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Regional convergence in Spain: 1965-95

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Abstract

This paper explores the sources of convergence in income per capita across the Spanish regions using a decomposition of this variable into employment and productivity factors and an estimate of a regional production function.

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1. Introduction

My job today is to review the process of regional convergence in Spain over the last few decades and to explore the forces driving this process, with special reference to the impact on it of regional policies and aggregate growth performance. To do this, I will rely on a standard measure of convergence (the rate of unconditional beta convergence)¹ and use a technique that allows me to decompose this measure into the sum of a series of partial convergence coefficients that capture the contribution of different variables of interest to the reduction of regional disparities. In this manner, we can trace back the observed reduction of inequality to the evolution of the different components of income per capita and isolate the effects of employment-related variables and the accumulation of productive factors among other things.

The paper is organized as follows. In Section 2 I briefly review Spain's performance over the period 1965-95 in terms of growth, employment creation and regional convergence. In Section 3 I present and discuss the results of the decomposition of the rate of regional convergence in income per capita for each of the three decades in the sample period. One clear implication of the results is that the poor employment performance of the less advanced regions has been a major factor in the "convergence slowdown" we observe in Spain during this period. Section 4 concludes with an exploration of the possible causes of this phenomenon. Some of the more technical details of the analysis are left for the Appendix.

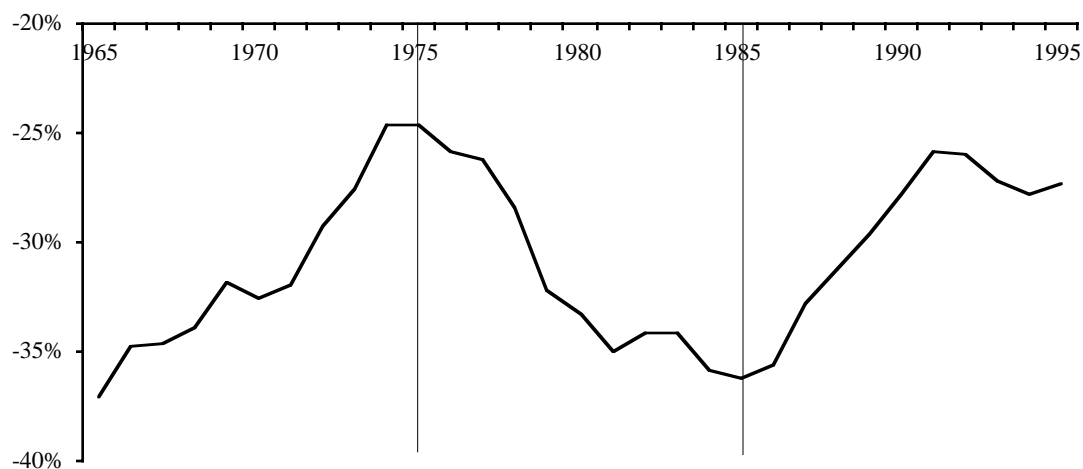
2. Aggregate growth and regional convergence

Spain's economic performance over the period between 1965 and 1995 has been rather uneven. As illustrated in Figure 1, fast growth and rapid catching up with average OECD per capita income levels during the first decade of this period was followed by a long crisis that brought the country back to its initial

¹ Just in case the reader is unfamiliar with this concept, the rate of unconditional beta convergence (Barro and Sala i Martin, 1990) is obtained by regressing the growth rate of income per capita on the initial level of the same variable without controlling for any other factors. Intuitively, this coefficient measures the fraction of the income per capita differential with the sample average that is eliminated each year in the case of a "typical region," thus giving us an indication of how fast regional disparities are declining over time.

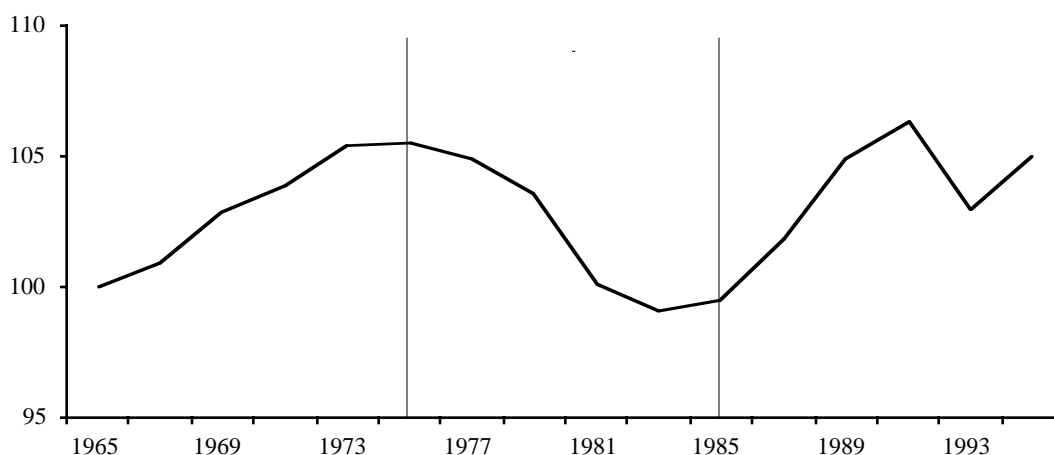
position vis a vis the OECD by 1985. After this year, the country entered a second period of relatively rapid growth during which the per capita income gap with the most advanced economies was again reduced at a rhythm of around one percentage point per year. As Figure 2 shows, the pattern is almost exactly the same when we look at the evolution of aggregate employment in the country.

Figure 1: Evolution of Spain's real income per capita relative to the OECD



- Note: Logarithmic difference between Spain's income per capita and (unweighted) average income per capita in a sample formed by the largest 21 OECD countries (excluding recent entrants). The data are taken from an updated version of Doménech and Boscá (1996) and are adjusted for differences in purchasing power.

Figure 2: Evolution of total employment in Spain (1965 = 100)



- Note: total number of jobs. The data are taken from Fundación BBVA.

Turning now to regional convergence, the Spanish experience does not quite fit the widespread perception that convergence is fastest in good times. The rate of convergence in income per capita across regions was indeed fairly high (2.49%) during the first period of rapid growth and declined substantially (to 1.08%) during the 1975-85 crisis, but continued to decline (to 0.38%) during the last decade, when Spain's growth rate was clearly above the average for the group of industrial countries in our reference sample. In contrast to what happened in the sixties and early seventies, laggard regions benefitted less than more advanced ones from the recovery that started in 1985.

Figure 3: Beta convergence in income per capita and output per job



As Figure 3 shows, this sharp decline in the rate of convergence in income per capita does not carry over to productivity, measured by output per job. In terms of this variable, regional convergence was actually fastest during the middle decade of low growth and slowest during the first subperiod of rapid development. The disparate behaviour of these two convergence rates is a first indication of a phenomenon to which I will return: the enormous influence of employment performance on the evolution of the distribution of regional income per capita.

3. The sources of convergence in income per capita

To get some feeling for the relative importance of the factors that have influenced the evolution of regional disparities, in this section I will perform an

exercise in what may be called *convergence accounting*. I will derive the desired additive decomposition of the rate of beta convergence from a multiplicative decomposition of income per capita. This variable can be expressed as the product of two main components, income per job and jobs per capita, which can in turn be written as products of other ratios of interest following the scheme summarized in Table 1 and described in greater detail in the Appendix. The employment component of income per capita, in particular, depends crucially on labour force participation and unemployment rates, and its productivity component can be related to the stocks of productive factors per job (private capital, infrastructures and human capital) and to total factor productivity (TFP) with the help of a regional production function.

Table 1: A decomposition of income per capita

	income per capita =	
<i>income per job</i>	*	<i>jobs per capita</i>
=		=
output prices		weight of working age population
*		*
operating subsidies		labour force participation rate
*		*
output per job		jobs per active worker
= f(factor stocks per job, TFP)		

It is a straightforward exercise to go from this multiplicative decomposition of income per capita in levels to an additive decomposition of the same variable in relative growth rates, that is, to derive an expression that says that the growth rate of income per capita in each region (measured in deviations from a conveniently defined sample average) is simply the sum of the growth rates of its various components also measured in relative terms. Using this expression, we can write the left-hand side variable in the regression used to estimate the rate of beta convergence as the sum of a number of components. By regressing each of these components on initial relative income per capita (i.e. on the same right-hand side variable as in the standard convergence regression), we can obtain a series of *partial convergence coefficients* that add up to the original "total" convergence rate. These partial coefficients capture the degree of convergence

that would have been induced by the evolution of each of the components of income per capita, holding all the rest constant in relative terms.²

Applying this technique to the data at hand we obtain the decomposition of the rate of beta convergence in income per capita across the Spanish regions shown in Table 2. The first line of the table shows the actual convergence rates observed in each decade in the sample period, and the rest of the table shows the decomposition of these indicators into their main productivity and employment components and their respective subcomponents.³

Table 2: Decomposition of the rate of beta convergence in income per capita

	1965-75	1975-85	1985-95
<i>observed rate of beta convergence</i>	2.49%	1.08%	0.38%
<i>induced by the evolution of:</i>			
1. <i>income per job</i>	1.19%	1.98%	1.17%
1.1 real output per job	1.03%	2.41%	1.10%
1.2 output prices	0.16%	-0.44%	-0.17%
1.3 operating subsidies	0.01%	0.00%	0.24%
2. <i>jobs per capita</i>	1.30%	-0.90%	-0.78%
2.1 working age population	0.13%	0.17%	-0.29%
2.2 participation rate	0.93%	0.08%	-0.40%
2.3 jobs per active worker	0.24%	-1.15%	-0.10%
1.1 <i>real output per job</i>	1.03%	2.41%	1.10%
a. <i>physical capital accumulation</i>	0.49%	1.36%	0.46%
infrastructures per job	-0.21%	0.10%	0.54%
physical capital per job	0.70%	1.26%	-0.08%
b. <i>education</i>	0.25%	0.89%	0.96%
c. <i>tfp</i>	0.29%	0.16%	-0.33%
1.1.a <i>physical capital accumulation</i>	0.49%	1.36%	0.46%
total infrastructure stock	-0.46%	-0.08%	0.41%
total physical capital stock	0.01%	0.74%	-0.45%
total employment	0.93%	0.70%	0.51%

² See de la Fuente (1998) and the Appendix for further details.

³ The data used to perform the calculations comes mostly from Fundación BBVA and Mas et al (various years). To estimate the contributions to growth of changes in factor stocks I use the (Cobb-Douglas) regional production function estimated in de la Fuente (2000). The estimated coefficients of (non-infrastructure) physical capital, infrastructures and human capital are, respectively, 0.297, 0.106 and 0.286.

Figures 4-7 are constructed using the results in Table 2 and are used to highlight the key results. Figure 4 shows a first decomposition of the rate of convergence into its main productivity (income per capita) and employment (jobs per capita) components. As can be seen in the figure, the contribution of productivity to convergence in income per capita (which is not quite the same thing as convergence in productivity) has always been positive and sizable and displays no downward trend. All of the convergence slowdown comes from the behaviour of the employment component of income per capita, which displays divergent behaviour (adopts a negative value) in the second and third decades of the sample period.

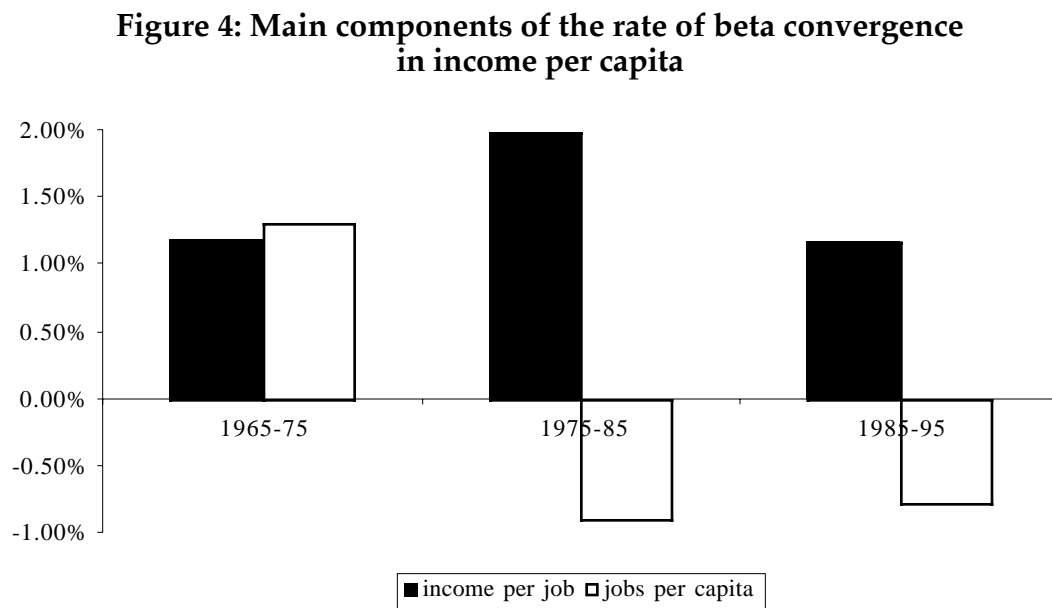
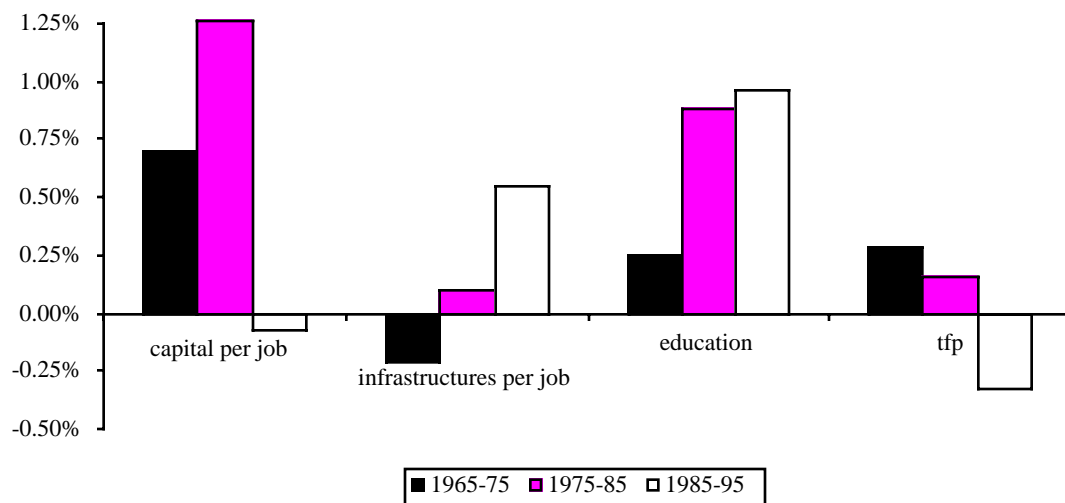


Figure 5 shows the contribution of changes in factor stocks per job and total factor productivity growth to the rate of convergence in income per capita. In general terms, disparities in factor intensities across regions have declined over time and this has contributed significantly to convergence in both productivity and income per capita.

The role of the public sector in this process of convergence in factor intensities has been increasingly important. The gradual equalization of schooling levels across regions has contributed positively to convergence in all three decades, but the size of the effect has increased over time. This upward trend is even more apparent in the case of infrastructure investment, whose contribution to

convergence was actually negative during the first decade. The positive effect of this component is particularly important during the last decade, following Spanish accession to the EU in 1986. In this period, redistributive public investment has become the main vehicle for an active regional policy cofinanced by the European Structural Funds. My estimates indicate that, in the absence of such a policy, regional incomes per capita would have diverged over the period 1985-95. Hence, the fact that convergence has been slowest following the adoption of redistributive regional policies cannot be taken as evidence of the lack of effectiveness of these policies. In fact, they have played a crucial role by significantly mitigating the impact of other factors having an adverse effect on the evolution of regional disparities. As we have already noted, the deteriorating employment performance of the poorer regions is one such factor. In the last decade, moreover, we also observe negative convergence contributions from private investment and TFP growth. Although the causes of this phenomenon deserve close investigation, this is well beyond the scope of this paper.

Figure 5: Main productivity components of the rate of beta convergence in income per capita (contribution of changes in factor stocks per job)



The gradual equalization of regional capital/labour ratios has been driven in part by faster employment growth in the richer regions. To highlight this effect, Figure 6 provides an alternative decomposition of the convergence effects of changes in capital/labour ratios where I show separately the contributions of growth in total employment (which is always positive

although decreasing) and growth in the total stocks of private capital and infrastructures (which is often negative, signalling faster accumulation in richer regions). This finding is consistent with the view that the large migratory flows of the sixties and early seventies contributed substantially to regional convergence in Spain.⁴

Figure 6: Main productivity components of the rate of beta convergence in income per capita (contributions of total factor accumulation and employment growth)

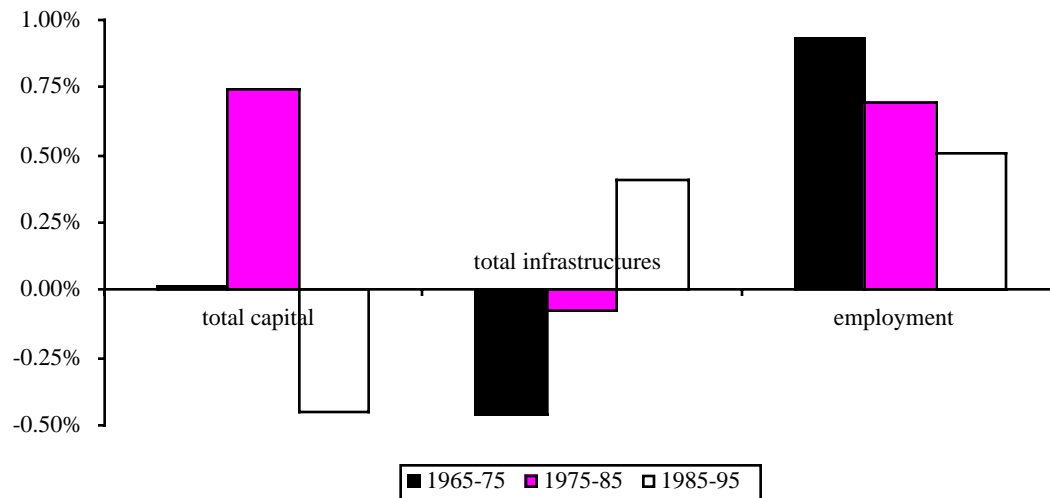


Figure 7: Employment components of the rate of beta convergence in income per capita



⁴ See for example Raymond and García (1996).

Figure 7 shows the evolution of the employment subcomponents of the rate of convergence. Rapid rises in the (female) labour force participation rate in poor regions contributed significantly to convergence during 1965-75. In the last two decades, however, the contribution of employment to income convergence becomes negative, with poor regions displaying below average performance in both participation and employment rates. Comparing the first and last decades in the sample, the evolution of these two variables alone reduced the convergence coefficient by 1.67 points, or 80% of the observed decrease in this indicator.

4. Structural change, migration and employment performance

As we have just seen, the main immediate source of the decline in the rate of convergence has been the reversal in the relative performance of rich and poor regions in terms of employment creation, measured by the change in the number of jobs per capita. Table 3 decomposes the convergence effect of the evolution of this ratio into the sum of the contributions of its numerator (employment) and denominator (population). The second effect is by far the more important one: holding all other things equal, the observed changes in the regional distribution of population growth rates would have lowered the rate of convergence by 3.13 points (which is the difference between 3.61 and 0.48%). Although this calculation can be highly misleading (because changes in population growth rates can be expected to trigger partially offsetting changes in job creation and other variables), it does serve to highlight the importance of migration flows in the convergence process.

Table 3: Decomposition of the rate of beta convergence in income per capita induced by the evolution of jobs per capita

	1965-75	1975-85	1985-95
jobs per capita	1.30%	-0.90%	-0.78%
total employment	-2.31%	-1.73%	-1.26%
total population	3.61%	0.83%	0.48%

The sharp decrease in internal migration rates, coupled with the pattern of structural change, seem to be the key to understanding the employment component of the regional convergence slowdown. The continued loss of agricultural jobs has been an important drag on net employment creation in poor regions throughout the period. Until the mid seventies, surplus

agricultural labour largely migrated and was absorbed by the more dynamic labour markets of the richer regions, where the outflow from agriculture was much smaller in absolute terms and the weight of the expanding service sector was larger. With the onset of the crisis (and the sharp decrease in employment probabilities throughout Spain), this escape valve ceased to function and job destruction in agriculture translated directly into rising unemployment rates in the poorer regions and falling convergence rates. Somewhat surprisingly, the situation has not changed much in spite of the recovery of the last decade.

Table 4: Population growth and employment creation/destruction by group of region

<i>group</i>	<i>period</i>	<i>agricult.</i>	<i>industry</i>	<i>services</i>	<i>tot. empl.</i>	<i>population</i>
6 richest	1965-75	-3.58%	8.17%	13.28%	17.87%	22.87%
6 poorest	1965-75	-12.76%	3.45%	8.48%	-0.83%	-0.26%
6 richest	1975-85	-2.94%	-8.75%	8.79%	-2.90%	9.04%
6 poorest	1975-85	-13.12%	-2.51%	6.89%	-8.73%	6.87%
6 richest	1985-95	-1.92%	-2.47%	14.41%	10.02%	2.59%
6 poorest	1985-95	-9.91%	0.72%	10.46%	1.27%	2.79%

- Notes: Growth rates over the entire 10-year period (not annualized). Sectoral figures are obtained by dividing the change in the number of jobs in the sector by initial total employment in each group of regions. Hence, their sum is equal to the growth rate of total employment, given in the fourth column.

Table 5: Sectoral rates of employment creation/destruction by group of region

<i>group</i>	<i>period</i>	<i>agricult.</i>	<i>industry</i>	<i>services</i>	<i>tot. empl.</i>
6 richest	1965-75	-28.18%	18.82%	30.26%	17.87%
6 poorest	1965-75	-25.71%	17.04%	28.17%	-0.83%
6 richest	1975-85	-38.05%	-19.99%	18.12%	-2.90%
6 poorest	1975-85	-35.27%	-10.48%	17.71%	-8.73%
6 richest	1985-95	-38.97%	-6.84%	24.43%	10.02%
6 poorest	1985-95	-36.17%	2.93%	21.83%	1.27%

- Notes: Growth rates over the entire 10-year period (not annualized). Sectoral figures are obtained by dividing the change in the number of jobs in the sector by initial employment in the same sector in each group of regions.

Table 4 provides some data that support this conclusion. It shows the growth rates of population and total employment during each decade in the six richest and the six poorest Spanish regions (as of the beginning of the relevant period). The growth rate of total employment is further decomposed into the sum of the contributions of three broad sectors (agriculture, industry and construction, and services), which are obtained by dividing the change in employment in each sector by initial *total* employment in the relevant group of regions. As a reference, Table 5 shows the growth rates of employment in each sector during the same period, obtained by dividing sectoral changes in employment by initial employment *in the same sector* at the beginning of the decade.

Table 4 shows that employment growth has always been slower in the poor regions than in the rich ones, and that this has been largely the result of the rapid decline of agricultural employment. Table 5 shows that this is essentially a composition effect: agricultural job destruction rates (computed relative to the size of the sector) are very similar in both groups of regions (and are in fact a bit lower in the poorer ones).⁵ Slow employment growth in the poor regions, however, only becomes a hindrance for convergence after 1975, when their population growth rate rises relative to that of the richest regions as a result of the drop in migration rates.

5. Conclusion

I suppose the topic of this talk was selected with the hope that it may give Eastern European policy makers some idea of what to expect in the future in their own countries in terms of the evolution of regional disparities. I am afraid, however, that the main lesson I would draw from the analysis above may not be very helpful in this respect. Although there is a well documented tendency for regional income differentials within reasonably developed countries to decrease over time, the process of convergence is not necessarily smooth nor automatic over the medium run, and can be influenced by a large number of factors, some of which we do not understand very well. With this caveat, my analysis of the Spanish experience suggests that regional convergence in productivity levels can be expected to proceed fairly smoothly and can in any

⁵ Differences in rates of employment growth in the other two sectors are also generally small and when they are not (as in the industrial sector in the last two decades), they tend to be favourable to the poor regions.

event be helped along by public investment and education policies that will also be eligible for Structural Fund cofinancing in Eastern countries as they join the EU. Convergence in income per capita, on the other hand, also requires reasonably good employment performance in backward regions that, as in the case of Spain, are likely to find themselves burdened with large surpluses of redundant agricultural labour. Ensuring the employability of these workers is likely to be quite a challenge over the next few decades.

Appendix: a decomposition of income per capita and the rate of beta convergence

Region r 's income per capita (YPC_r) can be written in the form

$$(1) YPC_r = \frac{GVA^n_r}{POP_r} = \frac{GVA^n_r}{EMP_r} * \frac{EMP_r}{POP_r} = YPJ_r * E_r$$

where GVA^n is regional gross value added at factor cost measured at current prices, YPJ is income per job, also at current prices, and E the total employment rate (defined as the average number of jobs per capita).

To analyze the evolution of these two "main components" of income per capita, it will be convenient to write each one of them as a product of other variables of interest. To decompose income per job, notice that nominal regional income at factor cost GVA^n (which includes operating subsidies to enterprises) can be written in the form

$$(2) GVA^n_r = P_r (1+SUB_r)GVA^r_r$$

where P is a production price index, GVA^r real output (measured at constant prices) net of subsidies and SUB the fraction of nominal income that comes from operating subsidies. Letting $Q (= GVA^r/EMP)$ denote net (of subsidies) real output per job, we can write nominal income per job in the form

$$(3) YPJ_r = P_r (1+SUB_r)Q_r.$$

On the other hand, the overall employment rate (E) is equal to the product of three factors: the weight of the working-age population in the total population ($WWAP$), the labour-force participation rate of this group ($LFPR$) and the employment rate of the labour force ($ERLF$), defined as the average number of jobs per active worker.

$$(4) E_r = \frac{EMP_r}{POP_r} = \frac{POP_{15-64}_r}{POP_r} * \frac{Labour\ force_r}{POP_{15-64}_r} * \frac{EMP_r}{labour\ force_r} = \\ = WWAP_r * LFPR_r * ERLF_r$$

Taking logarithms of (1), (3) and (4) and differences with the sample averages of the relevant variables (measured in logs), we have

$$(5) \ ypc_r = ypj_r + e_r = (p_r + sub_r + q_r) + (wvap_r + lfpr_r + erlf_r)$$

where the terms on the right-hand side of this expression are the components of relative income per capita. Lower-case letters are used to indicate that all variables are measured in logarithmic differences with the (geometric) sample average.

Finally, we can decompose the productivity component of relative income per capita (q_r) using an estimate of the regional production function. In particular, we have

$$(6) \ q_r = a_r + \theta_k k_r + \theta_p p_r + \theta_h h_r$$

where k and p are the stocks of (non-infrastructure) physical capital and infrastructures per job in the region, h an indicator of the level of education of employed workers in the region and a measures total factor productivity. As above, all variables are measured in relative terms, i.e. in log deviations from log sample averages. The coefficients θ_k , θ_p , and θ_h are output elasticities and measure the percentage increase in output that would result from a 1% increase in the relevant factor stock.

The growth rate of relative income can be decomposed in a similar way. Adding time subscripts to the equations derived above, and switching for convenience to a more generic notation, we have

$$(7) \ ypc_{rt} = \sum_k z_{krt}$$

where z_k is the k -th component of relative income per capita. Since all variables are measured in logarithmic differences with the corresponding (geometric) sample averages, the relative growth rate of each variable x over a given period (i.e. the difference between its growth rate and that of a hypothetical average region) will be given by

$$(8) \ \Delta x_{rt} = \frac{x_{r,t+h} - x_{r,t}}{h}$$

where h is the length of the period. Subtracting (7) evaluated at t from the same expression evaluated at $t+h$ and dividing by the length of the period, we have the following relation:

$$(9) \ \Delta ypc_{rt} = \sum_k \Delta z_{krt}$$

that is, the growth rate of relative income per capita is simply the sum of the relative growth rates of its components.

To obtain the partial convergence rates discussed in the text, I regress each of the components of the relative growth rate of income per capita on the initial level of the same variable. That is, for each k and each period of interest I estimate a cross-section equation of the form

$$(10) \Delta z_{krt} = -\beta_k y_{pcrt}$$

The coefficient of each of these component regressions, β_k , will give us the rate of (unconditional) beta convergence that would have been observed in a hypothetical world in which the relative income of each region changed due only to one of the factors under consideration, with all economies displaying average behaviour in terms of all other variables. It is easy to show that the partial convergence rates β_k will add up to the observed rate of "total" (unconditional) convergence, β , obtained by regressing the relative growth rate of income per capita (Δy_{pcrt}) on initial relative income per capita (y_{pcrt}).

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