Sigma convergence approach

Being closely related to Beta convergence approach, Sigma convergence approach refers to variation of income or other indicators between countries or regions. A decrease in variation over time provides empirical evidences that Sigma convergence takes place. On the contrary, an increase in the measures indicates convergence among countries or regions. The standard deviation and the coefficient of variation of output per capita across regions or states are definitely the most frequently measures of Sigma convergence.

It should be noticed that Beta convergence is necessary but not a sufficient condition for sigma-convergence to occur (Paas and Schlitte, 2006). According to Monfort (2008, p. 3) this happen " either because economies can converge towards one another but random shocks push them apart or because, in the case of conditional Beta-convergence, economies can converge towards different steady states.

Boldrin and Canova (2001) test the Sigma convergence hypothesis by using the standard deviation of regional GDP per capita, labour productivity and unemployment rate. Including in their sample 185 EU15 regions, Boldrin and Canova (2001) detecting that the standard deviation of regional GDP per capita goes from 0. 27 in 1980 to 0. 25 in 1996, find some support for the sigma convergence hypothesis . However, the standard deviation of labour productivity although it oscillates widely over the sample period, ends taking in 1996 the same value as it had in 1980. Moreover, Boldrin and Canova (2001) find that there is no downward tendency for unemployment rate as the regions with higher that average unemployment rates in 1980 still have unemployment rates higher that average in 1996. Tondl (2001) examines the development of disparities in terms of GVA for capita for the EU9 regions.

Tondl (2001) finds that the standard deviation follows an upward tendency from 1975 to 1981. However, after 1981 the disparities start to decline and this tendency continues until 1994.

The work of Yin, Zestos and Michelis (2003) calculates the standard deviation of GDP per capita for the period 1960 to 1995. The researchers, considering different groups of European regions detect for each one the validity of Sigma convergence hypothesis. Yin, Zestos and Michelis (2003), identify a downward trend of standard deviation for the EU9, EU12 as well as the EU15 regions for the entire period. In addition, they find that with exception of the period 1980 to 1996 a sigma convergence process is taking place among the EU6 regions as well. Cappelen et al. (2003a) tries to identify the dispersion of GDP per capita in 105 EU12 regions for selected years between 1980 and 1997. Cappelen et al. (2003a) detect that the standard deviation of the European regions changed very little between 1980 and 1990. Nevertheless, the researchers find that after 1990 appears to have been a convergence, as the standard deviation have been decreased from 0. 30 in 1990 to 0. 27 in 1997.

Other researches, using the dispersion measure of standard deviation do not find strong evidences for the Sigma convergence hypothesis. Neven and Gouyette (1995) detect that disparities in 107 European regions tend to fluctuate for the period 1975 to 1989. The researchers observe that the disparities are reduced from 1975 to 1980, boost again until 1985 and fall thereafter. Cappelen et al (2003b) find only that the standard deviation of the 163 EU12 regions is slightly lower for the period 1980 to 1997. In addition, when Cappelen et al. (2003b) exclude for their sample the regions

of the old cohesion countries-namely Spain, Portugal and Greece, the standard deviation of regional incomes appears a moderate increase. Thus, Cappelen et . al (2003b, p. 326) argues that “ convergence incomes within the EU in the last two decades is mainly due to relatively fast growth in these three southern countries. Basile et al. (2005) do not also find evidence for sigma convergence for the EU12 regions. The standard deviation of regional GDP per capita tends not to reduce significantly during the period of 1975 to 1998. Moreover, Basile et al. (2005) in an analysis within countries finds that during the nineties there is a significant divergence between the Italian regions and a considerable invariance of the disparities within, Spain, France, Germany, and United Kingdom. Similar, LÃƒ Ã†’pez-Bazo et al. (1999), and Barrios and Strobl (2005) reject also the sigma convergence hypothesis for the EU12 regions between the period 1975 to 1992 and 1981 to 1998 respectively.

Giannias et al. (1999) investigate Sigma convergence by measuring the coefficient of variation not only for economic but also for social and quality of life indicators like inhabitants per sq. km of land area or doctors per 1000 inhabitants. Giannias et al. (1999) confirm that both for the EU12 and the EU15 countries real convergence was achieved for the period 1970 to 1980. Convergence presents a downward trend between 1980-85 and then it increases until the end of the sample in 1990.

Paas and Schlitte (2006), examine also the variation of regional income in the enlarged EU25 and in the two country groups – the EU-15 and the ten new member states during the years 1995-2002. For the EU25, Paas and Schlitte detect that there is a strong sigma convergence process as the

coefficient of variation of regional income decreases rapidly. Similar, the EU15 coefficient of variation shows a clear downward trend without although being as high as in the case of the EU25. In the case of the ten new member states the sigma convergence hypothesis is not supported as the coefficient of variation fluctuates during the whole period. In addition, Paas and Schlitte (2006) examine the within country convergence process for the EU15 and the EU10. The authors' calculations show that while the variance of regional income per capita is stable in all the EU15 countries, it increases in all the EU10 countries.

The research of Monfort (2008) tries to draw a clear picture of the sigma convergence across the EU, as it measures the coefficient of variation of regional GDP per capita for the EU27 as well as the EU15 regions. In the case of the EU15 regions for the period 1980 to 1996, the researcher finds strong evidences to support the sigma convergence as the coefficient of variation decreases from 0. 33 to 0. 28. However, from 1996 until 2005 it has remained stable in band of values between0. 28 and 0. 29. On the contrary, disparities reduce rapidly in the EU27 regions as the coefficient of variation falls from 0. 43 in 1995 to 0. 35 in 2005. On the other hand, when Monfort (2008) extends the analysis within the new member states, finds that regional disparities tend to increase, sometimes dramatically, as in Romania where the coefficient of variation rose from 0. 15 in 1995 to almost 0. 40 in 2005.

In addition, the Sigma convergence hypothesis has been adapted by the European Commission in its occasional reports on economic and social cohesion in the EU. In the first three reports the Commission measures the

development of regional disparities by calculating the standard deviation of GDP per head for the EU15 regions. The Commission finds only a slow sigma convergence process for the period 1983 to 1993 as the standard deviation decreases slightly. On the contrary, after 1993 the three reports show that regional disparities in the EU15 regions tend to increase, as the standard deviation of regional GDP per head rises from 26. 3 in 1993 to 27. 8 in 1998. In addition, the sigma convergence analysis within countries detects that during the nineties there are notable divergence tendencies in Spain, Finland, Sweden, Greece, The Netherlands as well as in the UK.

The forth report on economic and social cohesion includes its analysis and the New member states from the Eastern and Central Europe. In this case, the Commission detects strong evidences for the validity of sigma convergence hypothesis in the EU 27 regions. Specifically, in the forth report is presented that the coeffiecient of variation of the regional GDP per head decreases by more than 7% for the period 2000 to 2006.

Not surprisingly, the literature of Sigma convergence approach obtains different results for the Sigma convergence process at the EU-15 as well as at the EU-27 level. In the case of the EU15-which is covered by the majority of the literature-the evidences show that sigma convergence was taking place from the eighties until the mid nineties. It can be argued that sigma convergence was taking place until the mid nineties due to the fact that the poorest regions in the old cohesion countries were catching up on the Union’s richest ones (Monfort, 2008). However, this catching up process seems to have stopped after the mid 1990s, as no one of the sigma convergence indicators shows a downward trend in the EU15 regions.

On the other hand, the literature shows than in the EU27 regions regional disparities continue to decrease rapidly since the late nineties. Such as in the case when the old cohesion countries joined the EU, and in this case of the Central and Eastern Enlargement the main reason for the sigma convergence process seems to be the rapid growth rate of the poorest regions in the new Member states relative to the EU’s richest regions.

Finally, literature shows that although regional inequalities decrease when considering the EU as whole, does not happen the same within the new Member states where regional disparities tend to increase in the most cases.