

but identify convergence clubs based on geographical divides between North/South and Western/Eastern Member States. Finally, looking at determinants of convergence for the timespan 1995-2005, Crespo-Cuaresma et al. (2014) establish that the catching up process of regions in new Member States is driving between-country convergence while within-country convergence mostly takes place in regions of the core Member States. Unsurprisingly, regions with a capital city also grow faster.

Overall, the literature on regional convergence within the European Union is rich in explanations for the catching-up process, or the lack thereof. The main takeaway is that economic disparities are long-lasting and that convergence between countries may not necessarily translate into a catching-up process between regions or evenly distributed gains on a regional level. Nonetheless, as most of the aforementioned studies use data that are at least a decade old, they could not have foreseen the future enlargement waves of the European Union, and the inclusion of Eastern European countries with very different regional levels of development. To the best of our knowledge, our work is one of the very few studies extending the analysis horizon up to 2014 while also taking into account all phases of EU expansion. In this sense, it is interesting to analyse the convergence process for subsequent expansion phases of the EU and verify if the trade-off between convergence on a country level and divergence on the regional level still persists.

4. Empirical Strategy

Our work contributes to and supplements the findings of existing literature by taking into account recent economic developments and providing a combined spatial and economic decomposition of existing disparities. We use data on gross value added (GVA) as a proxy for GDP, employment and population from Cambridge Econometrics and analyse the distribution of economic activity within the European Union for a sample of 189 regions for the time period 1991-2014.

GVA is a measure of economic activity, defined as the regional output less intermediate consumption. The data is deflated to 2005 prices and thus real, the unit being 2005 Euro. For employment and population, it should be noted that employment is measured at the workplace, while population is registered at the residency, which can result in some distortion of the results, as commuting is disregarded. However, as we use quite large regions, the effect should be minor.

In our analysis, we take into account the different phases of European enlargement and simulate the evolution of disparities in economic activity for five different groups of countries: EU-12, EU-15, EU-25, EU-27 and

EU-28. We use data on NUTS 2 level, with a number of exceptions: NUTS 1 data is used for Belgium, Germany, the Netherlands, Greece and the UK. Malta, Luxemburg, Latvia, Lithuania, Cyprus and Estonia enter our calculations on NUTS 0 level. We also eliminate a number of regions, due to their remote geographical positions: Spanish Canarias, Ceuta and Melilla, Portuguese Azores and Madeira, Finnish Aaland and French Departments d'Outre Mer. A complete list of regions can be found in Annex 2.

Our analysis employs the Theil Index of concentration to measure differences in economic activity between groups. The main advantage of the Theil index is its decomposability. Inequality varies not just between countries, but also between regions, which has different policy implications for development (World Bank Poverty and Inequality Handbook, 2009). We first examine the development of GVA disparities over time between and within countries and then build up on Terrasi (2000) and Bracalente and Perugini (2010) to decompose these disparities into the contributions of employment and productivity. Another additional decomposition breaks disparities down geographically into the contributions of differences between countries, and regional differences inside the single countries.

We are thus able to provide both an economic insight into how the evolution of different variables affects inequality in production across the EU, as well as a spatial perspective, by displaying the contribution to inequality of various levels of territorial aggregation.

The Theil index is part of the Generalized Entropy class of inequality indicators. The generic formula is given by:

$$T = \sum_{i=1}^n \left[\frac{a_i}{A} \ln \left(\frac{\frac{a_i}{A}}{\frac{b_i}{B}} \right) \right]$$

a_i and b_i being the value of some variable (e.g. GVA or population) for each group, and A and B representing the sum of the respective variables over all the groups. The Theil index is always positive, but the contributions of the groups can be either positive or negative. When a group has an equal share of both variables analysed, then the ratio will be one, and the contribution to inequality will be zero. (Conceicao, Ferreira, 2000) It thus takes values between zero and infinity, with zero representing a perfectly equal distribution of variables. Detailed technical specifications can be found in Annex 1.

We employ the Theil index to measure inequality in terms of economic activity, which has to be clearly separated from personal income inequality across the inhabitants of the EU. We use the term inequality to refer to the disparities between the regions of the EU in terms of economic activity, the share of employed people and productivity, expressed in value added for

each employed person of a region. Inequality is therefore used as a synonym for these disparities or differences in this context.

5. Results

Figure 5 shows how inequalities in regional economic activity in the EU have evolved over time with each subsequent wave of enlargement. We observe a trend of slowly rising disparities in the core Member States (EU-12 and EU-15, corresponding to the enlargement rounds in 1993 and 1995) and a drastic increase in inequality with the addition of new Member States for each phase of European expansion. New Member States appear to catch up – we observe shrinking inequality until the crisis sets in in 2009. Following the recession, this process of convergence is slowed down – however this is due to rising employment disparities in the core Member States, as we will show in the next section.

Now we turn to the decomposition of the Theil index into its geographical hierarchical components: figures 6 and 7 compare the contributions to total inequality of differences between countries with the contribution of regional disparities. We observe very different drivers of disparities: for EU-12, it is differences between regions that drive total disparities, whereas for EU-27, it is differences between Member States. Furthermore, the Theil index for EU-12 has risen quite significantly since 2009, while the Theil for EU-27 is relatively constant, suggesting a different evolution of disparities for different country groups.

Austria, Finland and Sweden joining the EU does not change much in terms of inequality, as EU-12 and EU-15 have an extremely similar evolution and comparable overall level of economic development between countries. As we turn to looking at EU-27 (after the enlargement round of 2007) in Figure 7, however, we see that the substantial jump in total inequality in Figure 5 is mostly due to differences between countries, that seem to be the driver of the trend in the overall Theil index, while within-country contributions are relatively stable. With Romania and Bulgaria joining the EU in 2007, the between-country contribution is further exacerbated, given the currently very heterogeneous levels of development of EU Member States.

To examine the evolution of regional disparities within countries, we calculate individual Theil indexes for selected Member States (Figure 8). We observe shrinking disparities in economic activity for some core countries such as Germany, Austria, Belgium or Portugal. Nevertheless, the tendency is towards increasing levels of regional inequality, which is most dramatic in Eastern European countries such as Romania, Bulgaria, Hungary and Slovakia. Overall, increases in regional disparities are wide-