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BETA AND SIGMA CONVERGENCE: TWO DIMENSIONS OF REGIONAL DISPARITIES

Regional disparities are among the most enduring challenges that modern economies face. When some regions surge ahead while others are left behind, the consequences reach well beyond the statistical tables. Widening gaps in income and productivity drive labour away from lagging territories, draining them of skilled workers and of their working-age population, while at the same time straining the housing and infrastructure of the prosperous cores that absorb this inflow. Persistent divergence puts mounting pressure on public budgets through ever-larger transfers and unequal access to services, weakens the internal market by leaving part of a country's productive potential underused, and ultimately erodes the social and political cohesion on which stable development rests. It is for these reasons that gauging whether regions are drawing together or drifting apart has become a routine yet consequential task of regional analysis, since real decisions on the allocation of public funds depend on its outcome.

Yet the very term “convergence” conceals a subtle complication, for it denotes not one phenomenon but two. The distinction, now standard in regional economics, separates two senses in which a set of economies may be said to converge [1]. β -convergence is the tendency of poorer economies, other things being equal, to grow faster than richer ones; it is established by regressing the growth rate of per-capita income on its initial level, where a negative coefficient signals catching-up. σ -convergence, by contrast, is the tendency of the dispersion of per-capita income across territories to fall over time; it is captured through the trajectory of a measure of spread, most often the coefficient of variation or the Gini index. The two notions are related but not identical, and it is precisely the nature of the link between them that is decisive for sound analysis.

The key point is that β -convergence is a necessary but not a sufficient condition for σ -convergence [2]. Put more simply, poorer regions may grow faster than richer ones and yet the overall gap may fail to close,

because random fluctuations continually reshuffle regions within the distribution. The link between the two measures is therefore one-directional: β -convergence can occur without σ -convergence, whereas a genuine reduction of disparities is impossible without some catching-up. Ukrainian regional-economics scholarship draws the same distinction, treating σ -convergence as the narrowing of inter-regional differences and β -convergence as the accelerated development of poorer regions, while noting that temporary divergence may arise even while catching-up is under way [3]. This yields a simple but important caution: judging convergence from the β coefficient alone risks declaring success precisely when the gaps between regions have in fact remained unchanged. Table 1 summarises this comparison.

Table 1

Beta- and sigma-convergence: a comparative outline

Criterion	β -convergence	σ -convergence
Essence of the concept	An inverse relationship between the growth rate and the initial income level: poorer regions grow faster than richer ones	A reduction over time in the statistical dispersion of per-capita income across a set of regions
Object of measurement	The dynamics (mobility) of individual regions within the distribution	The state of inequality of the whole set of regions
Method of assessment	Regression of the average growth rate on the logarithm of initial income over a long period	Time-series analysis of a dispersion statistic
Typical indicator	Estimated β coefficient (a significant negative sign)	Coefficient of variation, standard deviation of logarithms, Gini index
What divergence means	A positive β coefficient: poorer regions grow more slowly and fall further behind	A rise in dispersion over time: the gap between the poles of the distribution widens
Interpretation for policy	A necessary but not a sufficient condition for narrowing gaps	A direct criterion that gaps are genuinely narrowing

Source: compiled by the author on the basis of [1; 2; 3]

Why, then, may the faster growth of lagging regions still fail to bring territories closer together? The answer lies in several interlocking mechanisms. To begin with, convergence is usually conditional rather than absolute: regions move not towards a single common point but towards their own steady states, defined by their human capital, institutions and economic structure, so that poorer regions with weaker fundamentals settle

at permanently lower levels. Added to this are agglomeration effects, which pull economic activity towards already-dense metropolitan cores and reinforce the advantage of leading regions even as national income grows, so that cumulative causation can outweigh the catching-up of the periphery. Acting together, these forces give rise to convergence clubs and a “twin-peaks” distribution, in which groups of regions gather around different centres of gravity rather than around a single shared level, and the cross-regional distribution ceases to collapse towards one mean [4].

It is on precisely this foundation that EU cohesion policy is built, which lends the distinction between β - and σ -convergence a thoroughly practical significance. Reducing economic disparities between regions is a treaty objective of the European Union and a central aim of its structural policy, and that policy operationalises the convergence concept directly: regions are classified by their per-capita output relative to the EU average, and those falling short of a defined threshold receive priority support from the Structural Funds and the Cohesion Fund [5]. The logic of this instrument can be read precisely in terms of the two measures. The policy’s ultimate goal is σ in nature: to lower the overall dispersion of regional incomes, that is, to render the EU space more homogeneous. The chosen mechanism, however, relies on β -type catching-up: targeted investment in the poorest regions is meant to accelerate their growth and thereby close the gap. Yet the mechanisms outlined above explain why this wager does not pay off automatically: if the assisted regions are converging towards lower steady states while the agglomeration cores grow at least as fast, β -type catching-up may coexist with a stable or even rising σ -dispersion. The effectiveness of cohesion policy is therefore properly judged not by the growth rates of individual recipients but by the trajectory of σ -indicators. It is the direct evidence of whether territorial gaps are genuinely narrowing.

In sum, convergence should be understood not as a single, self-evident process but as two distinct dimensions that may pull apart: the faster growth of lagging regions (β) does not guarantee a narrowing of overall disparities (σ). A sound analysis of regional development, and any evaluation of cohesion instruments, should rest first and foremost on σ -measures of dispersion computed on comparable, harmonised territorial units, while β -type catching-up is best regarded as evidence about the mobility of individual regions rather than as proof that the space is in fact becoming more homogeneous.

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