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CATCHING UP AND UNEMPLOYMENT IN THE EU

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ABSTRACT: Europe's catching up of the US in per capita income levels has, with some exceptions, come to a halt and turned into a decline during the 1980s and 1990s with a simultaneous secular worsening in the EU unemployment situation. The aim of the paper is to present a systematic description of the role of unemployment in the convergence process, which is an issue ignored in the growth literature. In this effort a simple disaggregation is utilised, which decomposes the disparity in the level of income per capita, or its change over time, into four components: productivity, unemployment, participation rate and age structure. The EU countries show marked internal differences with respect to these factors. Secondly, we assess the role of unemployment in the convergence process by estimating the importance of the effect of the initial unemployment and the change in unemployment with respect to convergence of the EU to the US. We find that the former effect is not significant while over time there is a crowding in type of phenomenon, where a reduction in unemployment accelerates convergence more than with its direct impact.

Key words: Convergence, unemployment, EU

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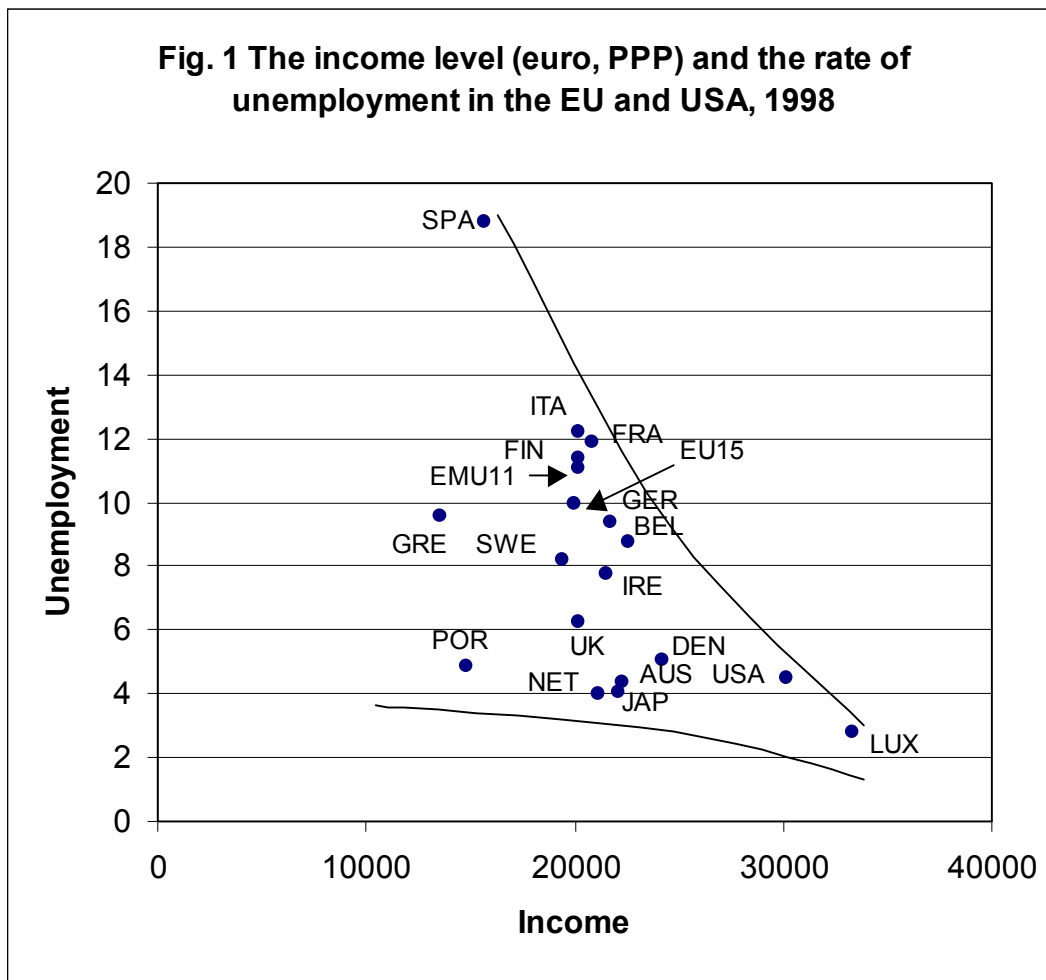
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TIIVISTELMÄ: USA:n kiinniotto per capita tulotasoissa on eräin poikkeuksin pysähtynyt ja kääntynyt taantumiseksi Euroopassa 1980- ja 1990-lukujen aikana samalla, kun EU:n työttömyystilanne on heikentynyt pysyväisluonteisesti. Tämän paperin tarkoitus kuvata systemaattisesti työttömyyden roolia konvergenssiprosessissa, mikä on ohitettu kysymys kasvukirjallisuudessa. Tämän vuoksi laaditaan yksinkertainen hajote, jossa tulotasoissa vallitseva poikkeama tai sen muutos yli ajan hajotetaan neljään komponenttiin: tuottavuuteen, työttömyyteen, osallistumisasteeseen ja ikärakenteeseen. EU-maat poikkeavat merkittävästi näiden komponenttien suhteen. Toiseksi arvioimme työttömyyden roolia konvergenssiprosessille estimoimalla alkuketken työttömyysasteen ja sen muutoksen vaikutuksen konvergenssille. Tulosten mukaan edellinen vaikutus ei ole tilastollisesti merkitsevä, kun taas yli ajan vallitsee tilanne, jossa työttömyysasteen aleneminen saa aikaan konvergenssiä enemmän kuin mikä on sen suora vaikutus.

Asiasanat: Konvergenssi, työttömyys, EU

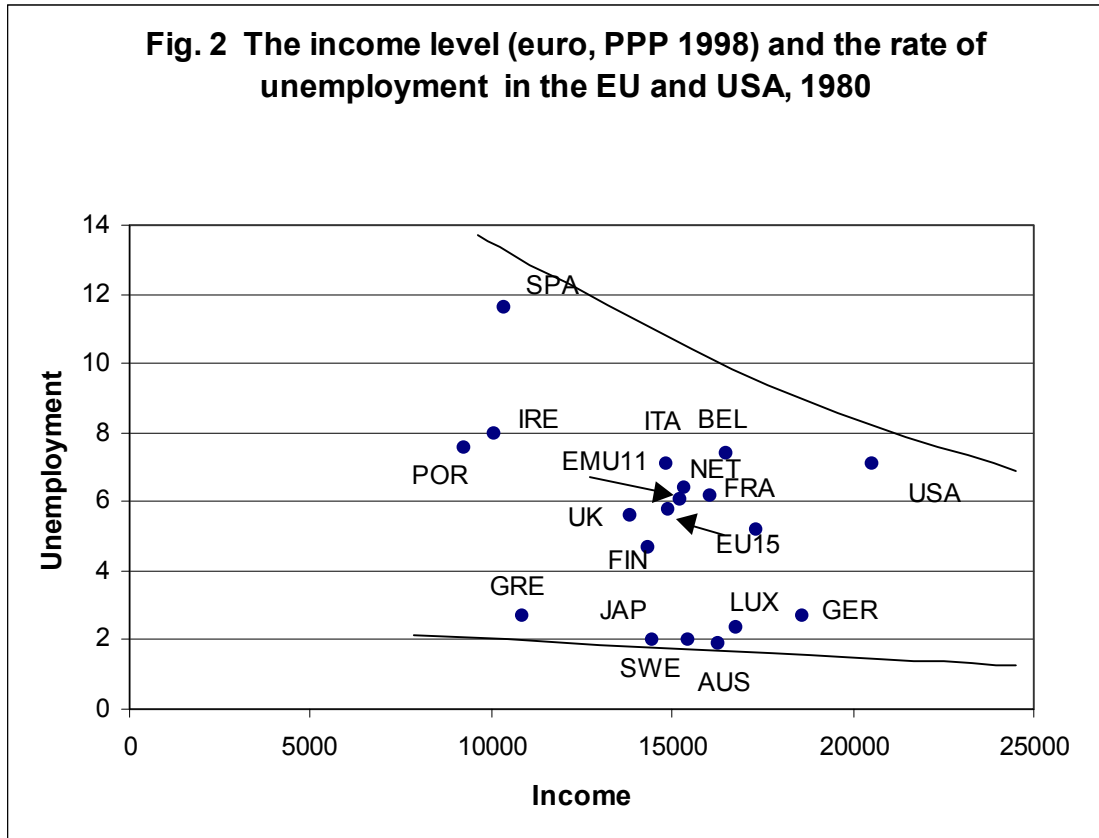
1. Introduction

The persistent unemployment problem of the EU is clearly in conflict with a good economic performance. In Figure 1 we have depicted an imaginary “funnel of richness”, which captures the idea that the higher the income level of a country, and the nearer to the top world income level it is, and achieves to be, with the higher necessity it also has to have a low level of unemployment. The reverse side of the coin is that with a lower level of income there can be a marked divergence with respect to the unemployment performance. So, we see that in the bulk of the EU countries, the rate of unemployment varies a lot at roughly the same level of income.



If we compare the situation to that 20 years ago, see Figure 2, we see that the funnel has become much tighter and steeper over time. This may be interpreted as a sign that solving the unemployment problem is now much more important for the European countries as to their convergence to top income levels. It is therefore essential to have a closer look on the conditions for a successful or poor economic catching up and its link to unemployment in a systematic way.

The aim of this paper is to shed light on the importance of unemployment in the growth process and catching up, or, in fact, its reverse, of the US by Europe from 1980 to 1998 and the reasons behind the wide variability in this respect. The reverse issue of the role of growth in reducing the European unemployment problem will be tackled in a subsequent paper in this project (see Alho 2002). Our point of departure



here is the following. Over the long run, the economy grows at the rate equal to the sum of the technological advancement (productivity growth) and the growth of the labour force, the rate of unemployment being at its natural level. This level is determined by the inefficiencies in the working of the labour and product markets. If the economy is on its long-run steady state growth path, the standard outcome should be that there is no causation from growth to unemployment in the long run. However, the reverse supply type of relation from a change in the structural unemployment to growth holds as more employment also leads to a higher output over time.

The aim of the paper is to enlarge the standard convergence literature by considering explicitly the role of unemployment in catching up. This issue has not been tackled to my knowledge in this literature, as it either considers the catching up in income levels calculated as growth of the aggregate income (GDP) per labour force in the working age without making a distinction between the employed and unemployed parts of the labour force, or it considers catching up in the per capita income without paying attention to this distinction, nor to the participation or the dependency ratios. Basically, the literature on growth and convergence is interested in convergence of productivities, while the policy oriented international comparisons are more interested in growth of per capita incomes. The aim here is to try to combine these two views.

The paper is organised in the following way. Section 2 presents the basic disaggregation of the income gap of the EU countries vis-à-vis the US prevailing in 1998 and of the catching up process over time from 1980 to 1998 and the various factors in it, one of which is the change in unemployment. The link between catching up and unemployment is analysed by running regressions linking the initial gap and the change of unemployment to the convergence of the EU countries with respect to the US in Section 3. Section 4 concludes briefly.

2. A disaggregation of the income gap and the European catching up process

We take as the usual starting point that the goal of the economy is to produce a high overall aggregate income level for its population. Of course, this view discards, i.a., the equality aspect of the economy, but this is based on internal preferences of each nation-state, which are not the focus of interest here. The backward linkages from equality to growth are not either our concern here.

We use the following multiplicative decomposition for the income per capita, to some extent similarly as in Prachnowny (1993), see Döpke (2001), but with another goal,

$$\frac{Y}{P} = \frac{Y}{L} \frac{L}{N} \frac{N}{P_L} \frac{P_L}{P} = \frac{Y}{L} (1-U) \frac{N}{P_L} (1-D), \quad (1)$$

where Y = income (GDP valued at PPP), P = population, L = employment, N = labour force, U = rate of unemployment ($= 1-L/N$), P_L = population in the working age, and D = the dependency ratio ($1-P_L/P$). We call these four components of the per capita income level productivity, employment, participation rate and the age structure, i.e., how favourable it is, as measured by one minus the dependency ratio. We could still enlarge the disaggregation in (1) by splitting the productivity component into the productivity per working hour and into the average number of working hours per worker. We have omitted this due to the lack of reliable data for all the countries under consideration. The EU Commission (2000, 21) has also used this kind of a decomposition for the aggregate EU and US growth with additionally separating also the hours worked, but without considering the individual member countries, which do here.

By going over to logarithms, we can both decompose the income gaps related to a cross section of countries in one point of time, or the corresponding change over time, with respect to the benchmark, which is here the US, as consisting of these four additive components presented in (1). We first consider the disaggregation of the income gaps of the EU countries and Japan to the US, prevailing in 1998, according to this decomposition, see Table 1. All components of the disaggregation (1) are transformed into logarithmic differences multiplied by one hundred, so that they are approximations to percentage differences.

From this we observe that there is a notable gap in the income levels between the EU and the US due to three factors: productivity, unemployment and lower participation. Roughly one half of the gap in income levels between the EU and the US is made by the lower productivity, one sixth by the weaker performance in unemployment and one third by the lower participation rate. The age structure is roughly similar, and even more favourable, in the EU than in the USA. As to Japan, its income gap vis-à-vis the US is virtually totally explained by the deficient productivity. The variability of these components within the EU obeys a similar pattern as the average size of them, i.e., those components have the biggest standard deviation for which the average difference vis-à-vis the US is also the biggest.

Table 1. Decomposition of the per capita income level (valued at PPP) in 1998 in the EU and Japan, in comparison to the USA, log differences multiplied by 100 (see eq. (1) in the text above)*

Country	Productivity	Employment	Participation	Age structure	Income level
Belgium	-3.20	-4.61	-20.16	-0.15	-28.88
Denmark	-25.28	-0.63	3.85	1.67	-21.70
Germany	-21.49	-5.27	-9.22	3.23	-32.68
Greece	-52.37	-5.49	-23.24	2.62	-79.91
Spain	-27.66	-16.22	-20.96	-0.42	-65.27
France	-12.19	-8.07	-15.83	-0.82	-37.03
Ireland	-16.51	-3.52	-14.49	0.43	-33.85
Italy	-7.11	-8.41	-27.92	3.05	-40.08
Luxembourg	-2.31	1.76	8.25	2.39	10.03
Netherlands	-20.54	0.52	-18.55	3.32	-35.38
Austria	-30.63	0.10	-0.83	2.44	-30.23
Portugal	-64.19	-0.42	-10.31	3.64	-71.42
Finland	-27.52	-7.50	-6.38	1.24	-40.16
Sweden	-35.70	-3.95	-3.27	-2.94	-44.05
UK	-33.67	-1.90	-3.56	-1.11	-40.22
Japan	-36.05	0.42	0.59	4.25	-30.79
EU15	-22.36	-5.93	-13.74	1.19	-40.84
EMU11	-18.52	-7.16	-16.24	1.71	-40.08
St. dev. for EU 15	17.11	4.63	10.51	1.98	21.39

* The averages for the EU and EMU countries are area-wide weighted averages, while the standard deviations are unweighted.

Table 2. Decomposition of the change in the per capita income level (at PPP in prices of 1998) in comparison to the USA, from 1980 to 1998 in the EU and Japan, change in log differences multiplied by 100*

Country	Productivity	Employment	Participation	Age structure	Income level
Belgium	4.91	-4.28	-7.10	0.86	-7.17
Denmark	2.05	-2.65	-8.54	3.90	-4.78
Germany	-12.89	-9.89	-3.72	3.04	-22.89
Greece	-11.15	-10.12	0.63	5.91	-16.14
Spain	7.96	-11.26	-2.61	9.15	3.03
France	3.09	-9.03	-9.84	3.02	-12.61
Ireland	29.83	-2.54	-1.52	12.21	37.40
Italy	6.02	-8.41	-12.91	6.67	-7.77
Luxembourg	17.41	-3.17	16.52	-0.50	30.21
Netherlands	-8.82	-0.23	2.08	3.35	-6.35
Austria	5.21	-5.34	-10.59	5.52	-7.08
Portugal	-0.90	0.12	0.60	7.98	8.45
Finland	19.51	-10.05	-12.68	-0.91	-4.20
Sweden	8.42	-9.30	-16.62	0.25	-15.51
UK	6.85	-3.50	-7.16	2.18	-0.73
Japan	7.09	-4.93	-0.35	2.45	4.24
EU15	0.69	-7.32	-6.83	4.44	-8.73
EMU11	-0.76	-8.23	-6.29	4.98	-10.06
St. dev. for EU 15	11.42	3.90	8.14	3.74	16.42

* The averages for the EU and EMU countries are area-wide weighted averages, while the standard deviations are unweighted.

There are to be discerned two groups of the EU countries in Figure 1 and Table 1 above, which show a marked divergence with respect to unemployment. The low unemployment countries (Luxembourg, the Netherlands, Austria, Denmark, Portugal, the UK), in contrast to the high unemployment countries (Finland, France, Italy, Spain), which two groups have roughly the same average income level, are distinguished from each other on the basis of two additional factors. The low unemployment EU countries have clearly a lower productivity (some 10 per cent) than the high unemployment group, but, on the other hand, the former have a clearly higher participation rate, the corresponding factor in the decomposition (1) being some 15 per cent higher than in the group of high unemployment countries. The demographic situation is roughly the same in the two groups. So, it seems that the strategies and structures of the two types of EU countries differ quite markedly from each other. More employment is in the former group created for the larger labour force, but at a lower level of productivity than in the high unemployment countries. The Netherlands is an exception with respect to the participation rate in the group of low unemployment EU countries.

Let us next decompose the change of the real per capita income level vis-à-vis the US from 1980 to 1998 in a corresponding way. The results are shown in Table 2. From these figures we see that the catching up has stopped and turned into a decline over the two decades if we take the EU as a whole. The catching up in the income levels between the US and the EU has also come to a standstill with respect to productivity gains, with the notable exception of the EU “miracles”, Luxembourg and Ireland. Also Finland has shown a marked rise in productivity. The poorer performance in unemployment is a factor, which has substantially worked in the opposite direction and it has had on average a negative impact of roughly seven percentage points widening the income gap over the two decades. The performance as to the participation rate has also been clearly worse than in the US, while the age structure in the EU has noteworthy improved. The EU top performer, Luxembourg, has been able to raise its participation rate substantially. It is also interesting to see that the standard deviations of the changes of all the components, excluding the age structure, in Table 2 are smaller than the corresponding variability in the levels in Table 1, which is a sign that the pattern of the components of income disparity has had a tendency to persist over time.

3. The role of unemployment in convergence

Next, we want to shed quantitative light on the role of unemployment in convergence. The basic model for convergence used in the literature identifies the initial gap in income levels as the main driving force behind convergence, see, e.g., Barro and Sala-i-Martin (1995). We want to add the role of unemployment to this relationship in two senses. First, we add the initial rate of unemployment as an explanatory variable. The idea is that if the rate of unemployment is higher than the natural rate, the country lies below its path of potential output and has room to grow more rapidly. Secondly, the change in unemployment, in the way it is presented in identity (1), is a component of the catching up of per capita income with a unitary coefficient. By including this component in the regression as the only one of the right-hand side components in (1), we want to study, whether the overall effect, including the spillovers, of the change in unemployment is bigger or lower than the unity. In the former case we can define that there are in a way increasing returns to scale, or crowding in, of lowering unemployment with respect to convergence, while in the latter case there are decreasing returns to scale in this respect.

In addition to this, and as an additional factor to the basic convergence hypothesis, we also analysed the effect of the variability of output, measured by the standard deviation of the GDP growth rate, on convergence and change in unemployment. This issue has recently received some attention in connection with convergence, see Martin and Rogers (2000). Anyway, it is important to analyse from the point of view of employment, how the labour markets have adjusted to the growth shocks experienced in the economy, see an analysis related to this issue by Blanchard and Wolfers (2000).

We split the time period from 1980 to 1998 into two parts, from 1980 to 1990 and from 1990 to 1998, in order to increase the number of observations. So, we have a panel for the 15 EU countries with a total of 30 observations. The model to be estimated for the convergence of the EU countries vis-à-vis the US is

$$\Delta \log(y_i / y_{US}) = \beta_0 + \beta_1 \log(y_i / y_{US})_0 + \beta_2 U_{i0} + \beta_3 \Delta \log((1 - U_i) / (1 - U_{US})) + \beta_4 gdev_i, \quad (2)$$

where y is the per capita real income valued at PPP, U is the rate of unemployment, $gdev$ is the standard deviation of the growth rate of GDP in country i over the 1980s and 1990s, respectively, and by subscript 0 is denoted the initial situation and by Δ the average change per annum from 1980 to 1990 and from 1990 to 1998, respectively.¹

The estimation results of equation (2) are presented in Table 3.

Table 3. The regression models for the convergence of the EU per capita income levels vis-à-vis the US from 1980 to 1998*

Variable	Model 1		Model 2		Model 3	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
Constant	-0.57	1.44	-0.75	1.68	-0.88	2.02
$\log(y_i/y_{US})_0$	-0.012	1.33	-0.008	0.75	-0.005	0.62
U_{i0}			0.056	0.87	0.030	0.64
$\Delta \log[(1-U_i)/(1-U_{US})]$					1.76	4.72
$gdev_i$					0.53	3.23
R_C^2	0.03		0.02		0.51	

* As in Tables 1 and 2, all explanatory variables (excluding the constant) have been multiplied by one hundred and are so percentages. In addition the flow variables, i.e., the variable to be explained and the variable measuring the component of the change in the unemployment rate, are divided by the number of years covered by the time span (i.e., 10 and 8 years, respectively).

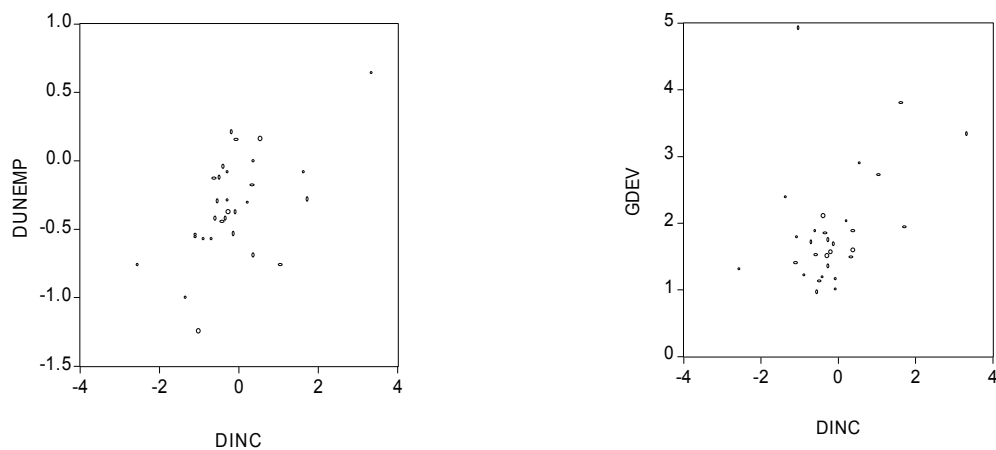
We get here only slight evidence on the basic convergence hypothesis. The coefficient of the initial income gap is negative as it should be and is less than the estimate of standard speed of convergence, i.e., 0.02, but the estimate is here statistically insignificant.

¹ Note that the third variable on the right-hand side of (2) is just the employment component in (1).

nificant. The impact of the initial rate of unemployment has the right sign, i.e., that high unemployment leads to an accelerated growth in the future, but this coefficient is also insignificant.

There are increasing returns to be experienced in growth and convergence from alleviating the unemployment problem, as can be seen from the estimation result of Model 3 in Table 3, because the coefficient of the change in the employment rate is clearly higher than unity. The interpretation of this result is that a lower level of unemployment leads, through the reverse of the discouraged worker effect, also to more participation into the work force and is thereby more conducive to catching up than its direct effect. The Wald test statistic for testing the hypothesis that this coefficient (i.e., β_3 in Eq. (2)) is unity is, however, somewhat inconclusive as the probability of the χ^2 -test is 0.041. However, this kind of effect can only be felt during the 1990s; in the estimation for the 1980s it turned out to be insignificant. In Figure 3 we have depicted the relationship between convergence and the change in employment component.

Figure 3. The scatter diagrams for the catching up in income levels (dinc) and change in the employment component per year (dunemp) and the standard deviation of output growth (gdev) in the EU for the periods 1980-90 and 1990 to 1998



Of course, we have to allow here for a two-way causality, as high growth, if it is persistently rapid as a result of a continuous stream of positive shocks to the economy, through the demand for labour effect, is conducive to a lowering in the unemployment rate. This is something, which we cannot address with the cross section data used here. We estimated a simultaneous model by 3SLS for convergence and the change in unemployment, using the same set of explanatory variables as above, but the fit of the convergence equation was now very poor and the results were not very stable, and are not reported here.

We also get the result that a large variability in output has been linked to a rapid growth, and as can be seen from Table 3, the effect is highly significant. The coefficient is also big, so that a rise in the variability of output growth by one percentage point has implied as much as 0.5 percentage points bigger convergence per year.² The fast growing countries have also adopted a more risky growth strategy. We do not argue here that the causation runs from the variability of growth to the average speed rather than the reverse, which may also be intuitively more plausible, but just raise

² This effect is the same, irrespective of whether we estimate its impact on the growth in per capita incomes or in productivities.

attention to the link between these two aspects of the growth process. This result of ours is noteworthy in the sense that it is in conflict with the result by Martin and Rogers (2000) who concluded that growth is negatively linked to output variability in the industrialised countries according to the learning-by-doing view, while for the developing countries the contrary relation holds. We have depicted our sample in Figure 3, which clearly reveals the positive correlation in EU data between convergence and variability in output growth.

We also included a time dummy to see, whether the convergence pattern of the 1990s differs from that in the 1980s. This dummy gets quite a big negative coefficient (-0.23), but it is not significant (t-value 0.8). So, we do not get any evidence that the convergence of the EU towards the US would have become more unfavourable in the 1990s.

We also estimated the impacts of the above explanatory variables on the change in unemployment, using OLS, but all the impacts were non-significant, which would then suggest that unemployment has changed in a pattern, which is not determined by the initial conditions, nor by the variability in growth. This last mentioned effect has only been modest on unemployment, quite the reverse as could be thought of. If the growth of output varies a lot, we could imagine that the wage setting mechanism can find it hard to adjust to this variability, so that there may be adverse hysteresis kind of effects to unemployment. According to the estimation, this is not the case, which is an interesting finding in itself. In the simultaneous model mentioned above, we, however, got some evidence that the variability of the growth rate has a negative effect on the change in unemployment, but the effect is smaller than in the case of the growth rate of income above.

Table 4. The residuals of Model 3 in Table 3 (100*log differences per year)

Country	1980-90	1990-98
Belgium	-0.47	-0.05
Denmark	0.09	-0.80
Germany	0.45	-1.21
Greece	-0.55	-0.22
Spain	0.84	0.04
France	0.36	-0.35
Ireland	1.29	0.66
Italy	0.51	-0.06
Luxembourg	0.50	2.03
Nether-lands	-0.79	-0.30
Austria	0.16	0.16
Portugal	-0.97	0.29
Finland	0.12	-0.77
Sweden	-0.15	-0.17
UK	0.24	-0.90

We also included in the model the key explanatory variables of convergence, namely the investment rate and the rate of schooling by Mankiw et al. (1992), but in our sample they proved to be insignificant both with respect to convergence of per capita incomes and of the levels of productivity.

We also estimated the effect of the above explanatory variables on the catching up, measured by the change in productivity vis-à-vis the US. In this case, the change in unemployment is not a significant variable. This result implies that the effect runs solely to convergence, measured by the change in the per capita income levels, through the change in the participation rate.

Using the estimation result of Model 3 in Table 3, we can infer that if the EU on average could eliminate the gap in the employment component of identity (1) of 7 or 8 percentage points vis-à-vis the US, this would lead to a catching up of more than 10 percentage points over a decade, which is very substantial indeed.

The residuals of Model 3 in Table 3 are displayed in Table 4. The biggest positive residuals, i.e., the model underestimates the convergence of the country concerned, are for Luxembourg, especially in the 1990s, and for Ireland, especially in the 1980s. The biggest negative residuals are for Finland, the UK and Germany in the 1990s.

4. Conclusions

We have shed light on the European unemployment problem in connection to convergence. Solving the unemployment problem is one condition for penetrating towards higher income levels, although there is still room also to raise the productivity of the EU countries with respect to the US. The performance with respect to unemployment and other indicators of the labour market performance, notably, participation, varies a lot between the EU countries. The long run Classical type of relation from the change in unemployment to growth was estimated with the result that there is a crowding-in effect from a better functioning of the labour market to an acceleration of catching up, which is bigger than the direct effect of this.

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