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EXTENDED ABSTRACT

Title: Decomposing changes in regional inequalities: a shift-share approach

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Subject area: S06 – Measuring regional changes: the spatial shift-share

Abstract:

Numerous studies have documented the increases in within-countries income inequalities. Countries are composed by different macro-regions, regions and sub-regions where different factors are operating, generating the results of income inequality between territories. There is a growing empirical literature emphasizing the geographic dimension of income inequality. There seems to be a consensus on the fact that regional income inequality increases as the geographical scale in which it is observed increases (Novotny, 2004). Nevertheless, although many studies have been conducted concerning the relationships among the measures of regional inequalities at different spatial levels (Benjamin et al., 2014), thorough analysis about the relationships among the changes of these measures of regional inequalities at different spatial levels are still rare. Thus, no studies can be found that directly decompose the changes in the measure of regional inequalities considering the influences of inequalities calculated at different geographical levels. Under these circumstances, it would seem interesting to decompose the changes in a measure of regional inequality in such a way that the role of inequality from the different spatial hierarchical levels could be quantified. This paper provides a methodological framework for studying the changes in regional income inequalities by

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considering the influences of changes in income inequalities at different territorial levels. Starting from a three-level hierarchical structure (for example: a) countries, regions, provinces; b) macro-regions, regions, counties; or c) regions, provinces and municipalities), the main purpose is to decompose the change (growth) in a measure of income inequality at the lowest geographical level.

The basic idea is to attribute the growth of a measure of income inequality at the lowest geographical level (provinces in the previous example a)) to the evolution of inequality between countries, to the greater or lesser preponderance of inequality at the country or regional level, and to the higher or lower inequality at provincial or regional level. This idea would require the use of a technique allowing the introduction and analysis of inequalities measured at different geographical levels. Thus, the drivers of regional inequalities will be explored by accounting for the measures of regional inequalities at different spatial levels by means the shift-share technique.

The standard shift-share analysis proposed by Dunn (1960) decomposes the growth of a socio-economic variable into three components: the national growth effect, the structural or industry mix effect and the regional or competitive effect:

$$g_i x_{i,r}^t = G x_{i,r}^t + (G_i - G) x_{i,r}^t + (g_i - G_i) x_{i,r}^t = NE + IM + CE \quad (1)$$

where g_i represents the growth of the socio-economic variable x in sector i for the region r , and g is the growth of x in all sectors for the region r . G_i and G are defined similarly to g_i and g at the national level. Besides, NE is the national growth effect, IM is the industry mix effect and CE is the regional shifts or competitive effect.

This paper proposes a way to decompose the growth of inequalities calculated at regional level by using a shift-share approach. This decomposition of the growth of a measure of regional inequality highlights the role that the different components exert over regional inequality. This is an important point of contrast between our approach and previous studies that also analyze regional income inequality. Thus, the main contribution of this paper is to show a decomposition of the growth of the income inequality that allows to identify different effects. Therefore, we present different effects that may provide important information in helping to fight against income

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inequalities at regional level. The first effect is the global inequality effect (GE). It measures the change observed in the inequality index calculated for the case of the provinces in the year t that can be attributed to the evolution of the inequality between countries in the European Union. This component determines the change in inequality that is motivated by the inequality between countries.

The second effect is the structural mix inequality effect (SMIE). The SMIE is the part of change explained by the difference between the inequality at regional level and the inequality between countries. This effect evaluates whether inequality is higher at regional level or between countries. It would be the part of the change that is explained by the regional structure of the countries. Finally, the third component is the regional inequality effect (RIE). This effect compares the change of inequality at provincial level with that registered at regional level. It determines whether inequality in the provinces is higher or lower than inequality in the regions.

In this paper, the growth of regional inequalities will be measure by means the Theil index. Theil index (Theil, 1967) is usually considered a static measure of regional inequality (Shankar and Shah, 2003). Consequently, the majority of studies using the Theil index have focused on both the analysis of this measure of regional inequality and their descriptive time evolution. The decomposition of the growth of inequalities of the Theil index that it is shown in this paper would make it possible to obtain three components within the change (growth) of inequality. As these components contemplate the different geographical results of inequality, the proposal allows to identify the geographical source of changes in income inequality for the lowest territorial level considered in the analysis. From this approach, it is possible to study how regional inequalities arises from changes of income inequalities at different geographical levels.

The decomposition will be illustrated presenting some results from our proposal by decomposing regional European inequalities at NUTS3 level¹. For this, they will be considered three geographical levels: countries, regions (NUTS2 regions) and provinces (NUTS3 regions). Hence, the empirical application will decompose changes in the measure of European NUTS3 regions into three components. Each of these components

¹ Level 3 within the European Nomenclature of Territorial Units for Statistics (NUTS).

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will inform about how territorial inequality is influencing on the changes in European NUTS3 regions. Thus, we propose to decompose the growth of the Theil index calculated for the case of the NUTS3 European regions, where: $TheilP_t$ is the Theil index calculated for the case of the European NUTS3 regions in the year t ; $g_{(p,t+1)}$ is the rate of growth of $TheilP_t$ between $t+1$ and t , that is, the annual growth in $t+1$ of the Theil index calculated for the case of the European NUTS3 regions; $TheilC_t$ denotes the Theil index for the European Countries and $TheilR_t$ is the Theil index for the European NUTS2 regions. The source of the dataset used in the analysis of the European regions is Eurostat (2021). Our sample covers 25 countries for the period 1993-2018. These countries were disaggregated into 275 NUTS2 and 1318 NUTS3.

Consequently, we will calculate the following effects: Global inequality effect (GIE). It measures the change observed in the Theil index calculated for the case of the European NUTS3 regions in the year t that can be attributed to the evolution of the inequality between countries in the European Union. This component determines the change in inequality that is motivated by the inequality between countries. Structural mix inequality effect (SMIE). It is the part of change explained by the difference between the inequality at regional level (NUTS2) and the inequality between European countries. This effect evaluates whether inequality is higher at regional level or between European countries. It would be the part of the change that is explained by the regional structure of the European countries. Regional inequality effect (RIE). It compares the change of inequality at NUTS3 level with that registered at NUTS2 level. It determines whether inequality in the European NUTS3 regions is higher or lower than inequality in the European NUTS2 regions. The corresponding expression should be corrected due the difference in sizes associated to each component, it can be done using a relative Theil measure. Next, following Akita (2003), a hierarchical geographical nested Theil index can be decomposed using a two-fold (between-within) or a three-fold approach (between regions, between provinces, and within provinces). Based on those ideas, collapsing the NUTS3 data into a NUTS2, it makes possible to calculate a Theil Index on NUTS2 (regional level). Consequently, using NUTS0 as a grouping criteria, a two-fold decomposition can be performed. From the two decompositions, by adding both expressions, we can consider all the, and a new one decomposition appears.

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Capturing if the growth of income inequality is becoming more or less influenced by changes in inequality at other geographical levels can inform about the geographical levels where the determinants of regional income inequality are operating. This would help in identifying the relevant factors of regional income inequality. Understanding regional inequality is a complex process that requires further research, although the decomposition of the changes in regional inequality proposed in this paper could help to focus the geographical level where economic policies should be directed.

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* Supported by Ministerio de Ciencia e Innovación (Grant/Award No. PID2019-109687GB-I00) and Junta of Extremadura (Spain), European Regional Development Fund (Grant/Award No. GR18124).

Keywords: *regional income inequality; decomposition, shift-share*

JEL codes: *C43, C10, R12, R19*

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