QUALITY OF LIFE IN COUNTRIES AND REGIONS OF EUROPE, AMERICA, ASIA AND OCEANIA: SUBJECTIVE AND OBJECTIVE INDICATORS, 2000-2020

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Abstract:
We present a comparison of 7 indicators of Quality of Life in OECD countries with the World average and with several countries with more than 100 million population (India, China, Rusia, Brazil and other ones) for the period 2016-2019, founding a higher quality in OECD averages. Among OECD countries we make a comparison of 7 indicators of Quality of Life: the subjective indicator of Life Satisfaction, 3 objective indicators with positive impact (Disposal income per capita, Life Expectancy and Educational Level of Population) and 3 objective indicators with negative impact (Unemployment rate, Homicides rate and Pollution PM2.5). We analyze the regional distribution of 6 indicators in 372 OECD regions in year 2016. The Educational level of Population is, accordingly to the empirical evidence of international econometric models, one of the main factors explaining high levels of quality of life, both at national and regional level, due to its indirect effects on other objective indicators, contributing to increase positive factors and to diminish the negative ones. We include 2 Annexesa: Annex 1 with the number of Highest, Middle and Lowest ranking positions in Quality, among 33 OECD countries of America, Europe, Asia and Oceania, and Annex 2 with data of 372 regions comparing two evaluations of regional income per capita at Purchasing Power Parities.

Keywords: Well-being, Life Satisfaction, Environmental quality, Regional Income per capita, Development, Europe, America, Asia, Oceania
JEL classification: I31, O51 O52 O53 O57, R11, R15

1. Introduction

Section 1 presents data of 7 indicators of Quality of Life of OECD average in comparison with World average and several of the most populated countries for the period 2017-2019. Many OECD countries show a relatively high value of Life Satisfaction in comparison with other areas due to the high values of the several important objective indicators with positive impact (like income per capita, peace, voice of citizens) and the low values of several important objective indicators with negative impact on Life Satisfaction (like unemployment rate, violence, political instability, pollution level), as seen in the international econometric models of Guisan(2021 a, b) and Guisan(2022) among others. We summarize the most outstanding data of increases and diminution for that period.

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Section 2 presents a comparison of objective and subjective indicators of Quality of Life in OECD countries. Section 3 shows the regional distribution in year 2016. Section 4 prsesnts de main conclussions. The Annex include data of several indicators of regional development in 372 regions, and an international comparison of regional inequalities in the distribution of real income per capita.

2. Comparison of average values of 8 indicators in the OECD and the World.

In Guisan(2022) we have cited several studies related with international comparisons of Quality of Life, as the interesting analysis of individual Well-Being in European countries published by Somarriba and Pena(2008), and other studies at regional or country level.

As seen in Guisan(2021), (2022) and other studies, the 36 OECD countries of this study have higher averages in several positive indicators of quality of life than World average: Life Satisfaction, Income per capita, Educational Level of Population, Voice of Citizens, Peace and Political Stability.

Table 1 shows the OECD averages together with World average in several positive and negative indicator, showing that OECD average is higher in the positive indicators and lower in the negative indicators of Quality, in comparison with many other countries and World average.

Table 1. Indicators of Quality of Life in OECD and 11 countries with more than 100 million inhabitants, around years 2017-2019 and change of Life Satisfaction for 2003-2020

Countries	Life Satisfation 2019 (1)	Production per capita 2019 (2)	Life Expectancy 2020 (3)	Homicides rate 2017 (4)	Voice of citizens 2019 (5)	Peace 2019 (6)	Pollution 2017 (7)	Change of (1) (8)
OECD	6.7	49947	80	2.6	7.4	5.9	14	0.15
Brazil	6.3	14759	76	29.5	4.1	3.9	12.7	-0.34
China	5.3	16092	77	0.6	6.3	4.7	52.7	1.02
India	3.8	6717	70	3.2	5.8	3.6	90.9	-1.57
Indonesia	5.3	11812	72	0.5	5.7	5.5	16.5	0.29
Pakistan	4.9	4690	67	4.4	3.9	2.8	58.3	-0.71
USA	6.9	62555	79	5.3	7.6	4.2	7.4	-0.20
Bangladesh	5.0	4754	73	2.5	3.4	4.8	60.8	0.84
Japan	5.9	41477	84	0.3	8.2	6.6	11.7	-0.48
Mexico	6.3	19701	75	19.3	4.7	3.4	20.9	-0.45
Phillipines	5.9	8915	71	11.0	5.1	4.0	18.1	1.23
Russia	5.5	27211	73	10.8	5.1	2.5	16.2	0.49
World	5.5	16135	73	6.2	5	5	46	0.15

Sources: (1) WHR 2021 (around years 2017-2019). (2) WB, Production per capita in 2019 (Dollar at 2017 prices and purchasing power parities. Mean OECD is the non weighted average of countries. (3) OECD weighted average of year 2019 from OECD(2021) Health at a Glance. Countries in table 1 data of 2019 from WB(2022). (4) Homicides rates per 100 thousand people from WB(2022) (5) and (6) from Guisan(2022), being (5) de indicator X2 calculated from WB Quality of Government and (6) the indicator of Peace calculated from IEP(2021). Indicastor (7) from Indexmundi,(2022) based on Brauer et al (2017) Mean annual exposure to PM2.5 micrograms per cubic meter of air. (8) Change in the indicator of Life Satisfaction, for the period 2003-2020, country data from Ortiz-Espina and Roser (2021). For OECD calculated non weighted average by the author.

There are 2 African countries with more than 100 million inhabitants Nigeria and Egypt. Life Satisfaction in year 2017 was 4,3 in Egypt and 4.8 in Nigeria. More information about African countries in the studies by Guisan(2021) and Guisan and Exposito(2021).

As Seen in Guisan(2022) it should be convenient to analyze with more detail the value of Life Satisfaction in India, age, gender, geographical areas, working conditions, and other factors. Lall(2018) points to the diminution of that indicator of Life Satisfaction in India. There are other estimations that indicate a higher average than the WHR values for this country as published by Jain(2021).

Comparison of OECD average with countries of table 1 and with World average:

(1). *Satisfaction with Life*, from UN World Happiness Report, show an average of OECD countries much higher than World average and high in comparison with many countries of table 1. Among the countries with more than 100 million inhabitantants, the highest averages correspond to the United States (6.9), Brasil (6.3), Mexico (6.3), Japan (5.9) and Phillipines (5.9). Slightly over World average are Russia (5.5), China (5.3) and Indonesia (5.3). Very close to World average are Pakistan (4.9), Bangladesh (5.0), and below World average India (3.8).

The low value of India is surprising because the subjective indicator Life Satisfaction has decreased for the period 2003-2020 as seen in Ortiz-Espina and Roser(2021), in spite of some improvements in several objective indicators. Jain(2021) states: *"According to HappyPlus Consulting's The State of Happiness report, India might be among the top 25 happiest countries in the world, with a happiness score of 6.84. This is contrary to the UN's World Happiness Report 2022, which recorded India's happiness score at 3.77. Both studies used comparable questions to get the anchor happiness score*."

Accordingly to the econometric relationship between objective and subjective indicators of Quality of Life we would suggest that a realistic indicator for many areas of India should be an intermediate position, not so low as 3.8 nor so high as the value 6.8 suggested by alternative measures.

(2) *Income per capita, at Purchasing Power parities*. It is important to compare countries income per capita, accordingly to Purchasing Power Parities (PPP) instead of Exchange Rates (ER), when there are great differences between both units of conversion in a commong currency. Table 1 includes an indicator of Income per capita, given by Gross Domestic Product per capita in Purchasing Power Parities.

Among the countries with more than 100 million inhabitants, 2 OECD countries (the USA and Japan) have a level of Gross Domestic Product per capita very much higher than World average. At a lower level, Russia and one OECD country (Mexico) are also over World average. One OECD country (Brazil) and China are slightly below World average, and the other countries of the table were in year 2019 below World average: India (6717), Indonesia (11812), Pakistan (4690), Bangladesh (4754), Phillipines (8915).

(3) Life Expectancy: The average of OECD countries is over the non-OECD countries of the table. The highest value among countries of Table 1 correspond to one OECD country (Japan with 84). Values of 75 and over, among countries with more than 100

million inhabitantans correspond to 4 OECD Countries (Brazil, Japan, Mexico and the USA) and one non-OECD country (China).

(4) *Homicides Rate per 100 thousand people:* The interesting UN(2019) Global Study on Homicide, indicates and average rate of 6.2 at World level, with the averages of Asia (2.3), Europe (3.0) and Oceania (2.8) clearly below World average. Africa has a high rate of 13 and America a very high average of 17.4.

There is a great difference by gender regarding homicide victims, as seen in table 2.

Table 2: Homicides rates in OECD and in the World by Continent
(% per 100 thousand people by gender of victim)

	Men	Women	All
OECD	4.4	0.9	2.6
Africa	21.5	4.5	13.0
America	31.2	3.6	17.4
Asia	3.1	1.5	2.3
Europe	4.3	1.7	3.0
Oceania	3.9	1.8	2.8
World	9.9	2.3	6.2

Sources. Elaborated from UN(2017) and OECD(2022).

Among the 3 American countries of table 1, the USA has a lower homicides rate (5.3) than Mexico (19.2) and Brazil (29.5). There are many differences among regions within a country. For example in the USA the lower values correspond to 15 states with rates lower than 3 and the highest to 7 states with values higher than 8, being the maximum values thos of Washington D.C. (20.4) and Louisiana (11.8). In the case of Mexico there are a few states with homicides rate lower than 4 (Aguascalientes and Yucatan) and 7 states with values higher than 30 (Baja California, Colima, Chihuahua, Guerrero, Morelos, Sinaloa and Zacatecas).

Among the countries with more than 100 million inhabitants, the lower homicides rates correspond to 3 Asian countries: China, Indonesia and Japan.

(5) Voice of Citizens: Is one of the most important indicators of quality of Government. World Bank provides data based on the approach by Kauffman et al. Our data have been calculated in a decimal scale from that source that was in the scale -2.5 yo 2.5, and appears in Guisan(2021 b). The non weighted average of OECD countries amounted to 7.4, much higher than World average (5). Among the countries listed in table 1 the highests values corresponded to Japan (8.4) and the USA (7.6), and the lowest to Pakistan and Bangladesh. As seen in the econometric model by Guisan(2021), and in other studies, the educational level of population has usually a positive impact on this indicator of quality, and the indicator has a positive impact on Life Satisfaction.

(6) *Peace*: Is an indicator calculated as 10 less the value of the indicator of Conflict in the statistics of EIP. Countries with low Conflictiveness have high values of this indicator. The OECD average is over the World average. The countries with the highest levels in table 1 were Japan and Indonesia.

(7) *Pollution level of PM2.5* (particles of 2.5 micrograms per cubic meter of air) . The OECD average was 14, much lower than World average (46). Among the countries with more than 100 million people, the lowest values correspond to the USA (7.4), Japan(11.7), Brazil(12.7). Russia (16.2), Indonesia (16.5), Phillipines(18.1) and Mexico(20.9). The worst quality, with the highest level of this indicator of Polluiton in table 1 corresponded to India (90.9), Bangladesh(60.8), Pakistan (58.3) and China(52.7), over the World average. Among OECD countries the indicator was between a minimum of 2.3 in Iceland and a maximum of 28.6 in Korea R. At world level there were 50 non OECD countries will pollution higher than OECD maximum, with the highest values, accordingly to Indexmundi(2017), based on Brauer et al(2017) higher than 90..

The Website of Indexmundi presents rankings and the evolution of each country for the period 1990-2018. This source indicates a diminution of World average from 50 to 46 for the period 2010-2017

(8) *Change in Life Satisfaction for 2003-2020*: Phillipines, China and Bangladesh are the countries of table 1 with highest increase in Life Satisfaction for the period 2003-2020. Other countries with positive change, in table 1, were Indonesia and Russia The World average and the average of OECD countries, increased 0.15 points. Countries with negative change in table 1 were: Brazil, India, Pakistan, USA, Japan and Mexico.

3. Rankings of 6 indicators in OECD countries

Table 3 shows the position of each OECD countries in the rankings of 6 criteria of quality of life, based in data from OECD(2022) corresponding to year 2016.

The 6 indicators were included in the study by Guisan(2022) of an interregional econometric model between Life Sastisfaction (R13) and several objective indicators: 2 indicators with positive impact (R4 and R7) and 3 with negative impact (R3,R5 and R8).

R13 = Life Satisfation (escale 0 minimum to 10 maximum)
R4 = Disposal income per capita in year 2016 at country level from OECD regional statistics in Dollars at constant prices of year 2010).
R7 = Life Expectancy (years of life expected)
R3 = Unemployment rate (% of Active Population=
R5 = Homicides rate (number per 100000 populaltion)
R8 = Pollution (PM2.5) (microns per cubic meter of air)

Table 3 includes the 6 indicators abovementioned and the following ones:

R4X= Disposal Income per capita at country level (including Income in kind), in year 2016, in Dollars at PPPs and prices of year 2010. Calculated by multiplying R4 of the USA by the ratio of R4* of each country to the value of R4* of the United States.

R4*=Disposal Income per capita (including Income in kind), at Purchasing Power Parities (PPPs) of 2016 fron OECD Naional Accounts statistics in year 2016.

R9 as indicator of the educational level, given by the percentageof Labour Force with “at least secondary education” from OECD regional statistics for year 2016.

We may notice a great difference in several countries, like Mexico, because the ratio between the values of R4 in OECD regional Statistics of year 2016 is too small in comparison with values measured in PPPs in the OECD National Accounts Statistics.

The values of R4X seem, generally, more realistic for international comparisons.

Table 3. Country data, form OECD statistics, for Quality of Life in year 2016

	R13	R4	R4X	R4*	R7	R3	R5	R8	R9
Australia	7.3	27698	32136	38939	82.2	5.7	0.9	5.1	83.3
Austria	7.3	23770	29898	36228	81.8	5.6	0.5	16.7	86.1
Belgium	7.1	19547	27914	33824	81.5	7.2	1.5	14.5	83.3
Canada	7.4	22499	27725	33594	81.9	6.3	1.7	7.3	90.4
Chile	6.4	6871	13796	16717	79.2	6.8	8.9	16.3	68.4
Czech R	6.5	13997	19529	23664	79.1	3.0	1.3	19.8	95.3
Denmark	7.7	18064	26368	31951	80.9	5.9	0.9	9.6	79.5
Estonia	5.4	12073	16063	19464	78.0	6.1	3.3	7.6	89.2
Finland	7.5	18688	26634	32273	81.5	8.9	0.4	6.2	88.3
France	6.7	20480	27689	33551	82.7	9.6	1.4	13.3	82.8
Germany	6.7	23887	31273	37894	81.0	3.9	0.8	14.1	86.7
Greece	5.6	12958	16741	20286	81.5	21.8	0.8	18.4	76.7
Hungary	5.0	11000	15625	18933	76.2	4.2	1.0	20.3	87.2
Iceland	7.4	16290	36970	NA	82.2	3.1	0.9	1.8	73.4
Ireland	7.1	17630	22389	27129	81.8	6.9	0.8	7.2	86.2
Israel	7.3	11391	26160	NA	82.2	4.9	1.5	21.9	89.7
Italy	6.3	19552	24325	29475	83.4	11.5	1.4	19.2	67.5
Japan	6.1	19322	24173	29290	83.9	3.5	0.7	15.1	89.1
Korea R	5.9	16909	19964	24191	81.4	3.8	1.5	31.1	84.3
Latvia	5.9	10434	15421	18686	74.9	9.0	4.4	10.4	91.4
Lithuania	..	13889	19221	23290	74.9	7.3	5.2	13.3	95.7
Luxembourg	7.0	29279	36730	44506	82.7	5.6	0.9	12.3	79.7
Mexico	7.0	3415	13933	16882	75.2	4.1	19.6	15.1	45.5
Netherlands	7.5	18631	27447	33258	81.7	5.0	0.9	13.8	78.4
New Zealand	7.3	17564	22599	27383	81.4	5.3	0.9	5.0	63.7
Norway	7.5	24549	30477	36929	82.5	4.3	0.5	4.5	82.4
Poland	5.8	13011	17264	20919	78.0	5.0	1.2	22.1	94.5
Portugal	5.3	14495	19762	23946	81.3	9.3	0.6	7.1	52.0
Slovak R	5.9	12999	16435	19914	77.3	8.2	1.1	21.3	93.7
Slovenia	5.9	14772	19301	23388	81.2	6.7	1.9	17.0	90.6
Spain	6.6	16065	21472	26018	83.5	17.4	0.6	11.5	62.9
Sweden	7.4	21276	27160	32911	82.4	7.0	0.9	6.5	85.1
Switzerland	7.6	24113	33904	41081	83.7	5.0	0.5	13.9	85.9
Turkey	5.3	5946	17035	20641	78.1	11.1	2.3	21.2	44.0
UK	6.9	20610	26642	32282	81.2	4.5	1.2	9.2	83.3
USA	7.2	40002	40002	48471	78.6	4.4	5.3	10.3	91.1

Sources: Indicators from OECD Regional Statistics, but R4X elaborated by M.C. Guisan, having into account the ratio of each country to the USA in R4* from OECD National Accounts at PPPs (including Disposal income in kind). Notes: In the cases of Iceland and Israel data of R4* unavailable at the OECD statistic of 2016 (NA) and estimation of R4X based on the ratios of GDP per capita at PPPS, in comparison with the United States, from World Bank, for year 2016.

The indicator of Household Income R4X seems to represent better than R4 the actual values of Disposal Income at Purchasing Power Parities (PPPs). The most undervalued countries, with R4 much lower than R4*, where Chile, Mexico and Turkey.

Table 4 presents the correlation coefficient of R13, R4 and R4X, with data of table 3. The correlation of Life Satisfaction (R13) is higher with R4X than with R4.

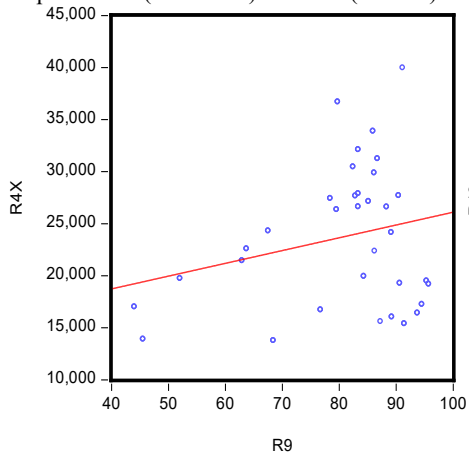
Table 4 correlation coefficients at country level

	R13	R4	R4X
R13	1.0000	0.5778	0.7024
R4	0.5778	1.0000	0.9479
R4X	0.7024	0.9479	1.0000

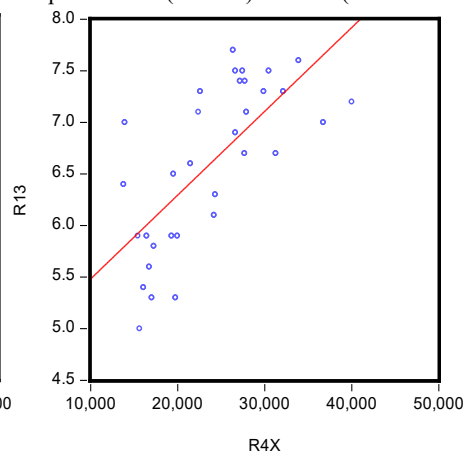
Source: Own elaboration with data from table 3.

Graphs 1.1 and 1.2. shows the relationships between R9 and R4X and between R4X and R13 at country level.

Graph 1.1. R9 (Education) and R4x (Income)



Graph1.2. R4X (Income) and R13(Life Satisfaction)



Source: Own elaboration from table 3.

We may notice that a high level of the Indicator of Education is usually a necessary condition for a high level of income per capita, but not sufficient because there are other factos that explain the variability among countries. Other indicators of Education may have a clearer impact. A high level of Income per capita usually has a positive impact on Life Satisfaction due to its positive effects on sanitarion, health, quality of environment and other variables that have a positive impact on the subjetctive indicator of quality of life, as shown in the econometric models by Guisan (2021)l and (2022) and in other studies.

If R4X is more realistic than R4, the inclusion of R4 in the econometric model of relationship between Life Expectancy and the objective indicators, imply an underestimation of this variable for all the regions (with the exception of the United States regions which have R4X=R4). We have checked that although this has some impact on the estimated value of the equation coefficients, it has not too much effect on the goodness of fit and tests, due to the high linear correlation between R4 and R4X.

In section 4.2 we present the histograms of R4 and R4X in 372 regions, and in the Annex 2 we include values of R4 and R4X at regional level.

4. Regional distribution of 6 indicators in 402 OECD regions

4.1. Indicators at regional level

OECD(2022), regional statistics, provides information of 13 indicators of quality of life in 402 regions of Europe, America, Asia and Oceania around year 2016. There are some unavailable data for a few countries. We have selected 6 of those indicators to present an international comparison for 372 regions with availability of data for all the variables: A subjective indicator (R13=Life Satisfaction) and 5 objective indicators (R3=Unemployment Rate (UR), R4=Real Income per cápita, R5=Homicide Rate (HR), R7=Lifex Expectancy (LEX), and R8=Polution of PM2.5).

Table 5. Countries of the Study and number or regions (within parentheses).

America: Canada (19) Chile (15), Mexico (32), United States (51).
Europe: Austria (7), Belgium (3), Czech R (8), Denmark (5), Finland (4), France (13), Germany (16), Greece (9), Hungary (7), Iceland (2), Ireland (2), Italy (21), Luxembourg (1), Netherlands (12), Norway (7), Poland (16), Portugal (7), Slovakia (4), Slovenia (2), Spain (19), Sweden(8), Switzerland (7), United Kingdom (12)
Asia: Israel (5), Japan (10), Korea R (7), Turkey (26)
Oceania: Australia (8), New Zealand (14)

Table 6 presents the correlations at regional level. We noticie a positive correlation of R4 and R7 with R13 and a negative correlation of R3 and R5 with R13.

Table 6. Correlation coefficients of 6 Indicators of Quality of Life in 372 regions

	R13	R4	R7	R3	R5	R8
R13	1.0000	0.4021	0.0904	-0.4050	0.1217	-0.5692
R4	0.4021	1.0000	0.2805	-0.2380	-0.2316	-0.3318
R7	0.0904	0.2805	1.0000	0.2568	-0.5347	-0.0451
R3	-0.4050	-0.2380	0.2568	1.0000	-0.1732	0.1532
R5	0.1217	-0.2316	-0.5347	-0.1732	1.0000	-0.0896
R8	-0.5692	-0.3318	-0.0451	0.1532	-0.0896	1.0000

Source: Own elaboration. The coefficient of R5 is not negative but the regression coefficient in Equations 2 and 3 of the model estimated by Guisan(2022) was negative and significant. In graph 10.2 in section 4.4, we may notice a negative impact on R13 for R5>10.

In Guisan(2022) we present the estimation of an interregional econometric model, with data of 372 regions from OECD statistics in year 2016, that shows the impact of the objective indicators on the subjective indicator.

4.2. Subjective Well-being: Life Satisfaction (R13).

The following list includes the interval of regional values of R13.

Table 7. Regional values of R13 and highest regional values in each country

Australia (7.0 to 7.7): Tasmania(7.7), Canberra (7.7).
Austria (7.1 to 7.5): Tyrol (7.5).
Belgium (6.8 to 7.2): Flemish region (7.2).
Canada (7.3 to 8.1): Newfoundland-Labrador (8.1), Prince Edward (8.0). Manitoba(7.6), British Columbia (7.6).
Chile (5.6 to 7.9): Aysen (7.9), Magallanes-Antártica (7.3), Valparaiso (7.1).
Czech R (6.2 to 6.8): Prague (6.8).
Denmark (7.5 to 7.7): Copehagen region (7.7), Northern Jutland (7.7).
Finland (7.5 in all the regions): Western, Eastern and Northern, Southern, Hellsinki.
France (6.3 to 7.3): Corsica (7.3), Brittany (6.9) and Nouvelle-Aquitain (6.9).
Germany (6.1 to 7.0): Hamburg (7.0), Baden-Wurttenberg(6.9), Bavaria (6.9), Bremen (6.9), Lower Saxony (6.9) and Schleswig-Holstein (6.9).
Greece (4.8 to 5.9): East Macedonia-Thrace (5.9), West Greece (5.9) , Peloponeso (5.9).
Hungary (4.5 to 5.3): Western Transdanubia (5.3).
Iceland (7.1 to 7.3): Other regions 7.3, Reykjavik (7.1).
Ireland (7 to 7.2): Border, Midland and Western (7.2).
Israel (7.0 to7.5): Tel Aviv (7.5), Central (7.4), South (7.4).
Italy (5.4 to 6.8): Aosta Valley (6.8), Bolzano-Bozen (6.7) and Trento (6.7).
Japan (5.7 to 6.1): Northern Kanto (6.1), Southern Katon (6.1), Toukai (6.1).
Korea R (5.7 to 6.1): Chngcheong (6.1), Seoul (6.0), Gyeongnam(6.0).
Luxembourg (6.9).
Mexico (6.2 to 8.6): Campeche (8.6), Tamaulips (8.2), Yucatan (8.2), Quintana Roo (8.1), Sinaloa (8.1), Sonora (8.1).
Netherland (7.1 to 7.8): Zeeland (7.8). Groningen (7.6), Friesland (7.6).
New Zealand (7.1 to 7.7): Otago (7.7), West Coast (7.6).
Norway (7.4 to 7.7): 7.7 in Trondelag and 7.6 in Oslo ,South-Eastern, Agder and Rogaland
Poland (5.4 to 6.6). Zachodniopomorskie Pomerania (6.8), Pomorskie (6.1).
Portugal (5.1 to 5.4): Lisbon (5.4), Alentejo (5.4), Azores (5.4).
Slovakia (6.0 to 6.5): Bratislava (6.5).
Slovenia (5.9 to 6.2): Western Slovenia (6.2).
Spain (6.1 to 7.0): Cantabria (7.0), Navarra (7.0).
Sweden (7.3 to 7.6): Smaland & Islands (7.6), South Sweden (7.5).
Switzerland (7.3 to 7.8): Eastern (7.8), Central (7.8), Zurich (7.7).
Turkey(4.4 to 6.3):Eastern Marmara-South(6.3),Western Black See Middle&East (6.0).
United Kingdom (6.7 to 7.1): Scotland (7.1), SW England (7.0), Northern Ireland (7.0).
United States (6.6 to 8.1): Delaware (8.1), Vermont (8.0), North Dakota (7.9), Nebraska (7.8), Wyoming (7.8), South Carolina (7.7), Hawaii (7.6),

Source: Elaborated by M.C.Guisan from OECD regional statistics 2016.

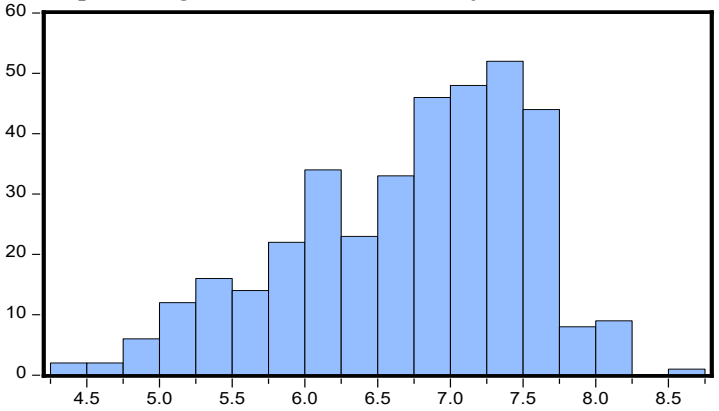
Data for each region appears in Annex 1, in the classification of groups, and ordered by alphabetical name of country in Annex2 and Guisan(2022).

Only 6 regions (4 from Turkey and 2 from Greece) have a value lower than 5. There are 60 regions with values of R13 higher tha 5 and lower than 6: 2 regions from Chile, 7 from Greece, 5 from Italy, 4 from Japan, 4 from Korea R., 10 from Poland, the 7 regions of Portugal, 1 region from Slovenia, 20 from Turkey. Threre are 306 regions with values of R13 higher than 6. Several of them have got very high values (higher than 7.5).

Countries where all the regions has a value of R13 higher than 6.9: Australia, Austria, Canada, Denmark, Finland, Iceland, Ireland, Israel, Netherlands, New Zealand, Norway, Sweden and Switzerland.

Graph 2 shows the histogram, and several measures of R13 in OECD regions in year 2016.

Graph 2. Regional distribution of subjective indicator: Satisfaction with Life (R13).



Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)

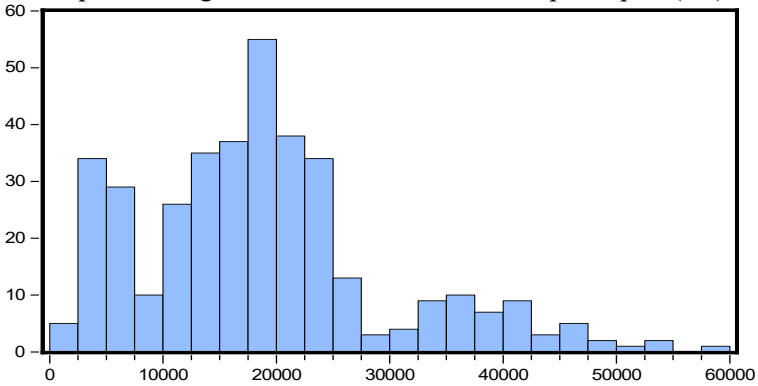
Many regions are below 7.0, due to low income per capita, lack of good employment opportunities and other causes.

4.3. Positive indicators of objective well-being: Income per capita and Life Expectancy

Graphs 3.1 and 3.2 show the distribution of Income per capita accordingly to regional data of R4 and R4X.. At regional level, values of R4X were calculated by applying the factor (R4X/R4) at country level to the regional data R4 from OECD(2022) regional statistics.

The highest values of R4 corresponde to regions with indicator of Income per capita over 20000: All de regions of Australia, Austria, Luxembourg, Norway, Switzerland and the United States, and also several regions of the following countries: Belgium (1), Canada(8), Finland (1), France (5), Germany (15), Italy (10), Japan (2), Netherlands (1), New Zealand (2), Spain (3), Sweden (4), United Kingdom (4).

Graph 3.1. Regional distribution of Income per capita (R4)

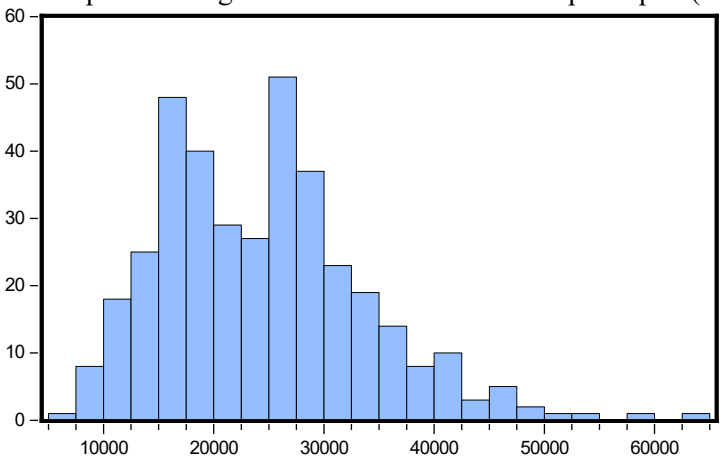


Series: R4	
Sample 1 372	
Observations 372	
Mean	18625.34
Median	17735.50
Maximum	59267.00
Minimum	1652.000
Std. Dev.	11064.24
Skewness	0.876094
Kurtosis	3.791380
Jarque-Bera	57.29490
Probability	0.000000

Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)

Real income per capita is usually important for quality of life but the empirical evidence shows that Life Satisfaction experiences high increases with Income per capita in poor regions, and that the Income effect is also positive, but lower, for richer regions. This is the evidence related with the Easterlin Paradox, cited in Clark et al (2008).

Graphs 3.2. Regional distribution of Income per capita (R4X)



Series: R4X	
Sample 1 402	
Observations 372	
Mean	24440.14
Median	24302.46
Maximum	62960.94
Minimum	6740.063
Std. Dev.	9333.273
Skewness	0.732695
Kurtosis	3.792780
Jarque-Bera	43.02600
Probability	0.000000

R4X has a correlation coefficient, with R13, higher than R4 as it is shown in the following table

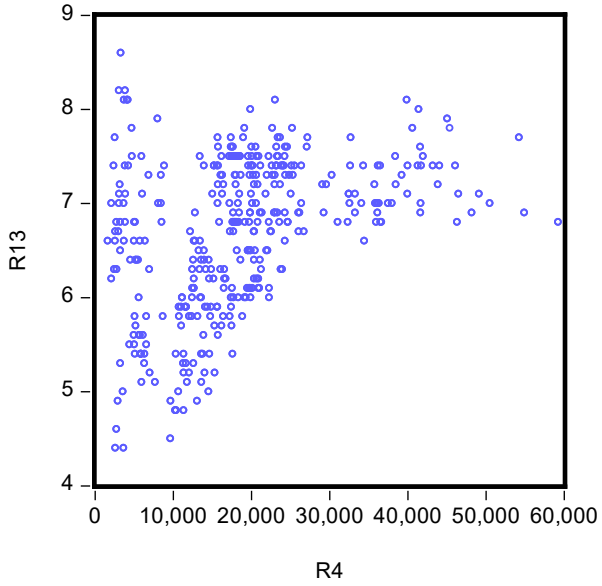
Table 8. Correlation between R13, R4 and R4X in 372 regions

	R13	R4	R4X
R13	1.0000	0.4015	0.4909
R4	0.4015	1.0000	0.9547
R4X	0.4909	0.9547	1.0000

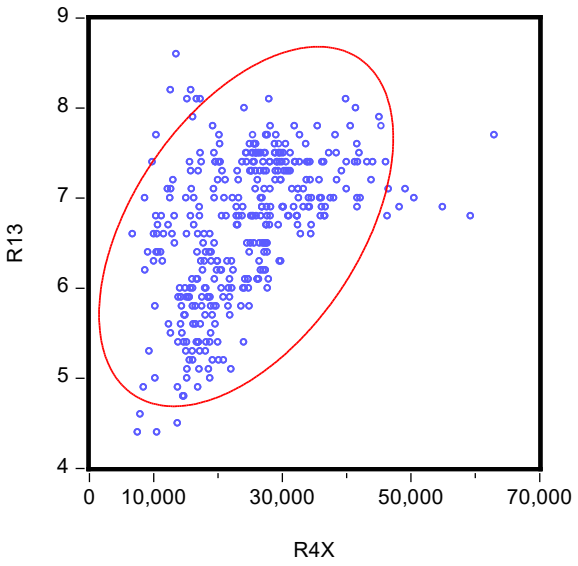
Source: Elaborated from data in Annex 2.

Graphs 4.1 and 4.2 show that the direct impact of increases of Income per capita on Life Satisfaction is positive and usually much higher for low levels of Disposal Income, diminishing for high Income per capita. There are other positive indirect effects, usually related with high levels of income per capita like lower levels of pollution, improvements in quality of government, quality of labor opportunities, health services, etc.

Graph 4.1. Relationship between R13 and R4 in 372 regions



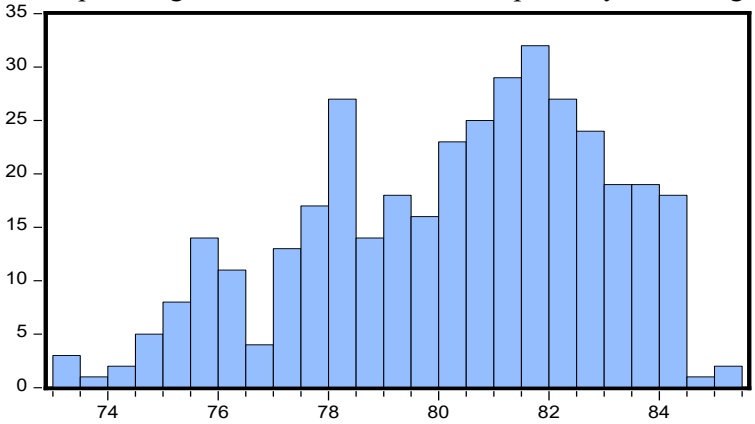
Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)



Source: Elaborated by M.C.Guisan from R4X, estimated, having into account OECD National Account Statistics and Regional Statistic, by applying the factor (R4X/R4) at country level to the regional data R4 from OECD(2022) regional statistics. For countries with unavailable data in table 2, see footonote of table 3.

Graph 5 shows the regional distribution of Life Expectancy in 372 regions. We may notice a concentration o values in the interval 77-84.

Graph5. Regional distribution of Life Expectancy in 372 regions



Series: R7	
Sample 1 372	
Observations 372	
Mean	80.20726
Median	80.65000
Maximum	85.20000
Minimum	73.00000
Std. Dev.	2.667631
Skewness	-0.460048
Kurtosis	2.414851
Jarque-Bera	18.42916
Probability	0.000100

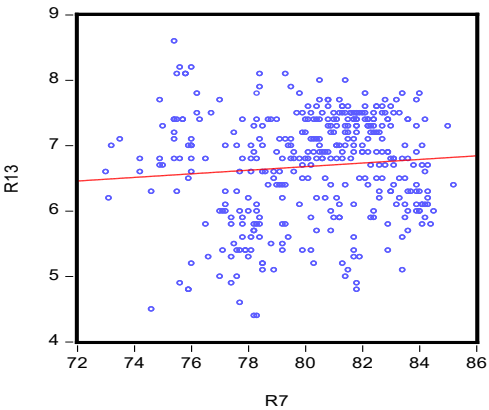
Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)

Life expectancy is over World average in all the regions. The countries with all. or almost all, regions around 80 years or more are: Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea R, Luxembourg, Netherlands, New Zealand, Norway, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

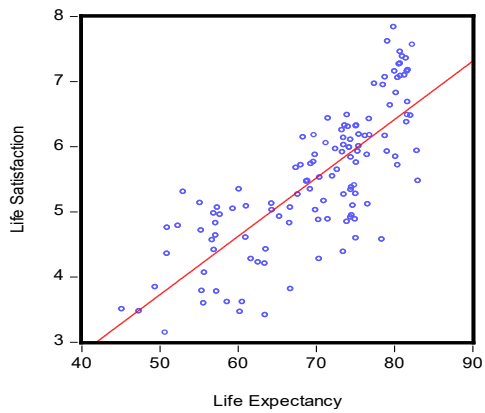
In the United States there are 39 regions with Life Expectancy below 80 years and 12 with 80 year or more.

Graph 6.1 shows the relationship with the sample of 372 regions, where there is less variability of Life Expectancy (R7) and thus the effect, although also positive, is not so clear as in graph 6.2, which includes the relationship between R7 and R13 in 132 countries of the World with more variability of R7.

Graph 6,1. R7 and R13 in 372 regions



Graph 6.2. R7 and R13 in 132 countries

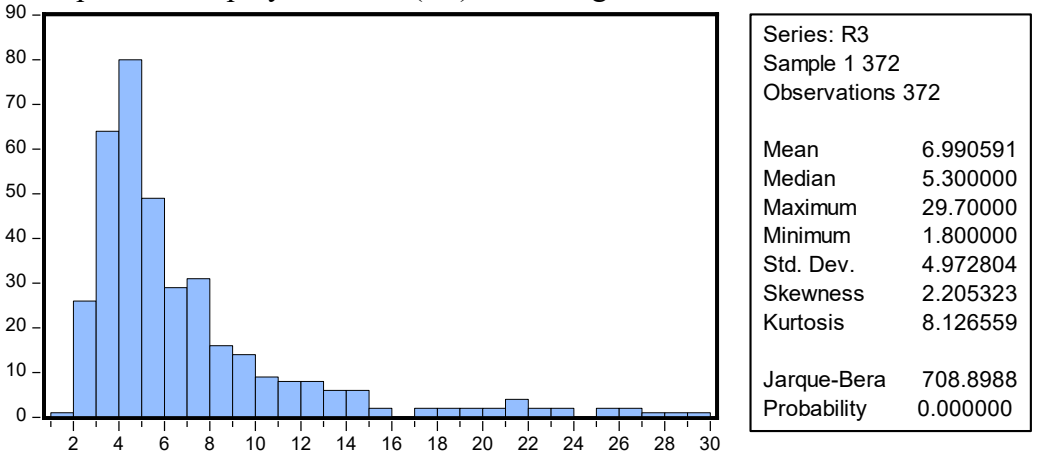


Source: On elaboration with data from OECD and World Bank.

4.4. Negative indicators of well-being: Unemployment, Homicides and Pollution.

Unemployment Rate (R3): There are big differences among regions, from a minimum of 1.8 to a maximum of 29.7 in the percentage of Active Population that is unemployed. This variable shows a negative effect on Life Satisfaction.

Graph 7. Unemployment rate (R3) in 372 regions



Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)

The regions with the highest values of R3 are the following ones, with more than 10% of Unemployment:

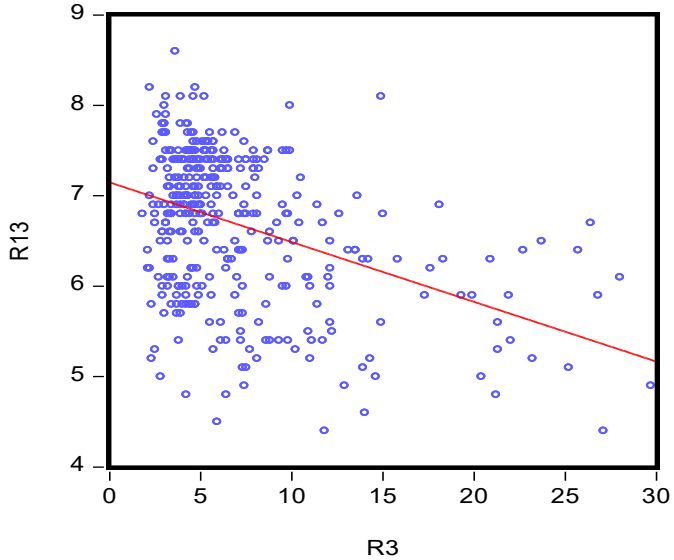
In Austria: Vienna (10.5). In Belgium: Brussels (15.0). In Canada: Newfoundland-labrador (14.9), in France 4 regions (Normandy (10.1), Hauts-de-France (12.1, Grand-Est (10.1), Provence-Alps-Cote d´Azur (10.4). In Greece: values in the interval 17.3 to 29.7 in all the regions. In Italy there are 9 regions with R3 <10 and 11 regions with high values in the interval 10.8 to 22.0, with the highest values in Calabria (22.0) and Sicily (21.9). In Portugal there are 2 regions with R3>10: North(10.2) and Madeira (11.0). In Slovakia the region of East Slovakia (12.1). In Spain all the regions present values of R3 in the interval 10.3 to 26.4, with the lowest value in Navarra(10.3) and the highest in Extremadura (26.4). In Turkey there are 13 regions with value of R3<10 and another 13 regions with values between 10.9 and 27.1, with the highest unemployment rate in Southeastern-Anatolia-East.

In the United Kingdom, the United States and other countries the rate of unemployment is lower than 10 in all their regions.

Graph 8 shows the negative impact of the Unemployment Rate (R3) on Life Satisfaction (R13). This indicator has particular negative effect in countries without subsidies or income transfers to unemployed people. A low value of Unemployment rate has a positive effect on Life Satisfaction particularly in countries with good levels of average wages. As seen in the report by ILO-Gallup(2017). the Employment status is usually important for life satisfación with levels of “thriving” people. With data of

Europe the percentaje of "people thriving" was 38% among Employed persons, 28% for out of work population and 22% for unemployed persons.At Wordl level the percentages were 27%, 21% and 16%.

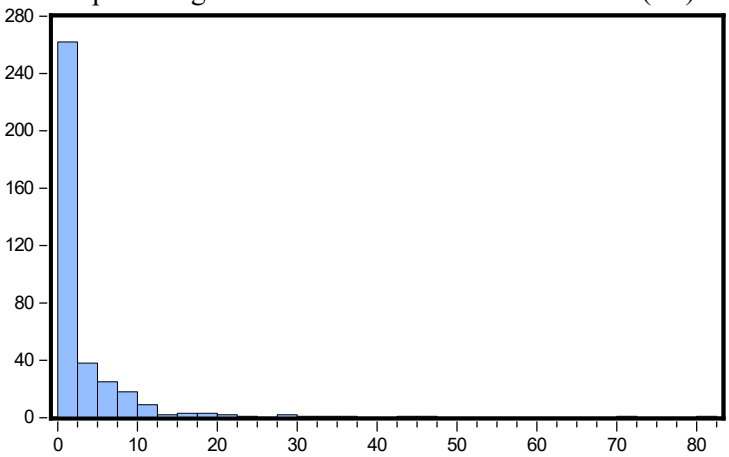
Graph 8: Life Satisfaction and Unemployment Rate n 372 regions



Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)

Homicides Rate per 100 thousand people (R5). Is one indicator of unsafety and has a negative impact on Life Satisfaction, although its impact depends on several circunstances. When it is related with general violence that affect to many citizens its effect is strong. There are big differences from a minimum of 0 (in the Canadian region of Prince Edward Island) to a maximum of 82.2 (in the Mexican region of Colima).

Graph 9. Regional distribution of Homicides Rate (R5)



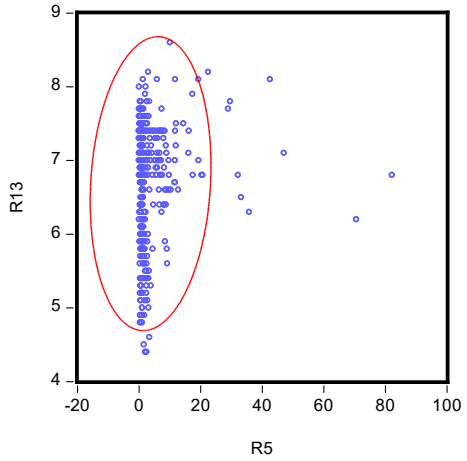
Series: R5	
Sample 1 372	
Observations 372	
Mean	3.750806
Median	1.200000
Maximum	82.20000
Minimum	0.000000
Std. Dev.	7.979622
Skewness	5.693276
Kurtosis	45.04547
Jarque-Bera	29410.87
Probability	0.000000

Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)

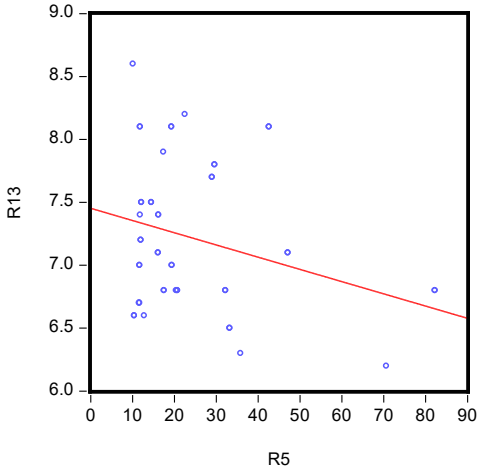
In the regional sample there is not a negative correlation coefficient between R5 and R13 (due to interaction with other variables), but in the estimated interregional model of 372 regions the effect was negative and significant in equations 2 and 3 (Guisan(2022).

In the sample of 164 countries of Guisan(2021) there was a negative correlation of the Homicides Rate with Life Satisfaction but the variable X3 of that study (as indicator of unsafety life) showed stronger negative correlation with Life Satisfaction than R5: The correltion coefficient, of Homicides Rate with Life Satisfaction, was only -0.14 and the indicator of unsafety life (X3) had a correlation of -0.56 with Life Satisfaction.

Graph 10.1. R5 and R13 in 372 regions



Gran 10.2. R5 and R13 for R9>10



Source: Own elaboration from OECD regional statistics

In graphs 10.1 and 10.2 we may notice a negative impact when R5 is higher tha 10.

The regions with the highest values of Homicides Rates (R5>17) were: I

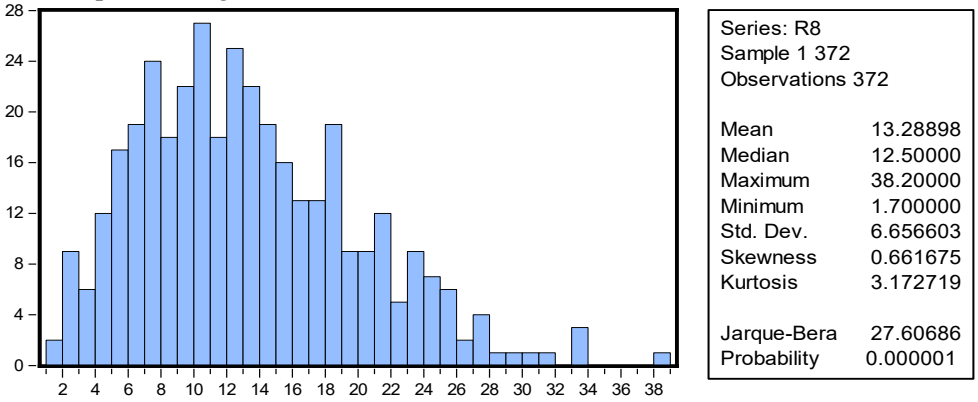
n Chile: Aysen with 17.4). The lowest regional values in Chile correspond to 4 regions with R5<8: Coquimbo, O´Higgins, Los Lagos, and the region Magallanes and Antartica.

In México: Baja California (32.2), Baja California Sur (29.6), Colima (82.2) Chihuahua (47.1), Guanajuato (20.7). Guerrero (70.6). Michoacan (29.0), Morelos (32.2), Oaxaca (19.4) Sinaloa (42.6), Sonora (19.3), Tabasco (17.5), Tamaulipas(22.5) and Zacatecas (35.8), and values lower tan 17 in 18 regions. The Mexican regions with lowest values (R5<10) were: Hidalgo, Queretaro, Tlaxcala and Yucatan.

In the United States the only region with R5>17 was Washington D.C. with 20.4. In 19 regions of the USA the value of R5 was below the average of 372 OECD regions (3.75). The states with lowest values (R5<3) were: Commecticut, Hawaii, Idaho, Iowa, Maine, Massachusetts, Minnesota, Nebraska, New Hampshire, North Dakota, Oregon, Rhode Island, Utah, Vermong, and Washington.

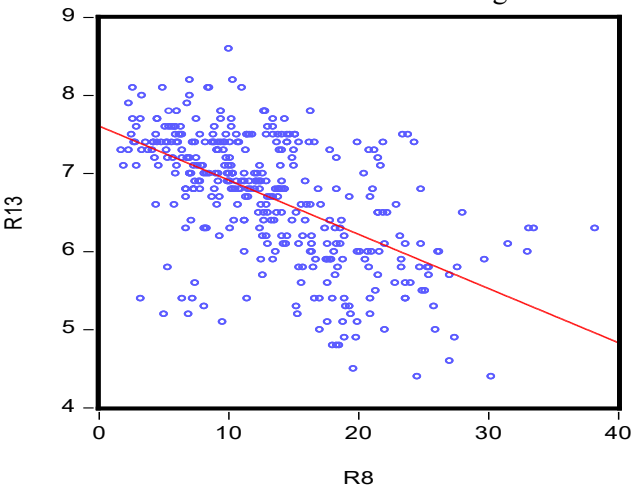
Pollution of particles PM2.5 in the air (R8): Graph 11 shows that many regions present levels of R8 higher than the maximum recommended (10), although most OECD regions have very low values in comparison with the excessively high levels in other areas of the World. Graph 12 shows the negative relationship between R8 and R13.

Graph 11. Regional distribution of Pollution



Source: Elaborated by M.C.Guisan from OECD regional statistics (see table in Guisan(2022)

Graph 12. Pollution and Life Satisfaction in 372 regions



Source: Own elaboration from OECD regional statistics

The European Parliament (2006) suggested a maximum value of R8=20 in year 2020. Most regions of Europe were below that value in year 2016.

It is important have into account the great benefit of Education to avoid excessive increase of World pollution. As seen in Guisan(2020) and Guisan and Exposito(2020) the Total Emissions of CO2 diminished in major OECD countries for the period 1970-2020 while experienced a high increase in other areas of the World. We estimated that 85% of the high increase of World Total Emissions for that period where due to Population growth in countries with low educational level and high averages fertility rates.

5. Conclusions

1) One conclusion is that the indicators of Quality of Lif here analyzed have usually better values in most OECD countries than in other areas of the World. This is mainly due to the higher educational level of population in many OECD countries for several decades. Education has contributed to improve the positive indicator (income per capita, life expectancy, quality of government) and to diminish the negative indicators (rate of unemployment, homicides rate and pollution level).

2) Household disposal income per capita in Purchasing Power Parities is a very important variable to explain high levels of the subjective indicator of Life Satisfaction, particularly when countries evolve from low to middle positions. The impact of increase of this variable is also positive, but lower, when countries have reached high levels of development. The indicator (R4X) seems to be more realistic than R4.

Data for countries and regions from OECD regional statistics (indicator R4) seems underestimate the ratio of the values (in Purchasing Power Parities) of countries to the value of the United States. We have calculated the variable R4X which seems better for comparing Disposal Income in terms of Purchisng Power Parities. The correlation coefficient of R4X with the subjective indicator of quality of life (R13) in OECD countries amounts to 0.7024, higher than the correlation coefficient between R4 and R13. R4X was calculated at country level as indicated in the footnote of table 3, and at regional level as indicated in section 4.3.

3) Life Expectancy: Many OECD countries and regions are in the highest levels of years of Life Expectancy in the World. In several countries all their regions have values around 80 year or more: Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea R, Luxembourg, Netherlands, New Zealand, Norway, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

4) Unemployment rate: In the United Kingdom, the United States and other countries the rate of unemployment is lower than 10 in all their regions. In several countries the maximum value of regional unemployment rate was equal or lower than 15: Austria, Belgium, Canada, France, Portugal, Slovakia.

The countries with several regions with high values of unemployment rates and maximum values higher than 15 are: Greece (regional values between 17.3 to 29.7), Italy (with only 9 regions with R3<10, and with 11 regions with values in the interval 10.8 to 22), Spain (between 10.3 and 26.4, from the minimum in Navarra to the maximum in Extremadura), and Turkey (where there are 13 regions with R3<10 and another 13 regions with values between 10.9 and 27.1).

5) Homicides rate. Is usually low in the countries of Europe, Asia and Oceania. The average of 372 OECD regions was 3.75, below World average (6.2). In the case of the American countries of this study the lowest country value corresponds to Canada (1.7) and the United States (5.3), while the value was higher in Chile (8.9) and much higher in Mexico (19.6). At regiona level the highest values corresponded to one region in Chile, 14 regions in Mexico and 1 region in the United States.

6) Pollution indicator (level of micrograms of PM2.5 per cubic meter of air) is usually lower in OECD countries (average 14) than World average (46) and very far from the highest values of the World (like India with 90.9). Among the 36 OECD countries of table 3, there are 23 with country average lower than OECD average (R8<14): Australia, Canada, Denmark, Estonia, Finland, France, Iceland, Ireland, Israel, Italy, Japan, Korea R, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK and USA. Most OECD regions have low values and the highest are below World average (46). The regions with the highest values (R8>23) are less than 10% of total sample of OECD regions (35 regions out of 372):

OECD regions with R8>23: In Chile: Santiago Metropolintan (24.8). In Czech R: Moravia-Silesia (23.2). In Israel: Tel Aviv (23.4) and South (24.3). In Italy: Piedmont (28.0). Liguria (26.2), Lombardy (38.2), Veneto (33.5), Emilia Romagna (33.1) and Tuscany (23.6). In Korea R: 6 out of 7 regions, with the highest value in Seour Region (33.0). In Mexico: Mexico city (23.8). In Poland: 6 out of 16 regions with the highest level in Slaskie (27.6). In Spain all the 17 Autonomes Regions were not only below 23 but also below the OECD regional average (13) but the Autonomous Cities of Ceuta (18.7) and Melilla (24.8) had higher values than OECD average. In Turkey, the following regions presented a value of R8>23: Ankara (23.3) and other 10 regions, with the maximum in Southeastern Anatolia-East (30.2).

Having into account the significant effect of the objective indicators here analyzed on the subjective indicator of life satisfaction it is interesting to foster policies addressed to improve the quality of objective indicators, increasing rates of employment, disposal income per capita and health support and diminishing negative indicators both at national and at regional level.

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Annex (updated 8th march of 2024)

1. Countries in highest positions of Quality of Life Indicators

Table A1 shows the position of each country in the classification accordingly to 3 levels of quality: 1 Highest. 2 Middle. 3 Lowest

In the case of *positive indicators* of quality of life, the "quality 1" corresponds to the countries with the highest values of the indicators: R13 = Life Satisfaction, R4 = Production per capita, R7 = Life Expectancy

In the case of *negative indicators* of quality of life, "quality 1" corresponds to the countries with the lowest values of those indicators: R3 = Unemployment rate (% of Active Population), R5 = Homicides rate (per 100 thousand people), R8 = Indicator of Pollution (PM2.5 microns per cubic meter of air)

Table A1. Countries classified in 3 levels of quality in 6 indicators

	Quality in Positive Indicators			Quality in Negative Indicators		
	R13	R4	R7	R3	R5	R8
Australia	1	1	1	2	2	1
Austria	1	1	2	1	1	3
Belgium	2	1	2	2	2	2
Canada	1	2	1	2	2	1
Chile	2	3	2	3	3	3
Czech R	2	3	3	2	3	3
Denmark	1	2	2	1	1	1
Estonia	3	3	3	3	3	1
Finland	1	2	2	3	1	1
France	2	1	1	3	2	2
Germany	2	1	2	2	1	2
Greece	3	2	2	3	2	3
Hungary	3	3	3	2	2	3
Iceland	1	2	1	1	1	1
Ireland	2	2	3	1	2	1
Israel	1	3	2	2	3	3
Italy	2	1	1	3	1	3
Japan	3	1	1	2	1	2
Korea R	3	2	1	1	2	3
Latvia	3	3	3	3	3	2
Lithuania	2	3	3	3	3	2
Luxembourg	2	1	2	1	1	2
Mexico	2	3	3	1	3	3
Netherlands	1	1	2	1	1	2
New Zealand	1	2	1	2	2	1
Norway	1	1	1	1	1	1
Poland	3	3	3	3	3	3
Portugal	3	2	3	1	2	1
Slovak R	3	3	3	3	3	3
Slovenia	3	3	2	2	3	2
Spain	2	2	1	3	1	1
Sweden	1	2	1	2	1	1
Switzerland	1	1	1	1	1	2
Turkey	3	3	3	3	3	3
UK	2	2	2	2	2	2
USA	2	1	3	1	3	2

Source: Elaborated by M.C.Guisan from data of table 3. Note: Columns (1) to (6) indicates position in quality: 1. Highest quality. 2. Middle quality. 3 Lowest quality

Countries with indicators in the highest quality.

6 indicators: Norway;
5 indicators: Iceland, Switzerland;
4 Indicators: Australia, Austria, Denmark, Netherlands, Sweden.
3 Indicators: Canada, Finland, Italy, Japan, Luxembourg, New Zealand, Spain;
2 Indicators: France, Germany, Ireland, Korea R., Portugal, United States;
1 Indicator: Belgium, Estonia, Israel, Mexico.

Annex 2. Quality of Life and Disposal Income per capita in PPPs: R13, R4, R4X. Tables 2.1 to 2.33 include data of R13 (Life Satsifaction), R4 (Data of income in OECD regional statistics 2016) and R4X estimation of regional income at purchasing power parities estimated in this study, by M.C. Guisan, based both in OECD regional statistics and OECD National Statistics for year 2016, in order to avoid possible undervalues at purchasing power parities in several countries. The number in the tables is the order of regions in the list of 402 regions from OECD regional statistics 2016.

Table A2.1 Australia

Nb	Region	R13	R4	R4x
1	New South Wales	7.2	29608	34352
2	Victoria	7.4	25539	29631
3	Queensland	7.3	25325	29383
4	South Australia	7.4	25151	29181
5	Western Australia	7.2	29120	33786
6	Tasmania	7.7	23692	27488
7	Northern Territory	7.0	36333	42155
8	Canberra Capital Region	7.7	54266	62961

Table A2.2 Austria

Nb	Region	R13	R4	R4x
9	Burgenland	7.2	23709	29821
10	Lower Austria	7.3	24863	31273
11	Vienna	7.2	23003	28933
12	Carinthia	7.3	23031	28968
13	Styria tienen dn1 dn2	7.4	23253	29248
14	Upper Austria	7.4	23824	29966
15	Salzburg	7.3	24376	30660
16	Tyrol	7.5	23442	29485
17	Vorarlberg	7.1	25084	31551

Table A2.3. Belgium

Nb	Region	R13	R4	R4x
18	Brussels-Capital Region	6.8	17608	25145
19	Flemish Reg	7.2	20822	29735
20	Wallonia	6.8	17869	25518

Table A2.4. Canada

Nb	Region	R13	R4	R4x
21	NewfoundlLabrador	8.1	23059	27940
22	Prince Edward I	8.0	19902	24115
23	Nova Scotia	7.4	20190	24464
24	New Brunswick	7.3	20649	25020
25	Quebec	7.4	19626	23781
26	Ontario	7.3	22720	27530
27	Manitoba	7.6	20584	24941
28	Saskatchewan	7.4	23161	28064
29	Alberta	7.4	26405	31995
30	British Columbia	7.6	24350	29505

Table A2.5. Chile

Nb	Region	R13	R4	R4x
34	Tarapacá	6.6	6432	12915
35	Antofagasta	7.0	8107	16278
36	Atacama	5.6	6165	12378
37	Coquimbo	6.8	5172	10385
38	Valparaíso	7.1	6066	12180
39	O'Higgins	6.4	5547	11138
40	Maule	6.6	5004	10047
41	Bío-Bío	6.4	5333	10708
42	Araucanía	6.4	5215	10471
43	Los Lagos	6.6	5765	11575
44	Aysén	7.9	8027	16117
45	Magallanes y Antártica	7.3	8453	16972
46	Santiago Metropolitan	6.8	8562	17191
47	Los Rios	5.8	5110	10260
48	Arica y Parinacota	6.4	4548	9132

Table A2.6. Czech Republic

Nb	Region	R13	R4	R4x
49	Prague	6.8	18176	25360
50	Central Bohemian Region	6.2	14630	20412
51	Southwest	6.4	13603	18979
52	Northwest	6.3	12458	17382
53	Northeast	6.6	13455	18773
54	Southeast	6.5	13948	19461
55	Central Moravia	6.6	12813	17877
56	Moravia-Silesia	6.2	12662	17666

Table A2.7 Denmark

Nb	Region	R13	R4	R4x
57	Copenhagen Region	7.7	18996	27728
58	Zealand	7.5	17980	26245
59	Southern Denmark	7.5	17473	25505
60	Central Jutland	7.6	17674	25799
61	Northern Jutland	7.7	17418	25425

Table A2.8. Finland

Nb	Region	R13	R4	R4x
67	Western Finland	7.5	17783	25344
68	Helsinki-Uusimaa	7.5	20938	29841
69	Southern Finland	7.5	18206	25947
70	Eastern North. Finland	7.5	17192	24502

Table A2.9. France

Nb	Region	R13	R4	R4x
72	Île-de-France	6.6	24302	32856
73	Centre - Val de Loire	6.5	20481	27690
74	Bourge-Franche-Comté	6.7	20339	27498
75	Normandy	6.5	19968	26997
76	Hauts-de-France	6.5	18165	24559
77	Grand Est	6.5	19593	26490
78	Pays de la Loire	6.8	19746	26697
79	Brittany	6.9	19858	26848
80	Nouvelle-Aquitaine	6.9	19859	26849
81	Occitanie	6.8	19210	25972
82	Auvergne-Rhône-Alpes	6.8	20829	28161
83	Prov-Alpes-Côte d'Azur	6.7	20391	27569
84	Corsica	7.3	18670	25242

Table A2.10. Germany

Nb	Region	R13	R4	R4x
85	Baden-Württemberg	6.9	26052	34107
86	Bavaria	6.9	26183	34279
87	Berlin	6.4	21133	27667
88	Brandenburg	6.2	20926	27396
89	Bremen	6.9	22941	30034
90	Hamburg	7.0	26408	34574
91	Hesse	6.8	24689	32323
92	MecklVorpommern	6.5	19589	25646
93	Lower Saxony	6.9	23045	30171
94	North Rhine-Westphalia	6.8	23613	30914
95	Rhineland-Palatinate	6.8	24670	32298
96	Saarland	6.7	22469	29417
97	Saxony	6.2	20685	27081
98	Saxony-Anhalt	6.1	20122	26344
99	Schleswig-Holstein	6.9	24308	31824
100	Thuringia	6.2	20361	26657

Table A2.11. Greece

Nb	Region	R13	R4	R4x
101	East Macedonia - Thrace	5.9	11050	14276
102	Central Macedonia	5.2	12069	15592
103	West Macedonia	4.9	13096	16919
104	Thessaly	5.3	11661	15065
105	Epirus	5.1	11800	15245
106	Ionian Islands	5.0	14538	18782
107	West Greece	5.9	10738	13873
108	Central Greece	4.8	11372	14692
109	Peloponnese	5.9	11686	15098

Table A2.12. Hungary

Nb	Region	R13	R4	R4x
114	Central Hungary	5.0	10693	15189
115	Central Transdanubia	5.2	11354	16128
116	Western Transdanubia	5.3	11299	16050
117	Southern Transdanubia	4.8	10275	14595
118	Northern Hungary	4.5	9671	13737
119	Northern Great Plain	4.9	9696	13773
120	Southern Great Plain	4.8	10385	14751

Table A2.13 Iceland

Nb	Region	R13	R4	R4x
121	Reykjavik Region	7.1	16290	36970
122	Other Regions	7.3	16290	36970

Table A2.14.Ireland

Nb	Region	R13	R4	R4x
123	Border, Midland&W	7.2	15759	20013
124	Southern and Eastern	7.0	18312	23255

Table A2.15. Israel

Nb	Region	R13	R4	R4x
125	Jerusalem	7.3	6881	15803
126	North	7.0	8477	19468
128	Central	7.4	13960	27159
129	Tel Aviv	7.5	16224	32060
130	South	7.4	8882	37259

Table A2.16. Italy

Nb	Region	R13	R4	R4x
131	Piedmont	6.5	22077	20398
132	Aosta Valley	6.8	22258	27466
133	Liguria	6.0	22290	27692
134	Lombardy	6.3	23960	27731
135	Abruzzo	6.1	17570	29809
136	Molise	5.6	15759	21859
137	Campania	5.6	13913	19606
138	Apulia	5.9	14856	17309
139	Basilicata	6.4	14580	18483
140	Calabria	5.4	13609	18139
141	Sicily	5.9	14095	16931
142	Sardinia	6.2	16558	17536
143	Bolzano-Bozen	6.7	26075	20600
144	Trento	6.7	22556	32440
145	Veneto	6.3	21271	28062
146	Friuli-Venezia Giulia	6.5	21931	26464
147	Emilia-Romagna	6.3	23781	27285
148	Tuscany	6.1	21045	29586
149	Umbria	6.1	19480	26182
150	Marche	6.0	19930	24235
151	Lazio	6.1	19864	24795

Table A2.17. Japan

Nb	Region	R13	R4	R4x
152	Hokkaido	6.0	17748	24713
153	Tohoku	5.7	17501	22204
154	Northern-Kanto, Koshin	6.1	19751	21895
155	Southern-Kanto	6.1	22290	24710
156	Hokuriku	6.0	19135	27886
157	Toukai	6.1	20911	23939
158	Kansai region	6.0	19303	26161
159	Chugoku	5.8	18884	24149
160	Shikoku	5.8	17261	23625
161	Kyushu, Okinawa	5.9	17454	21595

Table A2.18. Korea R.

Nb	Region	R13	R4	R4x
162	Seoul Region	6.0	18352	21836
163	Gyeongnam	6.0	17403	21668
164	Gyeongbuk	5.7	16228	20547
165	Jeolla	5.9	15696	19160
166	Chungcheong	6.1	16511	18532
167	Gangwon	5.7	15310	19494
168	Jeju	5.8	16428	18076

Table A2.19 Luxembourg

Nb	Region	R13	R4	R4x
185	Luxembourg	6.9	29279	36730

Table A2.20. Mexico

Nb	Region	R13	R4	R4x
186	Aguascalientes	7.0	3695	15075
187	Baja California	6.8	5058	20636
188	Baja California Sur	7.8	4712	19225
189	Campeche	8.6	3318	13537
190	Coahuila	6.6	3716	15161
191	Colima	6.8	3864	15765
192	Chiapas	6.6	1652	6740
193	Chihuahua	7.1	3904	15928
194	Mexico City	7.5	5973	24369
195	Durango	7.0	3078	12558
196	Guanajuato	6.8	3249	13256
197	Guerrero	6.2	2124	8666
198	Hidalgo	6.3	2461	10041
199	Jalisco	7.4	3831	15630
200	Estado de Mexico	7.1	3114	12705
201	Michoacan	7.7	2551	10408
202	Morelos	6.5	3259	13297
203	Nayarit	7.2	3201	13060
204	Nuevo Leon	7.5	4760	19421
205	Oaxaca	7.0	2118	8641
206	Puebla	6.7	2609	10645

207	Queretaro	7.4	4280	17462
208	Quintana Roo	8.1	4238	17291
209	San Luis Potosi	6.7	3017	12309
210	Sinaloa	8.1	3732	15226
211	Sonora	8.1	4095	16707
212	Tabasco	6.8	2755	11240
213	Tamaulipas	8.2	3877	15818
214	Tlaxcala	7.4	2405	9812
215	Veracruz	6.6	2591	10571
216	Yucatan	8.2	3095	12627
217	Zacatecas	6.3	2796	11408

Table A2.21. Netherlands

Nb	Region	R13	R4	R4x
218	Groningen	7.6	17424	25669
219	Friesland	7.6	17589	25912
220	Drenthe	7.5	17587	25909
221	Overijssel	7.5	17599	25927
222	Gelderland	7.5	18130	26709
223	Flevoland	7.1	18485	27232
224	Utrecht	7.5	19608	28886
225	North Holland	7.5	20064	29558
226	South Holland	7.5	18577	27367
227	Zeeland	7.8	19124	28173
228	North Brabant	7.5	18480	27225
229	Limburg	7.3	18016	26541

Table A2.22. New Zealand

Nb	Region	R13	R4	R4x
230	Northland	7.5	13438	17290
231	Auckland	7.2	20356	26191
232	Waikato	7.2	16461	21180
233	Bay of Plenty	7.3	16087	20699
234	Gisborne	7.4	15248	19619
235	Hawke's Bay	7.4	15248	19619
236	Taranaki	7.3	17922	23060
237	Manawatu-Wanganui	7.1	15037	19348
238	Wellington	7.1	21852	28116
239	Tasman-Nelson-Marl.	7.4	15786	20311
240	West Coast	7.6	15786	20311
241	Canterbury	7.2	18030	23199
242	Otago	7.7	15707	20210
243	Southland	7.4	15629	20109

Table A2.23. Norway

Nb	Region	R13	R4	R4x
244	Oslo Region	7.6	27125	33675
245	Hedmark and Oppland	7.4	22645	28113
246	South-Eastern Norway	7.6	23238	28849
247	Agder and Rogaland	7.6	24603	30544
248	Western Norway	7.5	24291	30157
249	Trøndelag	7.7	23395	29044

Table A2.24. Poland

Nb	Region	R13	R4	R4x
251	Lódzkie	5.8	13134	17528
252	Mazowieckie	5.9	15626	20854
253	Malopolskie	5.8	12386	16530
254	Slaskie	5.8	14792	19741
255	Lubelskie	5.7	11075	14780
256	Podkarpackie	5.4	10363	13830
257	Swietokrzyskie	5.4	11359	15159
258	Podlaskie	5.8	10784	14392
259	Wielkopolskie	6.0	13482	17993
260	Zachod. Pomerania	6.6	12675	16916
261	Lubuskie	5.9	11688	15598
262	Dolnoslaskie	6.0	13622	18179
263	Opolskie	5.8	12055	16088
264	Kujawsko-Pomorskie	5.9	11524	15380
265	Warminsko-Mazurskie	6.0	11194	14939
266	Pomorskie	6.1	12632	16858

Table A2.25. Portugal

Nb	Region	R13	R4	R4x
267	North	5.3	12631	17221
268	Algarve	5.2	15323	20891
269	Central Portugal	5.1	13629	18581
270	Lisbon	5.4	17624	24028
271	Alentejo	5.4	13777	18783
272	Azores	5.4	14678	20011
273	Madeira	5.2	14063	19173

Table A2.26. Slovakia

Nb	Region	R13	R4	R4x
274	Bratislava Region	6.5	19836	25079
275	West Slovakia	6.1	12677	16028
276	Central Slovakia	6.0	12441	15730
277	East Slovakia	6.0	11167	14119

Table A2.27. Slovenia

Nb	Region	R13	R4	R4x
278	Eastern Slovenia	5.9	14406	18823
279	Western Slovenia	6.2	15182	19837

Table A2.28. Spain

Nb	Region	R13	R4	R4x
280	Galicia	6.3	14885	19895
281	Asturias	6.3	16566	22142
282	Cantabria	7.0	15708	20995
283	Basque Country	6.9	21119	28227
284	Navarra	7.0	20133	26909
285	La Rioja	6.2	16746	22382
286	Aragon	6.7	17292	23112
287	Madrid	6.4	20372	27229
288	Castile and León	6.3	16060	21465
289	Castile-La Mancha	6.3	13416	17931
290	Extremadura	6.7	12193	16297
291	Catalonia	6.4	18632	24903
292	Valencia	6.3	14202	18982
293	Balearic Islands	6.8	15933	21296
294	Andalusia	6.4	12579	16813
295	Murcia	6.9	12835	17155
296	Ceuta	6.4	13981	18687
297	Melilla	6.1	12481	16682
298	Canary Islands	6.5	13287	17759

Table A2.29: Sweden

Nb	Region	R13	R4	R4x
299	Stockholm	7.4	23982	30614
300	East Middle Sweden	7.3	20258	25860
301	Småland with Islands	7.6	20052	25597
302	South Sweden	7.5	20699	26423
303	West Sweden	7.4	21193	27054
304	North Middle Sweden	7.3	19796	25271
305	Central Norrland	7.4	19973	25497
306	Upper Norrland	7.4	20107	25668

Table A2.30. Switzerland

Nb	Region	R13	R4	R4x
307	Lake Geneva Region	7.4	24086	33866
308	Espace Mittelland	7.5	22233	31261
309	Northwestern Switzerland	7.4	24192	34015
310	Zurich	7.7	27214	38264
311	Eastern Switzerland	7.8	22700	31917
312	Central Switzerland	7.8	25241	35490
313	Ticino	7.3	22009	30946

Table A2.31. Turkey

Nb	Region	R13	R4	R4x
314	Istanbul	5.1	7695	22046
315	Thrace	5.8	6598	18903
316	Southern Marmara - West	5.4	5924	16972
317	Izmir	5.2	7032	20146
318	Southern Aegean	5.1	5969	17101
319	Northern Aegean	5.4	5832	16708
320	Eastern Marmara - South	6.3	6968	19963
321	Eastern Marmara - North	5.4	6350	18192
322	Ankara	5.8	8690	24896
323	Central Anatolia – W&S	5.6	5652	16193
324	Mediterranean reg - West	5.5	6608	18932
325	Mediterreg - Middle	5.5	5040	14439
326	Mediterr region - East	4.4	3678	10537
327	Central Anatolia - Middle	5.4	5137	14717
328	Central Anatolia - East	5.6	5775	16545
329	Western Black Sea - West	5.3	6316	18095
330	West Black Sea- Mi&E	6.0	5626	16118
331	Middle Black Sea	5.7	5213	14935
332	Eastern Black Sea	5.4	5923	16969
333	Northeastern Anatolia - W	5.6	4975	14253
334	Northeastern Anatolia - E	5.3	3262	9345
335	Eastern Anatolia - West	5.5	4428	12686
336	Eastern Anatolia - East	4.9	2948	8446
337	Southeastern Anatolia - W	5.0	3578	10251
338	Southeast Anatolia - Midd	4.6	2763	7916
339	Southeast Anatolia - East	4.4	2625	7520

Table A2.32. United Kingdom

Nb	Region	R13	R4	R4x
340	North East England	6.7	17738	22929
341	North West England	6.8	18419	23810
342	Yorkshire& Humber	6.9	17716	22901
343	East Midlands	6.9	18476	23883
344	West Midlands	6.8	18010	23281
345	East of England	6.9	21369	27623
346	Greater London	6.7	26727	34549
347	South East England	6.9	23349	30183
348	South West England	7.0	20622	26658
349	Wales	6.8	17733	22923
350	Scotland	7.1	19994	25846
351	Northern Ireland	7.0	17233	22277

Table A2.33. United States

Nb	Region	R13	R4	R4x
352	Alabama	7.4	32686	32686
353	Alaska	6.8	46338	46338
354	Arizona	6.9	33304	33304

355	Arkansas	7.0	32574	32574
356	California	7.4	44093	44093
357	Colorado	7.4	41740	41740
358	Connecticut	6.9	54925	54925
359	Delaware	8.1	39885	39885
360	District Columbia	6.8	59267	59267
361	Florida	7.0	37510	37510
362	Georgia	7.0	34116	34116
363	Hawaii	7.6	41620	41620
364	Idaho	6.8	32368	32368
365	Illinois	6.9	41661	41661
366	Indiana	7.0	35874	35874
367	Iowa	7.5	38438	38438
368	Kansas	7.4	40002	40002
369	Kentucky	7.1	32509	32509
370	Louisiana	7.4	36214	36214
371	Maine	6.8	36549	36549
372	Maryland	7.4	46107	46107
373	Massachusetts	7.0	50499	50499
374	Michigan	6.9	36150	36150
375	Minnesota	7.4	41291	41291
376	Mississippi	7.3	30303	30303
377	Missouri	7.2	35767	35767
378	Montana	6.6	34462	34462
379	Nebraska	7.8	40618	40618
380	Nevada	6.8	35987	35987
381	New Hampshire	6.9	48205	48205
382	New Jersey	7.1	49152	49152
383	New Mexico	7.1	32463	32463
384	New York	7.1	46512	46512
385	North Carolina	7.4	34334	34334
386	North Dakota	7.9	45071	45071
387	Ohio	6.8	36638	36638
388	Oklahoma	7.0	38008	38008
389	Oregon	7.0	36093	36093
390	Pennsylvania	7.0	41673	41673
391	Rhode Island	7.5	41969	41969
392	South Carolina	7.7	32729	32729
393	South Dakota	7.1	39992	39992
394	Tennessee	7.4	36500	36500
395	Texas	7.3	39256	39256
396	Utah	7.1	33302	33302
397	Vermont	8.0	41425	41425
398	Virginia	7.4	43221	43221
399	Washington	7.2	43860	43860
400	West Virginia	6.8	31055	31055
401	Wisconsin	7.2	38502	38502
402	Wyoming	7.8	45393	45393

Source. Values of OECD regional statistics for R13 and R4, ane estimations by M.C. Guisan for R4X based on OECD regional and National Accounts statistics.

Regions of the United States with value of R13 in year 2015 between 6.6 and 7.0:

Arkansas, Connecticut, Florida, Georgia, Illinois, Indiana, Massachusetts, Michigan, New Hampshire, Oklahoram, Oregon, Pennsylvania.

Regions of the United States with values of R13 between 7.1 and 7.5:

Alabama, California, Colorado, Iowa, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Missouri, New Jersery, New Mexico, New York, North Carolina, Rhode Island, South Dakota, Tennesse, Texas, Utah, Virginia, Washington, Wisconsin.

Regions of the United States with R13 between 7.6 and 8.1: Delaware, Hawaii, Nebraska, North Dakota, South Carolina, Vermont, Wyoming.

Annex 3. Regional disparities in income per capita.

Table A3 shows the mean of regional income per capita, measured by R4x, and the coefficient of variation (CV%=% of the Standard Error on the Mean), for countries with more 2 regions.

Table A3. Mean of R4x, Standard error (S.E.) and Coefficient of Variation (CV%)

Country	Mean	S.E.	CV %	Country	Mean	S.E.	CV%
Australia	36117	11805	33	Korea R	19902	1483	7
Austria	29989	970	3	Mexico	13914	3848	28
Belgium	26799	2549	10	Netherlands	27092	1261	5
Canada	26735	2710	10	New Zealand	21376	2875	13
Chile	12516	2759	22	Norway	30064	1980	7
Czech R	19489	2576	13	Poland	16548	1947	12
Denmark	26140	944	4	Portugal	19813	2186	11
Finland	26408	2364	9	Slovakia	17739	4965	28
France	27187	1974	7	Spain	20993	3748	18
Germany	30046	3006	10	Sweden	26498	1760	7
Greece	15505	1500	10	Switzerland	33680	2610	8
Israel	26350	8816	33	Turkey	15493	4440	29
Italy	23934	4818	20	United Kingdom	25572	3699	14
Japan	24088	1953	8	United States	39573	6200	16

Note:* The high variation in Australia is due to the high value of R4X in Camberra, although in the group of the other regions the variation is only of 16%.

There is an slight negative correlation (-0.23) between R4X and CV%, because usually the increase of economic development favors more equality of income per capita among regions, by several means: with migration movementes, with investments, with income transfers or other means.