, and (in the north) of Spain during the early 2000s. What, however, sticks out once more is the low number of regions experiencing a growth take-off. In the 18 years of regional development considered in this paper, we detected only 33 growth take-offs in GDP per capita growth. In terms of productivity growth such take-offs are even more seldom: Only 16 regions experienced a growth take-off in the last two decades.

3 Econometric Analysis - Predictors of successful development of lagging regions

Our findings so far thus highlight the vast heterogeneity in growth and convergence experiences of regions relative to their respective country averages in the EU. From a policy perspective this suggests that protracted periods of catching-up and rapid growth are the exception rather the rule in most monetary unions. This thus sobers any hopes for a quick fix solution to the European periphery countries' competitiveness problems. From the analytical perspective, however, the natural question arises which factors (if any) can discriminate between successful and not so successful regions. Since our interest in this paper is primarily on the process of poor regions catching-up, we focus on regions that initially had GDP per capita or productivity levels below the country median and use a series of probit regressions to analyse which variables are associated with a significant increase or decrease in

the probability for successful catching-up in terms of GDP per capita and productivity using different definitions of successful regions. In detail we use three different indicators for successful regions. These are:

- First, set of two dependent variables that takes on a value of 0 if the region under consideration diverged from below and 1 if the region under consideration converged from below in terms of GDP per capita or productivity, respectively, in the time period considered.
- Second a further set of two indicator variables which takes on a value of 1 if the region was upwardly mobile and 0 if the region was permanently poor in terms of GDP per capita, or productivity, respectively, and
- Third, set of indicator variables which takes on a value of 1 if a particular region experienced a growth take-off in terms of GDP per capita or productivity in the period considered and 0 else.[3]

For the control variables we use a number of variables that are frequently used as explanatory variables in the regional growth literature (Durlauf et al. 2005 and Magrini 2004 for surveys). These are initial values of the dependent variables (i.e. GDP per capita and productivity in the starting period), the investment intensity (i.e. total investments per capita), unit labour costs (measured as total real labour compensation in % of real GDP) all of which are taken from the Cambridge Econometrics data base, as well as the share of population with tertiary education[4] and the number of patents per million inhabitants, which were obtained from EUROSTAT sources. We also include variables capturing the sector composition of a region as measured by the share of employment in agriculture or industry, which was again taken from Cambridge Econometrics sources. All these variables are measured in logarithms relative to the country-wide average, to purge results from any country specific effects stemming from national institutions or policies. In addition, since regional development could be influenced not only by factors impacting on the own region but also on developments in nearby regions through spatial spillovers (see e.g. Ertur and Koch, 2007; LeSage and Fischer, 2008; Crespo-Cuaresma et al., 2012) we include two variables that take account of the spatial structure of the economy and capture potential spillover effects. These are a spatial lag[5] of the initial GDP per capita of neighbouring regions of the same country and a dummy variable that

[3] Note that in defining this variable – on account of the low number of successful regions – we have to give up our focus on catching-up and consider all 259 regions in the sample.

[4] For education levels data is only available from 1999 on, so that we use this earliest available observation.

[5] The spatial lag is based on a contiguity matrix W, with element $w_{ij}=1/n$ if region *i* borders on region *j* and is located in the same country, and $w_{ij}=0$ otherwise and with *n* being the number of neighbors of region *i*.

takes on a value of 1 if the region under consideration does not border on regions of the same country (is an island) and is equal to 0 otherwise.

3.1 Predictors for convergence from below

A set of three different specifications is estimated for each of the two binary dependent variables indicating convergence from below in GDP per capita and productivity, respectively (table 1). As can be seen from the results and in line with the beta-convergence literature (see Dobson et al. 2006, and Abreu et al., 2005 for recent meta-studies), we find that regions starting at a lower initial value (*Y*) of GDP per capita or productivity, have a higher probability to converge from below both in terms of GDP per capita and productivity. In addition the spatial lag of GDP, which was included to control for potential spillovers from neighbouring regions of the same country (*W*Y*), is insignificant for the probability to converge from below in terms of GDP per capita but significant for productivity. Islands have a significantly higher probability to converge from below in GDP per capita and the decade fixed effect (*1990s*) show that the chance for convergence from below in productivity was higher in the 1990s, while for GDP per capita no significant period effects can be found.

Besides these control variables that cannot be influenced by policy, variables associated with pro-active, growth oriented strategies are more strongly correlated with the probability of a backward region to converge from below than variables that can be associated with policies based on internal devaluation strategies. In particular the share of highly educated in the population (*TertEdu*) turns out to be the uniformly most significant and robust predictor of convergence from below in productivity and GDP per capita. Its impact is positive and highly significant across all specifications. Similarly, investments (*Invest*), are positively correlated with the convergence probability for GDP per capita and productivity, although the significance is not robust in all specifications. Unit labour costs, somewhat in contrast to prior expectations, on the other hand have a positive but insignificant correlation with the probability to converge from below. This therefore implies that higher unit labour costs are not associated with a decrease in the probability of poor regions to experience above average growth.

Table 1: Pooled probit regression results for convergence from below in GDP per capita and productivity

	(1) GDP per capita	(2)	(3)	(1) Productivity	(2)	(3)
Y	-2.164***	-2.729***	-2.535***	-4.504***	-4.722***	-4.981***
	(-2.64)	(-3.49)	(-2.92)	(-3.99)	(-4.36)	(-4.06)
Invest	1.020**	0.759	1.121**	0.794	0.651	0.940*
	(2.05)	(1.64)	(2.24)	(1.53)	(1.34)	(1.75)
ULC	2.576	0.381	1.674	2.564	0.402	1.771
	(1.63)	(0.26)	(0.99)	(1.50)	(0.25)	(0.95)
TertEdu	1.374**	1.525***	1.310**	2.020***	2.027***	1.935***
	(2.38)	(2.61)	(2.22)	(3.16)	(3.39)	(2.98)
W*Y	0.204	0.0289	0.286	2.380**	2.791**	2.356*
	(0.26)	(0.04)	(0.35)	(2.00)	(2.47)	(1.94)
Island	1.391**	1.517**	1.317**	0.527	0.301	0.474
	(2.50)	(2.57)	(2.34)	(1.30)	(0.69)	(1.18)
Patents	0.0319		0.0204	0.0594		0.0530
	(0.31)		(0.19)	(0.55)		(0.50)
p91_00	0.103	0.0821	0.0985	0.438**	0.325*	0.431**
	(0.51)	(0.43)	(0.49)	(2.10)	(1.72)	(2.08)
IndShare		0.447			0.0818	
		(1.38)			(0.26)	
AggShare			-0.235			-0.192
			(-1.27)			(-1.01)
Constant	-0.0320	-0.182	-0.0467	0.0335	-0.00155	0.0250
	(-0.14)	(-0.82)	(-0.20)	(0.16)	(-0.01)	(0.11)
	-0.0320	-0.182	-0.0467			
N	226	236	226	228	237	228
Pseudo R^2	0.108	0.103	0.113	0.122	0.114	0.125

Source: Cambridge Econometrics, OECD, EUROSTAT. Table reports coefficients of a probit regression on the probability of poor regions to grow with an above national average growth rate. ***, (**), [*] indicate significant coefficients at the 1%, (5%), [10%] level, respectively. Values in brackets are t-statistics of the estimates, based on heterosketasticity robust errors.

All other variables controlling for economic characteristics of the regions, by contrast, do not significantly contribute to predicting convergence from below. Innovation measured by the number of patents per million inhabitants as well as measures of the sector structure of regions (the share of agricultural and industrial employment) turn out to be insignificant in predicting convergence from below for both dependent variables. On the one hand side therefore more innovation in peripheral regions does not necessarily increase the chances to grow above the national average – a fact that could potentially be explained by the lower absorptive capacity of these regions. On the other hand side the growth of these regions is also not impacted on by their sector structure – a fact that could be interpreted as reflecting the varied comparative advantages of peripheral regions.

3.2 Predictors for upward mobility

Similar stylized facts also apply to the regressions for upward mobility. Although in this specification – on account of the few successful regions, - the low variance of the dependent variable leads to lower significance levels, again tertiary education as well as investments are significantly positively correlated with upward mobility in productivity, although the later is only weakly so. For GDP per

capita, by contrast, the number of patents is weakly significantly positively related to upward mobility. Unit labour costs once more although having the expected negative sign, are statistically insignificant in all specifications for both variables.

Table 2: Pooled probit regression results for upward mobility in GDP per capita and productivity

	(1)	(2)	(3)	(1)	(2)	(3)
	GDP per capita			Productivity		
Yt	6.123***	6.291***	6.188***	5.984***	5.674***	5.149**
	(3.91)	(3.85)	(3.76)	(3.05)	(2.78)	(2.57)
Invest	-0.496	-0.534	-0.515	0.991	1.124*	1.267*
	(-0.64)	(-0.67)	(-0.66)	(1.46)	(1.67)	(1.80)
ULC	-1.017	-2.740	-0.911	-0.596	-2.992	-1.774
	(-0.52)	(-1.43)	(-0.45)	(-0.26)	(-1.47)	(-0.72)
TertEdu	0.430	0.836	0.443	2.142***	2.577***	1.990**
	(0.56)	(0.96)	(0.56)	(2.87)	(3.35)	(2.55)
W*Y	-0.803	-1.154	-0.831	1.650	2.007	1.603
	(-0.70)	(-1.02)	(-0.73)	(1.04)	(1.31)	(0.96)
Island	0.896	1.266*	0.901	0.232	0.736	0.177
	(1.42)	(1.77)	(1.41)	(0.45)	(1.24)	(0.35)
Patents	0.256*		0.256*	0.0946		0.104
	(1.70)		(1.70)	(0.71)		(0.77)
p91_00	-0.223	-0.0232	-0.221	0.390	0.448*	0.374
	(-0.77)	(-0.08)	(-0.77)	(1.53)	(1.88)	(1.45)
IndShare		0.998**			1.061***	
		(2.20)			(3.18)	
AggShare			0.0343			-0.354
			(0.13)			(-1.60)
Constant	0.0417	-0.125	0.0436	0.137	0.0919	0.122
	(0.13)	(-0.40)	(0.14)	(0.47)	(0.33)	(0.42)
				0.137	0.0919	0.122
N	226	236	226	228	237	228
Pseudo R^2	0.182	0.184	0.182	0.196	0.221	0.208

Source: Cambridge Econometrics, OECD, EUROSTAT. Table reports coefficients of a probit regression on the probability of poor regions to move to a position in the upper half of the national distribution. ***, (**), [*] indicate significant coefficients at the 1%, (5%), [10%] level, respectively. Values in brackets are t-statistics of the estimates, based on heterosketasticity robust errors.

The signs of control variables, however, differ somewhat between the specifications for upward mobility and convergence from below. The initial value of GDP per capita and productivity is highly significantly negative in all specifications. This, however, is no big surprise given that the initial value relative to the country average reflects the distance to the median country level. The positive coefficients therefore reflect the fact that the higher the initial level of GDP per capita or labour productivity, the shorter the distance to the country average, and thus the higher the probability for upward mobility. Spillovers from neighboring regions (*W*Y*) have an insignificant negative correlation with upward mobility in terms of GDP per capita, but a positive one with the probability to be upwardly mobile in terms of productivity. This implies that for GDP per capita vicinity to rich regions reduces the probability of upward mobility for poor regions – a fact that could be due to withdrawal effects – while being close to high productivity regions increases the probability of upward mobility in productivity, due to positive spillover effects. Also in contrast to results for convergence from

below the dummy for the 1990s remains less significant for productivity and islands have a less significant effect on the probability for upward mobility in GDP per capita than on the probability for convergence of poor regions.

Unlike for convergence, sector structure is more important for upward mobility: The share of industrial employment (*IndShare*) is significantly positively correlated with upward mobility of a region in terms of GDP per capita as well as productivity and the share of agricultural employment (*AgriShare*) is negatively, although insignificantly, correlated with upward mobility of a region in the productivity distribution.

3.3 Predictors for growth take-offs

Finally, in predicting growth take-offs we have to follow a slightly different econometric approach than for upward mobility and convergence from above. The reason for this is that such a growth take-off can occur at any point in time. This implies that the appropriate model for estimating the probability of a take-off is a random effects panel probit model, in which, however, the effects of neighbouring regions cannot be identified on account of the low time variance in this variable. In table 3 we therefore report the results of such a model – excluding neighbouring region impacts.

In accordance with previous results - a significantly positive impact on the probability to experience a growth takeoff in terms of both productivity as well as GDP per capita arises from the share of highly educated population and the investment intensity. By contrast unit labour costs once more have an insignificant impact on the probability to experience a growth takeoff both in terms of productivity and GDP per capita growth and the share of agricultural employment in the region has a significantly negative impact on the probability of experiencing a growth takeoff in both GDP per capita and productivity growth.

In contrast to previous results, however, in this specification also the number of patents per million inhabitants is significantly positively correlated with the probability to experience a growth take off, in all specifications for productivity and in one specification where for GDP per capita. Also, unlike for the previous specifications, the share of industrial employment has a significantly negative impact on the probability to experience a growth takeoff both in terms of GDP per capita as well as in terms of productivity. The reason for this difference in results may, however, be that – in contrast to the previous regressions – when considering growth takeoffs, we also include rich regions in the analysis, which may be expected to have different comparative advantages than poor regions when considering sector specialization and also higher absorptive capacities in terms of patents per million inhabitants.

Table 3: Panel probit regression results for take-offs in GDP per capita and productivity

	(1) GDP per capita	(2)	(3)	(1) Productivity	(2)	(3)
Yt	-5.351***	-4.975***	-7.598***	-3.849***	-2.680	-5.113***
	(-5.43)	(-5.49)	(-6.76)	(-2.95)	(-1.62)	(-3.75)
Invest	1.445**	0.660	1.706**	0.422	0.221	0.862
	(2.06)	(1.03)	(2.34)	(0.42)	(0.27)	(0.83)
ULC	2.730	0.164	-1.124	-2.578	-4.201	-5.184
	(1.15)	(0.08)	(-0.44)	(-0.72)	(-1.36)	(-1.43)
TertEdu	1.593*	1.675**	1.032	3.135**	3.077**	1.997
	(1.92)	(2.21)	(1.23)	(2.50)	(2.45)	(1.53)
Patents	0.278*		0.210	0.717**		0.643**
	(1.74)		(1.26)	(2.49)		(2.17)
IndShare		-1.098***			-0.627	
		(-2.69)			(-0.91)	
AgriShare			-1.379***			-1.122***
			(-4.88)			(-3.16)
Constant	-4.857***	-5.052***	-5.637***	-5.537***	-4.298**	-5.977***
	(-14.03)	(-15.75)	(-15.83)	(-9.78)	(-2.01)	(-9.13)
N	3008	3049	3008	3069	3112	3069
rho	0.834	0.850	0.860	0.685	0.834	0.696

Source: Cambridge Econometrics, OECD, EUROSTAT. Table reports coefficients of a panel probit regression on the probability of regions to experience a takeoff. ***, (**), [*] indicate significant coefficients at the 1%, (5%), [10%] level, respectively. Values in brackets are t-statistics of the estimates, based on heterosketasticity robust errors.

4 Discussion and Conclusions

In sum our evidence therefore suggests that in existing currency unions successful restructuring of regions with the aim of regaining competitiveness is usually associated with pro-active, growth oriented policies. In particular our results highlight the important role of a highly skilled workforce and productive investments for successful catching-up both in terms of productivity and GDP per capita. By contrast, we find very little evidence of a close correlation between internal devaluation and catching-up.

Drawing on the analogy from regions within countries which, as argued in the introduction, are by definition geographic entities in a currency union, to countries in the EMU, that share the impossibility for external devaluation with regions in a country, we would therefore argue, that current strategies aimed at re-establishing the competitiveness of the countries of Europe's Southern periphery, should be augmented by more pro-active, growth oriented strategy elements focussed on triggering investments and attracting a highly qualified workforce.

Such a strategy will have to be developed by the peripheral countries themselves and will need to be based on the specific comparative advantages of each of the countries. To implement such a strategy therefore the periphery countries need to develop a vision of where they want to be in terms of economic development after successful consolidation. Even if the financial means available for such

an active strategy are limited, this vision is needed to guide the structure of expenditure and investment as well as of budget cuts and to point out the impediments to structural change that have to be abolished. Irrespective of its concrete content also this vision should be developed in and by the country itself, be elaborated jointly with experts, be based on a broad national consensus on the priorities of future governments and will need to be broadly communicated to the public. Furthermore, the concrete policy measures following from the vision will have to be coordinated with the necessary measures to reduce budget deficits so as to achieve higher growth without renouncing budgetary discipline. This would necessitate a shift in the structure of expenditures to more future oriented expenditure categories (such as education, investment and innovation) and away from administration, high pensions for specific groups and the military, as well as shifts in the structure of taxation from taxing labour to taxes on property or on financial transactions and increasing tax revenues through improved compliance of taxpayers.

Our results also suggest that such a strategy should put a strong priority on triggering investments and improving educational attainment levels of the workforce. Furthermore, the low productivity growth rates of the periphery countries in the last decade suggest that restarting productivity growth is key to successful reform. Thus strategies to foster private investments, FDI, more innovation and better cooperation between firms as well as better schools and universities will have to be designed and national education systems will have to be scrutinized as to whether they provide adequate skills to the population.

This could be achieved by many different individual measures. For instance industrial policy could be re-oriented on promoting entry of new firms and competition as well as attracting FDI's to accelerate technology transfers and boost productivity and increasing exports specifically to fast growing global markets rather than subsidizing large firms and preventing the market exit of already unviable enterprises. Furthermore, given the comparative advantages of all periphery countries in tourism, strategies aiming to upgrade the currently low value added mass tourism to more highly value added forms (such as health and wellness tourism or cultural tourism), and to lengthen seasons (e.g. by diversifying visitor structures and attracting new customers from non-EU countries) could be an important element in such a strategy. Finally the southern countries – given their history and location – are natural bases for trade with the Mediterranean region and South America. This could be used to boost exports and to develop these countries into an export hub to the fast growing markets of this region.

Similarly, reforms directed at the education system should take care to more closely orient education to labour market needs and to also provide for adequate medium level and vocational and technical skills training, while reforms directed at the university level will have to aim at fostering the

cooperation between universities and enterprises (e.g. through spinoffs, cooperation with SMEs or research contracts with manufacturing firms).

While the peripheral countries themselves are therefore clearly the most important actors in designing their reform packages, our theoretical considerations also suggest that these national endeavours will need the to be supported and monitored by the higher tier government levels (i.e. the European Commission) and have to receive economic support of the centre of the EU (i.e. countries such as Germany and Austria). Here the European Commission, aside from taking the role of a monitoring institution, which it has already assumed, should – in the light of the limited financial resources of these countries and in order provide a counterbalance to this rather unpopular role – also aim to assume the role of the "financier of the future" for the peripheral countries: Additional financial resources from the EU-budget as well as from the EIB should be targeted to the periphery countries, reform contracts with additional financial incentives could be provided to the governments of the periphery countries (and should be described as a welcome source of additional finance for the future projects of the respective governments, rather than as a further imposition of German austerity measures) and existing financial resources should be used more efficiently by better co-ordinating between individual EU-funds as well as by more effective monitoring and evaluation.

In the long run, however, it is highly unlikely that such ad-hoc measures will suffice to cushion the substantial asymmetries within EMU. A fiscal transfer system that acts as an automatic stabilizer for regions affected by asymmetric shocks must therefore be part of the governance structure of EMU. Such a transfer regime could be based on a common European unemployment insurance system or other social transfers on the expenditure side of the EUs budget, or on business cycle sensitive taxes such as financial transaction taxes on the revenue side. Finally, the European Commission will also need to continue to encourage inter-governmental support and knowledge transfer, when it comes to designing labour market, industrial and also regional policies.

The task of the countries in the centre in such a policy initiative, by contrast, would be to facilitate positive spill-overs to facilitate adjustment in the periphery. This could on the one hand side be achieved through a more expansionary policy stance that allows wages to grow at least at the pace of productivity, reduces income disparities within countries and by stimulating private enterprises that are currently net creditors. On the other hand side, these countries could also increase demand by fostering investments with double dividends (like investment into environmental and energy saving technologies) and pursuing the goals of Europe 2020.

In sum therefore successful reform strategies in the European periphery countries will need pro-active, growth oriented policies that are “owned” by the countries themselves, that are, however, supported and closely co-ordinated with both higher tier levels of government and the countries of the centre. Even at their best, however, judging from our evidence, these policies are unlikely to yield immediate success and restructuring the Southern European periphery is likely to preoccupy policy makers in Europe for quite some time.

References

Abreu, M, H.L.F. de Groot and R.J.G.M. Florax (2005): A Meta-Analysis of Beta-Convergence: The Legendary Two-Percent, *Tinbergen Institute Discussion Pa*pers 05-001/3, Tinbergen Institute

Aiginger K, M. Firgo and P. Huber (2012): Policy options for the development of peripheral regions and countries of Europe, *wwwforeurope, Policy Brief* 2, WIFO, Vienna.

Aiginger K, (2013): A new strategy for the European periphery, *wwwforeurope, Policy Paper* No.1. WIFO, Vienna.

Aizenman, J. and M. Spiegel (2010): Takeoffs, *Review of Development Economics*, 14(2), 177-196.

Berthélemy, J.-C. (2007): Convergence Clubs and Multiple Equilibria: How did Emerging Economies Escape the Under-Development Trap?, *Revue d'économie du development* 20 (5), 5-41

Bertola, G. (2013): Policy Coordination, Convergence and the rirse of EMU Imbalances, European Economy, *Economic papers*, Brussels

Bosker, M. (2009): The Spatial Evolution of Regional GDP Disparities in the 'old' and 'new' Europe, *Papers in Regional Science*, 88(1), 3-27.

Crespo-Cuaresma, J., G. Doppelhofer, and M. Feldkircher (2012): The determinants of economic growth in European regions, *Regional Studies*, forthcoming

Dobson S., C. Ramlogan and E. Strobl (2006): Why Do Rates Of B-Convergence Differ? A Meta-Regression Analysis, *Scottish Journal of Political Economy*, 53(2), 153-173

Durlauf, S.N., P.A. Johnson, and J.R.W. Temple (2005): Growth Econometrics, in: Durlauf, S.N. and P. Aghion (eds.): *Handbook of Economic Growth*, (Amsterdam: North-Holland), 555-677

Easterly, W. (2006): Reliving the 1950s: The big push, poverty traps, and takeoffs in economic development, *Journal of Economic Growth*, 11, 289-318

Ertur, C. and W. Koch. (2007): Growth, Technological Interdependence and Spatial Externatlities: Theory and Evidence, *Journal of Applied Econometrics*, 22, 1033-1062.

Faini, R. (2003): Migration and convergence in the regions of Europe: A bit of theory and some evidence, *FLOWENLA discussion paper* 9, HWWA Hamburg.

Fischer, M.M. and P. Stumpner (2008): Income distribution dynamics and cross-region convergence in Europe, *Journal of Geograhical Systems*, 10(2), 109-139

Hausmann, R., L. Pritchett and D. Rodrik (2005): Growth Accelerations, *Journal of Economic Growth*, 10(4), 303-329

Le Gallo, J. (2004): Space-Time Analysis of GDP Disparities among European Regions: A Markov Chains Approach, *International Regional Science Review*, 27 (2), 138-163

LeSage, J.P.; Fischer, M.M. (2008): Spatial Growth Regressions: Model Specification, Estimation and Interpretation, *Spatial Economic Analysis*, 3(3), 275-304.

Magrini, S. (2004): Regional (di)convergence, in J.V. Henderson, J.F. Thisse (ed.), *Handbook of Regional and Urban Economics*, vol. 4, (London: Elsevier) pp. 2741-2796

Monastiriotes, V. (2011): Making geographical sense of the Greek austerity measures: compositional effects and long run implications, *Cambridge Journal of Regions, Economy and Society*, 4(3), 323-337.

Quah, D.T. (1996a): Regional Convergence Clusters Across Europe, *European Economic Review*, 40(3-5), 951-958

APPENDIX: Table A1 – Regions with a growth take-off

GDP per Capita			Productivity		
Regioncode	From	To	Regioncode	From	To
BE31	1997	2002	BE10	1991	1995
BG41	2004	2008	CZ01	1992	2002
CZ01	1997	2003	DE41	1997	2001
DE41	1992	1996	DED2	1999	2004
DE80	1992	1996	ES11	1995	1999
DED1	1992	1999	HU10	1993	1997
DED2	1992	1996	HU21	1993	1997
DED3	1992	1996	ITF5	1991	1996
DEE0	1992	1997	ITF6	1993	1997
DEG0	1992	2001	PL63	2002	2006
ES11	2002	2006	PT16	1992	1996
ES13	1998	2002	RO32	1992	1996
ES30	1995	2000	SE11	1996	2000
ES41	2001	2006	SK01	1991	1995
ES61	2000	2006	SK02	1991	1996
ES63	2002	2006	UKI1	2001	2007
FI18	1994	1999			
GR30	1998	2004			
GR41	1994	1999			
HU21	1993	1998			
HU22	1995	1999			
ITC3	1994	1998			
PL12	1992	1999			
PL34	1992	1997			
PL41	1992	1998			
PL51	1992	1996			
SE33	2001	2006			
SI01	1994	1998			
SK01	1991	1995			
SK02	1991	1996			
UKH2	1996	2000			
UKI1	1996	2003			
UKM6	2002	2008			