

## Appendix A

Table A1 – Input variables and source

Thematic Area	Label	Description	Source	Year
Population	Pop.2017	Total population on 1st January	Eurostat [demo_r_d2]an]	2017
	% Pop. >65	People aged 65 and over (% of total population)	elaboration on Eurostat [demo_r_pjanaggr3]	2017
	% Pop. <15	People aged less than 15 (% of total population)	elaboration on Eurostat [demo_r_pjanaggr3]	2017
	% foreigners	Foreign (EU and non-EU countries) population (% of total population)	elaboration on Eurostat [cens_11ctzo_r2]	2011
	Pop. Density	Population density (per km2)	Eurostat [demo_r_d3dens]	2017
	% Pop upper secondary/tertiary educ.	Population aged 25-64, with upper secondary and tertiary education (ISCED levels 3-8) (% of total population)	Eurostat [edat_lfse_04]	2017
Economy and labour market	per capita GDP	Gross domestic product (GDP) at current market prices in Purchasing Power Standard, per inhabitant	Eurostat [nama_10r_2gdp]	2016
	Unempl. Rate	Unemployment rate (15-74 years)	Eurostat [lfst_r_lfu3rt]	2017
	Empl. Rate	Employment rate (15-64 years)	Eurostat [lfst_r_lfe2emprr]	2017
Sectoral structure	% GVA A	Gross value added at basic prices from Agriculture, forestry and fishing (A) (% of total GVA)	elaboration on Eurostat [nama_10r_3gva]	2015
	% Empl B-E	Employment in Industry (except const.) (B-E) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl F	Employment in Construction (F) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl G-I	Employment in Wholesale and retail trade, transport etc. (B-I) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl J	Employment in Information and communication (J) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl K	Employment in Financial and insurance activities (K) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl L	Employment in Real estate activities (L) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl M-N	Employment in Professional, scientific and technical activities (M-N) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl O-Q	Employment in Public administration (O-Q) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Empl R-U	Employment in Arts, entertainment and recreation (R-U) (% of total employment)	elaboration on Eurostat [nama_10r_3emprr]	2015
	% Mining, quarrying (05-09)	Employment in Mining and quarrying (05-09) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Food, drinks & tobacco 10 12	Employment in Food, drinks and tobacco (10-12) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Textiles, apparel & leather (13-15)	Employment in Textiles, apparel and leather (13-15) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Wood, paper & printing (16-18)	Employment in Wood, paper and printing (16-18) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Chem., pharm., rubber, plastic & refined petrol. (19-22)	Employment in Chemicals, pharmaceuticals, rubber, plastic and refined petroleum (19-22) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Non-metallic mineral products (23)	Employment in Non-metallic mineral products (23) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Basic metals & metal products (24-25)	Employment in Basic metals and metal products (24-25) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Electric, electronic, computer & optical equipment (26-27)	Employment in Electric, electronic, computer and optical equipment (26-27) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Machinery (28)	Employment in Machinery (28) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
	% Transport equipment (29-30)	Employment in Transport equipment (29-30) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*
% Other manufacturing (31-33)	Employment in Other manufacturing (31-33) (% of employment in B + C)	elaboration on Eurostat SBS data [sbs_r_nuts06_r2]	2015*	
Tourists per inhabitant	Arrivals at tourist accommodation establishments per inhabitant	elaboration on Eurostat [tour_occ_arn2]	avg. 2011-2017**	

\* Due to the presence of missing values in the structural business statistics (SBS) section, the values for year 2015 can be replaced with the values from the closest available year (2008-2015). However, for some regions and some NACE Rev.2 divisions, no data are available for the whole period under consideration. In these cases, a value equal to 0 is assigned to the specific region/division.

\*\* The average is computed on the only available data

Source: authors' elaboration on Eurostat data

Table A2 – Clusters of regions

Label	Population				Economy labour market							Sectoral structure																						
	Pop.2017 (mill.)	% Pop. >65	% Pop. <15	% foreigners	Pop. Density	% Pop upper sduc.	per capita GDP (000€)	Unempl. Rate	Empl. Rate	% GVA A	% Empl B-E	% Empl F	% Empl G-I	% Empl J	% Empl K	% Empl L	% Empl M-N	% Empl O-Q	% Empl R-U	% Mining, quarrying (05-09)	% Food, drinks & tobacco (10-12)	% Textiles, apparel,... (13-14)	% Wood, paper,... (16-18)	% Chem., Pharm ... (19-22)	% Non-metallic mineral ... (23)	% Basic metals ... (24-25)	% Electric, ... (26-27)	% Machinery (28)	% Transport equip. (29-30)	% Other manuf. (31-33)	Tourists/inhabit			
North-Western EU regions	<b>Very-high income capital city-regions</b>	0.6	14.2	16.2	42.7	225	76.4	75.1	5.5	66.3	0.3	8.9	10.2	23.3	4.1	11.0	0.9	15.6	20.7	4.3	1.3	26.0	0.0	6.5	5.9	11.2	20.8	2.5	19.3	0.0	6.6	2.0		
	Very-high income; financial centres; foreigners	5.0	12.3	19.6	26.9	6508	79.2	56.6	10.1	64.8	0.0	3.7	4.0	17.1	7.3	11.0	8.6	19.0	24.2	5.1	1.5	19.9	6.8	12.2	13.5	1.8	8.1	5.3	7.1	10.0	13.7	2.3		
	<b>Other urban regions</b>																																	
	Very-high income; large urban regions; high-employ.; highly educated	3.1	16.5	16.7	5.3	519	87.5	42.4	5.4	73.0	0.8	10.6	5.9	26.0	5.6	4.0	1.4	15.6	23.1	5.0	1.7	16.8	5.2	8.1	16.2	3.7	10.8	11.0	6.7	7.6	12.2	1.9		
	Very-high income; high-density city-regions; high-employ.; highly educated; touristic	1.8	18.8	14.1	13.5	3152	86.8	47.2	5.5	72.9	0.1	9.4	4.7	26.0	5.3	3.6	2.5	17.6	23.9	7.0	0.4	7.8	2.0	7.3	12.0	2.0	12.4	16.0	12.6	8.4	19.1	3.4		
	Urban regions; high-income; poorer employ. conditions; touristic	3.7	19.2	16.2	10.3	523	70.4	28.4	11.5	63.8	1.1	9.3	5.9	28.0	3.5	3.1	0.9	13.5	25.0	8.3	1.2	25.3	4.2	9.8	13.5	5.0	10.9	5.9	3.9	4.6	15.6	2.4		
	<b>Very-high income manuf. regions</b>																																	
	Very-high income; manuf.; population imbalances	5.7	22.5	13.4	9.1	260	72.7	34.9	6.8	69.3	1.5	20.4	5.7	24.4	2.4	2.8	0.8	12.2	20.6	8.6	0.5	10.5	4.1	5.7	10.6	3.4	18.6	9.4	15.4	12.5	9.4	1.9		
	<b>Medium-high income regions, services &amp; public sector</b>																																	
	High-income; high-employ.; low-manuf.; services & public sector	2.4	20.7	15.5	4.0	249	82.5	30.4	5.4	73.7	1.9	13.7	6.4	23.6	2.2	1.9	1.0	14.7	28.7	5.0	1.5	17.5	2.1	7.7	13.2	4.2	14.8	7.2	12.5	9.2	10.0	2.1		
	Medium-income; employ. imbalances; low-manuf.; services & public sector	2.3	20.7	17.6	3.8	111	77.3	24.9	9.1	64.6	3.3	13.2	6.8	21.3	1.5	2.2	1.0	12.1	32.7	5.2	0.7	23.4	3.6	8.4	14.7	3.6	16.6	5.6	6.9	6.1	10.2	1.8		
	<b>High-employment, with advanced services</b>																																	
Medium-income; high-employ.; manuf. & private services	5.2	19.1	17.8	7.0	323	78.1	26.0	4.4	73.4	0.9	17.3	6.5	19.0	4.3	4.3	13.1	9.8	20.9	3.9	1.1	15.3	2.9	9.5	12.8	3.1	16.5	8.3	7.4	12.5	10.7	1.3			
Medium-income; high-employ.; highly educated; manuf.: mining & quarrying	3.5	19.4	15.4	3.2	148	87.3	27.5	4.6	71.7	1.6	21.2	7.2	19.5	2.6	3.1	4.7	8.6	26.7	3.6	19.2	12.2	2.9	9.6	7.3	2.6	15.2	5.7	6.6	10.2	8.6	1.9			
<b>High-income low-population density regions</b>																																		
High-income; low-population density; tourism	0.9	20.0	14.7	9.0	71	81.7	32.1	5.5	71.2	2.2	15.6	7.7	27.8	2.0	2.3	1.3	9.3	23.1	5.3	2.0	18.2	4.5	12.6	7.5	5.5	17.0	7.5	8.5	5.2	11.6	5.9			
High-income; sparsely populated; public sector; highly educated	1.0	22.9	16.3	3.8	25	85.6	28.6	7.5	72.5	4.3	16.0	7.5	19.2	2.1	1.2	1.2	9.1	33.7	5.0	1.5	9.2	2.3	18.0	7.3	3.5	21.5	10.4	12.7	5.5	8.1	2.4			
<b>Eastern manufacturing regions</b>																																		
Low-income; high-employ.; manuf.; no foreigners; very highly educated	1.3	17.9	15.1	1.9	116	90.7	20.0	4.8	69.9	3.8	30.3	7.7	22.8	1.6	1.2	1.1	7.1	18.7	3.2	2.2	9.2	5.2	7.5	9.5	4.8	19.2	9.9	9.2	14.9	8.3	0.9			
Very low-income; manuf.; no foreigners; highly educated	2.2	17.0	15.2	0.2	97	86.8	16.4	5.6	65.0	4.1	22.3	7.3	22.8	1.6	1.8	0.8	5.1	19.3	3.0	2.5	16.9	11.2	10.4	9.8	4.8	12.5	5.5	4.6	7.5	14.2	0.7			
Very low-income; agricultural; manuf.: textile, electric, transport; low-population density	1.4	20.2	14.2	0.5	67	79.7	12.4	6.6	63.2	8.3	24.3	5.6	20.4	0.9	0.9	0.6	4.3	18.9	2.9	4.2	16.5	16.7	5.5	8.9	3.0	12.3	8.1	6.5	10.8	7.7	0.6			
<b>Regions with traditional economy &amp; empl.imbalances</b>																																		
Medium-income; employ. & population imbalances; manuf.: textile, basic metal, transport; very poorly educated.	1.7	23.5	12.5	5.2	105	60.0	23.6	11.9	60.9	3.3	17.9	6.9	25.6	1.4	1.9	0.6	9.7	20.3	8.9	1.7	17.1	14.4	7.1	7.2	5.8	16.8	3.9	4.9	11.7	9.4	1.7			
Low-income; high-density; high unemployment.; agriculture; food & drinks; very poorly educated	4.2	19.4	14.6	6.3	185	52.4	19.7	20.2	48.8	4.5	10.5	6.2	28.3	1.4	1.8	0.6	10.0	22.6	10.4	1.2	26.4	9.2	8.0	8.5	7.0	14.6	2.9	3.4	5.7	13.0	1.2			
Very-low income; agriculture; sparsely populated; very high unemployment.; traditional services (G-I)	0.8	22.6	14.1	6.8	45	60.9	17.4	20.9	55.3	8.4	11.6	5.8	28.2	0.9	1.4	0.3	6.1	22.5	6.0	2.6	40.2	8.2	7.0	7.3	6.1	14.4	2.4	2.6	1.8	7.4	1.4			
<b>Touristic areas; traditional-economy</b>																																		
Low-income; high-unemployment.; touristic; food & drinks; traditional services (G-I); very poorly educated	0.8	18.6	15.3	13.1	140	59.4	21.6	16.2	60.7	3.3	5.6	6.7	42.6	0.9	1.2	0.8	8.4	18.8	6.7	1.8	42.1	4.9	10.0	2.8	8.4	11.9	0.9	0.9	1.0	15.3	8.2			

Details on variables are described in Supplemental Table 1

Table A3 – Quantile distribution for input variables of EU-28 regions

Thematic Area	Label	Minimum	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile (max)
Population	Pop.2017	126,883	816,286	1,321,012	2,042,362	3,548,656	17,890,100
	% Pop. >65	11.57	17.36	19.03	20.54	22.55	28.35
	% Pop. <15	11.05	13.63	14.54	15.73	16.83	21.89
	% foreigners	0.06	1.25	3.40	5.80	9.41	42.73
	Pop. Density	3.4	61.9	88.9	133.7	292.7	7408.6
	% Pop upper secondary/tertiary educ.	42.0	66.3	77.4	82.8	88.4	97.6
Economy labour market	per capita GDP	8,600	18,100	23,600	27,540	32,680	75,100
	Unempl. Rate	1.7	4.2	5.6	7.7	11.3	29.1
	Empl. Rate	40.6	61.0	66.0	69.4	73.9	79.2
Sectoral structure	% GVA A	0.0	1.0	1.7	3.1	5.1	12.3
	% Empl B-E	3.2	10.0	13.8	17.2	21.9	40.2
	% Empl F	3.1	5.6	6.4	6.9	7.5	11.7
	% Empl G-I	14.3	21.0	22.7	24.8	27.2	49.6
	% Empl J	0.4	1.1	1.5	2.1	3.1	10.1
	% Empl K	0.4	1.2	1.8	2.2	3.0	14.1
	% Empl L	0.1	0.5	0.8	1.0	1.5	16.3
	% Empl M-N	1.5	6.4	9.1	10.9	13.4	23.1
	% Empl O-Q	9.9	18.6	21.7	24.2	28.9	39.0
	% Empl R-U	1.5	3.6	4.4	5.3	7.6	15.4
	% Mining, quarrying (05-09)	0.0	0.5	0.8	1.3	2.4	22.1
	% Food, drinks & tobacco 10 12	0.0	10.1	15.1	19.0	25.7	62.3
	% Textiles, apparel & leather (13-15)	0.0	1.8	2.8	4.6	8.8	44.1
	% Wood, paper & printing (16-18)	1.6	5.8	7.3	8.7	11.0	29.6
	% Chem., pharm., rubber, plastic & refined petrol. (19-22)	1.0	6.5	8.8	10.7	14.4	45.1
	% Non-metallic mineral products (23)	0.5	2.6	3.6	4.5	5.9	13.6
	% Basic metals & metal products (24-25)	6.3	10.5	12.9	15.7	18.6	37.0
	% Electric, electronic, computer & optical equipment (26-27)	0.2	3.4	5.4	7.3	9.8	26.1
	% Machinery (28)	0.0	3.3	5.4	8.2	11.6	26.4
	% Transport equipment (29-30)	0.0	2.4	4.8	7.9	13.5	37.6
% Other manufacturing (31-33)	4.0	7.7	9.1	11.2	13.9	26.7	
Tourists per inhabitant	0.2	0.8	1.3	1.8	2.7	12.4	

Table A4 – Clusters, by macro-group: number of regions, population and NUTS codes

Label	No. of regions		Population		Regions: NUTS codes
	#	%	Million	%	
<b>NORTH-WESTERN EU REGIONS</b>					
<b>Very-high income capital city-regions</b>					
Very-high income; financial centres; foreigners	1	0.5	0.6	0.1	LU
Very-high income; capital city-regions; diversified services	2	1.0	10.1	2.0	BE1, UK1
<b>Other urban regions</b>					
Very-high income; large urban regions; high-employment; highly educated	13	6.3	39.9	7.8	BG41, DK01, FI1B, FR10, HU10, IE02, NL31, NL32, PL12, RO32, SE11, SI04, SK01
Very-high income; high-density city-regions; high-employment; highly educated; touristic	5	2.4	9.2	1.8	AT13, CZ01, DE3, DE5, DE6
Urban regions; high-income; poorer employment conditions; touristic	10	4.8	36.9	7.2	CY, EL30, ES30, ES51, FR81, FR82, IE01, IT14, MT, PT17
<b>Very-high income manuf. regions</b>					
Very-high income; manufacturing; population imbalances	14	6.7	79.7	15.7	DE1, DE2, DE7, DEA, DEC, ES21, ES22, ES24, ITC1, ITC3, ITC4, ITH3, ITH4, ITH5
<b>Medium-high income regions, services &amp; public sector</b>					
High-income; high-employment; low-manufacturing; services & public sector	27	13.0	65.1	12.8	BE2, DE4, DE8, DE9, DEB, DED, DEE, DEF, DEG, DK03, DK04, DK05, FR42, FR62, FR71, NL11, NL12, NL13, NL21, NL22, NL23, NL33, NL34, NL41, NL42, SE22, SE23
Medium-income; employment imbalances; low-manufacturing; services & public sector	16	7.7	36.6	7.2	BE3, DK02, FR21, FR22, FR23, FR24, FR25, FR26, FR30, FR41, FR43, FR51, FR52, FR53, FR61, FR72
<b>High-employment, with advanced services</b>					
Medium-income; high-employment; highly educated; manufacturing; mining & quarrying	3	1.4	10.4	2.1	PL22, SE33, UKM
Medium-income; high-employment; manufacturing & private services	10	4.8	51.5	10.1	UKC, UKD, UKE, UKF, UKG, UKH, UKJ, UKK, UKL, UKN
<b>High-income low-population density regions</b>					
High-income; low-population density; tourism	15	7.2	13.1	2.6	AT11, AT12, AT21, AT22, AT31, AT32, AT33, AT34, EE, FR83, HR03, ITC2, ITH1, ITH2, LV
High-income; sparsely populated; public sector; highly educated	8	3.8	8.3	1.6	FI19, FI1C, FI1D, FR63, SE12, SE21, SE31, SE32
<b>EASTERN MANUFACTURING REGIONS</b>					
<b>Eastern manufacturing regions</b>					
Low-income; high-employment; manufacturing; no foreigners; very highly educated	14	6.7	18.5	3.6	CZ02, CZ03, CZ04, CZ05, CZ06, CZ07, CZ08, HU21, HU22, PL33, SI03, SK02, SK03, SK04
Very low-income; manufacturing; no foreigners; highly educated	20	9.6	44.0	8.7	BG33, HR04, LT, PL11, PL21, PL31, PL32, PL34, PL41, PL42, PL43, PL51, PL52, PL61, PL62, PL63, RO11, RO12, RO21, RO22
Very low-income; agricultural; manufacturing; textile, electric, transport; low-population density	11	5.3	15.6	3.1	BG31, BG32, BG34, BG42, HU23, HU31, HU32, HU33, RO31, RO41, RO42
<b>MEDITERRANEAN TRADITIONAL-ECONOMY REGIONS</b>					
<b>Regions with traditional economy &amp; empl.imbalances</b>					
Medium-income; employment & population imbalances; manufacturing: textile, basic metal, transport; very poorly educated	12	5.8	21.0	4.1	ES11, ES12, ES13, ES41, ITF1, ITF2, ITF5, ITI1, ITI2, ITI3, PT11, PT16
Low-income; high-density; high unemployment; agriculture; food & drinks; very poorly educated	8	3.8	33.4	6.6	ES52, ES61, ES62, ITF3, ITF4, ITF6, ITG1, ITG2
Very-low income; agriculture; sparsely populated; very high unemployment; traditional services (G-I)	13	6.3	10.0	2.0	EL41, EL51, EL52, EL53, EL54, EL61, EL63, EL64, EL65, ES23, ES42, ES43, PT18
<b>Touristic areas; traditional-economy</b>					
Low-income; high-unemployment; touristic; food & drinks; traditional services (G-I); very poorly educated	6	2.9	4.9	1.0	EL42, EL43, EL62, ES53, ES70, PT15
	<b>208</b>	<b>100</b>	<b>508.6</b>	<b>100</b>	

Figure A1 – the structure of clusters: the dendrogram

