ANNEX C

Indexes and Formulas

Part I – Regional focus on innovation and Part II – Regions as actors of national growth

Geographic concentration index

Definition: The Geographic concentration index for the variable *y* (*e.g.* population, GDP, etc.) is defined as:

$$\left[\sum_{i=1}^{N}\left|y_i - a_i\right| \Big/ 2\right] * 100$$

where y_i is the share of region *i* to the national total, a_i is the area of region *i* as a percentage of the country area, *N* stands for the number of regions and | | indicates the absolute value.

The index lies between 0 (no concentration) and 100 (maximum concentration) in all countries and is suitable for international comparisons of geographic concentration.

Interpretation: The geographic concentration index offers a picture of the spatial distribution of a certain variable within a country, as it compares the share of the variable and the land area of each region. Differences in geographic concentration between two countries may be partially due to differences in the average size of regions in each country. A comparison in the rate of change of the concentration index in two countries indicates the speed that the country is moving to capture agglomeration economies.

Part III – Making the most of regional assets

Gini Index

Definition: Regional disparities are measured by an unweighted Gini index. The index is defined as:

$$GINI = \frac{2}{N-1}\sum_{i=1}^{N-1}\left|F_i - Q_i\right|$$

where *N* is the number of regions, $F_i = \frac{i}{N}$, $Q_i = \frac{\sum_{j=1}^{i} y_j}{\sum_{i=1}^{n} y_i}$ and y_i is the value of variable *y* (*e.g.* GDP per capita, unemployment rate, etc.) in region *j* when ranked from low (y_1) to high (y_N) among all regions within a country.

The index ranges between 0 (perfect equality: *y* is the same in all regions) and 1 (perfect inequality: *y* is nil in all region except one).

Interpretation: The index assigns equal weight to each region regardless of its size; therefore differences in the values of the index among countries may be partially due to differences in the average size of regions in each country.

Weighted coefficient of variation

Definition: Regional inequalities can be measured by a weighted coefficient of variation. The weighted coefficient of variation of variable *y* (*e.g.* GDP per capita) in a country *i* is defined as:

$$CV = \frac{1}{\bar{y}_i}\left\{\sum_{j=1}^{N}\left[\left(y_{i,j} - \bar{y}_i\right)^2\left(\frac{p_{i,j}}{p_i}\right)\right]\right\}^{1/2}$$

where $y_{i,j}$ is the variable *y* in region *j* of country *i*; $\bar{y}_i$ is the country average of variable *y*; $p_{i,j}$ and p_i are, respectively, the population of region *j* and country *i*.

Interpretation: The weighted coefficient of variation is a relative measure of dispersion standardised with the mean value of the variable; the differences from the mean are weighted by the share of national population living in the region. The coefficient of variation is independent by the size of the variable and therefore usually adapted to measure a country's inequality over time.

Part I – Regional focus on innovation and Part III – Making the most of regional assets

Specialisation index

Definition: Specialisation is measured according to the Balassa-Hoover index, which measures the ratio between the weight of an industry in a region and the weight of the same industry in the country:

$$BH_i = \frac{Y_{ij}/Y_j}{Y_i/Y}$$

where Y_{ij} is total employment of industry *i* in region *j*, Y_j is total employment in region *j* of all industries, Y_i is the national employment in industry *i*, and Y is the total national employment of all industries. A value of the index above 1 shows specialisation in an industry and a value below 1 shows lack of specialisation.

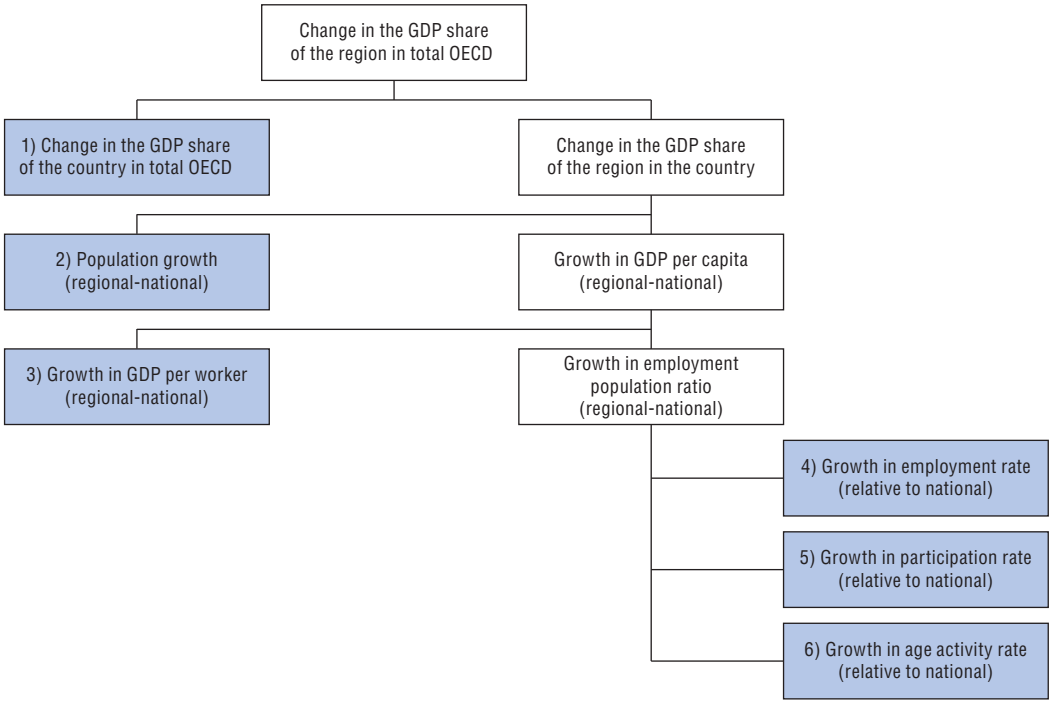
Interpretation: The value of the specialisation index decreases with the level of aggregation of industries. Therefore, the specialisation index based on a 1-digit industry (*e.g.* manufacturing) would underestimate the degree of specialisation in all 2-digit industries belonging to it (*e.g.* textile, chemistry, etc.).

Part IV – Key drivers of regional growth

Marked variation in regional growth rates occur as a result of differences in endowments and assets within regions, as well as regions' ability to mobilise these resources. Regional benchmarking helps identify the factors behind certain regions' success and the existence of unused resources in others by comparing a region's growth rate to that of all other OECD regions. Successful, competitive regions tend to grow relatively faster and therefore raise their share of GDP in the OECD. This is the joint result of several factors, both regional and national. In order to account for the contribution of these different factors, this

part breaks down changes in each region's share of GDP in total OECD GDP into: 1) national factors; 2) labour productivity; 3) employment rates; 4) participation rates; 5) age activity rates; and 6) population. Each of these components can be viewed as an indicator of the determinants of economic performance at the regional level.

Decomposing growth rates



Methodology for decomposing regional GDP growth

The share of region *i* in the total GDP of the *OECD* can be written as:

$$1.\ \frac{GDP_i}{GDP_{OECD}} = \frac{GDP_j}{GDP_{OECD}} * \frac{GDP_i}{GDP_j}$$

where *j* denotes the country of region *i*. The GDP share of region *i* in country *j* is then equal to:

$$2.\ \frac{GDP_i}{GDP_j} = \frac{GDP_i/E_i}{GDP_j/E_j} * \frac{E_i/LF_i}{E_j/LF_j} * \frac{LF_i/WA_i}{LF_j/WA_j} * \frac{WA_i/P_i}{WA_j/p_j} * \frac{P_i}{p_j}$$

where *P*, *E*, *LF* and WA stand, respectively, for population, employment, labour force and working age (15-64) population. Therefore the GDP share of region *i* in country *j* is a function of its productivity, employment rate, participation rate, age-activity rate and population, relative to, respectively, the productivity, employment rate, participation rate, age-activity rate and population of its country defined as following:

- Productivity is defined as GDP per worker (GDP/E), where employment is measured at the place of work.
- The employment rate is defined as the per cent of labour force that is employed (E/LF), where the labour force is the sum of employed and unemployed.

- The participation rate is the ratio between the labour force and the working age population (LF/WA), where the working age population is the population in the ages 15 to 64.
- The activity rate is the population in the working age class (ages 15 to 64) as a per cent of the total population.

By substituting equation 2 into equation 1, taking the logarithm and differentiating it, one obtains:

$$3.\ \left(g_i - g_j\right) = \left(g_{p,i} - g_{p,j}\right) + \left(g_{e,i} - g_{e,j}\right) + \left(g_{lf,i} - g_{lf,j}\right) + \left(g_{wa,i} - g_{wa,j}\right) + \left(g_{p,i} - g_{p,j}\right)$$

or, equivalently:

Difference in GDP growth between region *i* and the country *j*	=	Growth difference in GDP per worker between region *i* and country *j*	+	Growth difference in the employment rate between region *i* and country *j*	+	Growth difference in the participation rate between region *i* and country *j*	+	Growth difference in the activity rate between region *i* and country *j*	+	Growth difference in population between region *i* and country *j*

Part V – Competing on the basis of regional well-being

Age-adjusted mortality rates

Definition: The age-adjusted mortality rate of a region *i* is defined as the sum over the age group g (g = 1,…, G) of the product of the mortality rate in the age group *g* and the share of the standard population in the same age group.

$$MR_i = \sum_{g=1}^{G} M_{g,i} \times P_{g,std}$$

where MR_i is the age-adjusted mortality rate in region *i*, $M_{g,i}$ is the mortality rate in the *g-th* group of the region, and $P_{g,std}$ is the share of the standard population in the age group *g*.

Part I – Regional focus on innovation and Part V – Competing on the basis of regional well-being

Spearman correlation coefficient

Definition: The Spearman correlation coefficient is a measure of association between two variables to test whether the two variables covary, that is to say whether as one increases the other tends to increase or decrease. The two variables are converted to ranks and a correlation analysis is done on the ranks. The Spearman correlation coefficient varies between –1 and 1 and the significance of this is tested in the same way as for a regular correlation.

In this publication, for each country three Spearman correlation coefficients are computed between the TL2 regional values of a certain variable (for example, mortality rate, municipal waste, labour force with tertiary educational attainments, etc.) and the share of population in the TL2 regions living, respectively, in predominantly urban (PU), intermediate (IN), or predominantly rural (PR) TL3 regions.

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