imaJINE Integrative Mechanisms for Addressing Spatial Justice and Territorial Inequalities in Europe

Integrative Mechanisms for Addressing Spatial Justice and Territorial Inequalities in Europe

D2.4. Report on Inequality Indices at Local Level

Version 1

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Grant Agreement No.:	726950
Programme call:	H2020-SC6-REV-INEQUAL-2016-2017
Type of action:	RIA – Research & Innovation Action
Project Start Date:	01-01-2017
Duration:	60 months

Deliverable Lead Beneficiary: UNIOVI

Dissemination Level: PU

Contact of responsible author: avinuela@uniovi.es

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 726950.

Dissemination level:
• PU = Public
• CO = Confidential, only for members of the consortium (including the Commission Services)

Change control

VERSION	DATE	AUTHOR	ORGANISATION	DESCRIPTION / COMMENTS

Bibliographic information

Esteban Fernandez-Vazquez, Maria Plotnikova, Paolo Postiglione, Fernando Rubiera-Morollon, Ana Viñuela (2018) *Report 3. Inequality Indexes at Local Level*. IMAJINE WP2 Analysis of Territorial Inequalities in Europe

This report can be downloaded from our website http://imajine-project.eu/

Acknowledgements

We thank the research assistants Alberto Cartone, Alberto Diaz-Dapena, Diana Gutierrez-Posada and Domenica Panzera.

December 2018

Acronyms and Abbreviations

AROPE	At risk of poverty or social exclusion
CGE	Computable general equilibrium
EQLS	European Quality of Life Survey
EU	European Union
EU-SILC	European Union Survey on Income and Living Conditions
ESRC	Economic and Social Research Council
GCE	Generalized Cross Entropy
HS	Household Surveys
LAU	Local administrative unit
LIS	Luxembourg Income Study
NUTS	Nomenclature of Territorial Units for Statistics
WP	Work Package

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Introduction

Asking why some places generate more wealth than others is not very different from asking why some people succeed in life while others do not. There are general pointers, such as having good health, loving parents or growing up in stimulating surroundings, but these alone do not guarantee success and happiness. For territories it is the same. We can find theories that that address the issue of why some areas are richer and more successful but the comprehensive approaches or general theories do not seem to be enough to understand the success or failure of particular localities. The quest for extensive explanations, as well as magic recipes or best practices that worked in one place, are constantly thwarted by the changing characteristics of the localities. Even more, when analysing the spatial distribution of wealth and its possible explanations one thing is clear: the more local data and information we have, the better our understanding will be.

One of the paradoxes of the new technologies revolution and the globalization of economies is that *place* now matter more than ever. But what is the concept of *place* in present times? Nowadays *place* is identified by the localities, villages, towns or cities, urban or metropolitan areas. It is at such levels of spatial disaggregation beyond the traditional concept of a *region* can we find the *agglomeration economies* (of *urbanization* or *localization*), the *spillovers*, the positive or negative *accumulative processes* as well as local *endogenous processes*. Consequently, it is only at this spatial level that territorial inequalities and spatial justice should be examined. However, regional and urban planners and policy makers tend to design and execute plans and policies at regional level using the administratively-defined regions as their basic spatial unit and ignoring the internal regional heterogeneity. We like to believe that the main reason behind this is the lack of comprehensive data and information at higher levels of spatial disaggregation.

One of the objectives of Work Package 2 (WP2) of the IMAJINE project is to provide an inclusive and homogenous database at local level for several EU countries. This database comprises information on two crucial indicators in the study of territorial inequalities that until now had simply not existed at local level for many EU countries: average household income and poverty. In addition to this, some other local variables related to the level of, among others, education, dependency or immigration of the localities were collected for the EU countries where that information was available at such a level of spatial disaggregation Thus, EU territorial inequalities in terms of income, poverty, education, immigration or ageing are given a new spatial perspective. Not only can spatial disparities *between* EU regions be analysed but also the territorial inequalities *within* the regions.

This report is organized in three sections. Section 1 provides a general but brief review of the existing literature on territorial inequalities in the European Union. While many studies have been done on this topic at *regional* level, analysis at local level is relatively lacking. Benefiting from the local dataset constructed in this WP2, in Section 2 we provide an overview of the existing territorial inequalities in Europe both at *regional* and *local* levels, underlining the relevance of the spatial unit chosen when calculating inequality indicators. In Section 3 some potential applications and subsequent policy implications are outlined following some lines of

research opened by the authors of this report. These and many other questions related to territorial inequalities can now be answered at a finer scale of disaggregation than the region.

1. Territorial inequality: a reappraisal of the main theories and measurement approaches and its application to the European Union

1.1 Spatial inequalities and social justice: the spatial justice concept

The space where we develop our lives is much more than just a physical place that supports our life in society, including our productive or economic activity. Location and size of each *place* - among other characteristics - are key factors that affect socio-economic processes related, although not limited, to innovation, social change, environmental issues or demographic balance (Soja, 2009). The influence of the space can be positive but also negative, shaping distinct paths and patterns of social and economic development, and leading to the notion of *spatial justice*.

The first discussions on the relationship between *space* and its embedded *justice* were made by Davies (1968) and Harvey (1973). As explained in Pirie´s (1983) essay, the concept of *spatial justice* was surrounded by significant controversy, with difficulties involved with the definition of *justice* itself, the level of disaggregation at which justice has to be considered, and the meaning of the possible differences observed between the different spatial levels. Although highly critical, this work encourages scholars and politicians to face the challenges posed by the conceptualization of space as a social creation that needs to embrace the idea of justice. According to Soja (2009): "*Combining the terms spatial and justice opens up a range of new possibilities for social and political action, as well as for social theorization and empirical analysis.*"

1.2 From the spatial justice concept to the welfare multidimensional measurements across the space

Western culture evolved to recognize equality, democracy and civil rights as indicators of the existing level of justice. However, it is very difficult to assess the extent to which these elements correspond to a fair or unfair environment, since the outcome of such an evaluation depends on the material resources and the mental perceptions of the environment, i.e. our perceived relative position within society. In this complex framework, the related literature advocates for the idea of distributional justice as a reflection of general social goodness, a universally-accepted definition of justice set by Rawls (1971). Some examples of this contention are Sen (1980) and Nussbaum (1992), whose propositions led to the broad agreement that 'welfare' (doing or being well, as early stated by Aristotle) represents a suitable magnitude with which to analyse the advantages or disadvantages that determine the perception of fairness. In spite of the conformity around this idea, it remains a concept hard to measure due to its inherent subjectivity and dynamism: individual perspectives and cultural values profoundly influence the notion of welfare, in addition to the fact that perceptions of the distribution of material and immaterial endowments change over time and across space as a result of comparison or adaptation (Jackson 2007). The debate about the definition of welfare has led to its current

definition as a multidimensional concept related to every aspect of life (socio-cultural, psychological or environmental), either factual of aspirational (McGillivray 2007).

The research devoted to the study and quantification of welfare can be divided according to its character into *subjective* and *objective*. On the one hand, the *subjective* approach tries to analyse personal opinions and expectations on life quality and their evolution, often linked to the feeling of happiness (Andrews and Withey, 1976; Warr, 1999; Diener and Lucas, 2000; Van Hoorn, 2008). Complementing the subjective line, on the other hand, the *objective* strategy relies on observable indicators of the fulfilment of needs as proxies of individual and social welfare (Prince and Prince, 2001; Cummins, 2006; Andreoni and Galmarini, 2014). Another way to classify the studies on welfare arises from the postulates of Maslow (1954) with regards to the hierarchy of needs of a human being seeking personal realization (physiological circumstances, safety, belonging, esteem, self-actualization and self-transcendence). In a similar vein, Allardt (1975) proposed a separation of the aspects related to life quality in terms of the needs to be accomplished. His influential approach separates basic needs into *Having* (material living conditions), *Loving* (kinship and social interaction) and *Being* (identification with the society and the natural environment). Delving further into the aspects that determine what a good society and a convenient environment are, Veenhoven (1993, 1996 and 2000) considers that economic welfare, demographic and political stability, health care, safety, participation, freedom and peace are among the key elements to measure the general quality of life.

The *objective* assessment of welfare tends to be associated with the study of the material means available to that aim, which would fall into the *Having* group. However, in practice both classifications are intertwined, accommodating many empirical options. Scholars from several fields have contributed to constructing a large body of evidence on this matter, bringing together the different standpoints on the topic. The psychological view focuses on the large effect that personality characteristics have on the perception of welfare (Argyle, 1987; Hamer, 1996; Diener and Lucas, 1999; Inglehart and Klingemann, 2000), whereas sociologists evaluate the social behaviour in response to a change in the conditions affecting life satisfaction (Veenhoven 1984; Argyle 1999; Headey and Wearing 1992; Hagerty et al. 2002; Glatzer and Zapf 1984; Diener and Lucas 1999). In Economics the focus has been on the differences that exist with regard to the awareness of the relative income distribution and its associated marginal utility (Frey and Stutzer 2002a, b; Oswald 1997; Layard 2005).

1.3 The persistence of an uneven welfare distribution among the EU countries using different approaches

Regardless of the definition used or the approach adopted, distribution of welfare varies over time and across space. The identification of clusters of persistent underdevelopment in terms of welfare, i.e., the existence of territorial injustice, is especially important when it comes to devising successful tools, intervention strategies and spatial policies aimed at amending them. The EU has for decades offered an excellent case study for analysing territorial inequality, as it has brought together a large conglomerate of countries with dissimilar cultural and material endowments that pursue economic integration and social cohesion through common policies designed by a supra-national authority that sets global and also local objectives that

complement the measures and means designed and adopted by national, regional and/or local authorities.

To contribute to the policy agenda, many research studies have tried to shed light on the differences in perceptions of welfare across the EU and their possible determinants. Böhnke (2008) explores the micro and macro social effects on subjective wellbeing, jointly considering the individual living conditions and the societal context. As comprehensively reviewed in her article, previous analyses had addressed the relationship between unemployment, inflation and life satisfaction (Oswald and Clark 1994, Blanchflower and Freeman 1997, Oswald 1997, Blanchflower and Oswald 2001, Di Telia *et al.* 2001, Clark 2003, Clark *et al.* 2004), as well as the effect of economic prosperity on wellbeing (Inglehart and Klingemann 2000, Ryan and Deci 2001, Di Telia *et al.* 2003, Fahey and Smyth 2004). Nevertheless, these relationships are not always consistent, as they seem to differ between rich and poor countries (Easterlin 1973, Argyle 1999, Veenhoven 1997), or vary depending on the quality of the governance (Andrews and Withey 1976, Diener and Lucas 2000, Frey and Stutzer 2000, Veenhoven 2000, Inglehart and Klingemann 2000, Donovan and Halpern 2002, Helliwell 2003) or the cultural values embedded in the society (Inglehart 2001).

In a similar fashion, Aristei and Perugini (2010) explore cross-country inequality in the distribution of personal wellbeing for 26 European countries (EU-27 excluding Bulgaria, Malta and Romania, but including Norway and Iceland) using information from the 2006 *European Union Survey on Income and Living Conditions* (EU-SILC). Based on the *capabilities* approach (Sen 1985, 1987), they take into account income, health and educational aspects to build a multidimensional wellbeing index. These national indexes are then compared through a social welfare function that follows the form proposed by Atkinson (1970), where concavity depends on the national tolerance for inequality. A key point in this analysis is the relaxation of the assumption of homogeneity of the preferences regarding redistribution, as revealed by the tax system implemented in each country (Evans 2008, Gouveia and Strauss 1994, Young 1990). The results regarding the inequality aversion parameter (ε) show high values for Ireland, United Kingdom and Slovenia, while Denmark, Sweden and Latvia exhibit a weaker aversion for an uneven distribution.

The studies presented so far underline the role of *subjective* wellbeing as a measure of the degree of development in a society. But there is one *quantifiable* indicator that comprises most of the aspects included in the individual assessment of life in terms of feeling and functioning well: mental health. As reviewed by Huppert and So (2013), a high level of mental health, or flourishing, is related to positive collective outcomes such as greater learning, productivity, creativity, and pro-social behaviour (Diener *et al.* 2010a and 2010b, Dolan *et al.* 2008, Lyuborminsky *et al.* 2005). In their examination, Huppert and So (2013) conduct a psychometric analysis based on the individual data from the 2003 *European Social Survey*, focusing on ten items generally agreed as indicators of mental health: competence, emotional stability, engagement, meaning, optimism, positive emotion, positive relationships, resilience, self-esteem and vitality. With this information, the authors built a multidimensional marker out of three aggregate components (positive characteristics, positive functioning and positive appraisal) derived from an *Exploratory Factor Analysis*. The criterion established to define "flourishing individuals" is having almost all the features listed as positive characteristics,

positive functioning and positive emotion (which identifies with positive appraisal and is closely correlated with life satisfaction). The conditions set were met by 15.8% of the 43,000 respondents and the spatial results showed once again a large variability among European countries and the existence of clusters responding to their shared culture and governance style. The Nordic countries lead the ranking and Denmark was the country with the highest rate of flourishing individuals (40.6%). Not surprisingly, this finding is consistent with previous studies outlining higher levels of happiness in the Nordic countries due to their high levels of income and their low levels of inequality, which go hand in hand with the existence of a solid health care system, low unemployment rates, high social trust (Diener *et al.* 1995, 2010a; Haavind and Magnusson 2005; Hagerty 2000). On the other hand, results for Eastern Countries were at the lower end of the spectrum, with figures on flourishing individuals ranging from 10% to 15%, reflecting their low levels of income, their high inequality levels, their weak welfare states and their institutional deficiencies (Brainerd 2010). The miscellaneous Southern/Western Europe block is represented all over the classification, though mainly in the range from 17o% and 22%. With regards to the scores in each of the ten features included, top and bottom performers show a consistent behaviour, while some countries like France and Spain shift between the highest and the lowest positions depending on the item considered.

1.4 Regional disparities: the heterogeneous distribution of welfare within EU countries

A multicriteria approach combining both the subjective and objective angles has become standard when analysing welfare disparities (Zeleny 1982, Yu 1985, Munda 2005). For instance, Andreoni and Galmarini (2016) recently completed a multidimensional description of welfare that includes economic, socio-demographic, health and environmental features. This empirical study used 2009 information from Eurostat to evaluate the overall performance of 266 NUTS2 regions in terms of twelve indicators and to map the results obtained, which allows them also to detect the factors behind EU territorial inequality by means of the Gini coefficient.

The Gini coefficient is calculated following the formulation of Deaton (1997) and results suggest that the largest inequalities in wellbeing between European regions derive from the divergences on the environmental and economic factors considered (0.41 and 0.38 respectively). On the other hand, the social and health indicators show a relatively more even distribution across the regions, with values around 0.20 and 0.12 in each category. Then, regional results are compared to the best outcome scored in each category. In general, regions that contain large cities and metropolitan areas show the larger GDP values, levels of tertiary education and fertility rates, but also of waste generation. Regions from Eastern countries exhibit the lowest levels in health indicators, and Mediterranean regions would score low in intentional self-harm. The map produced by Andreoni and Galmarini (2016) shows that the Eastern regions have the largest number of underperforming indicators (i.e. below the EU level), while Scandinavian regions and region in the South of England enjoy values above the EU average for almost all indictors. Regions from Central Europe, Ireland and Cyprus have slightly more than half of the indicators in the top rank. On the other hand, the Mediterranean regions, the English Midlands and Eastern France lie right below the middle of the classification. Again, the comparative analysis confirms that regions comprising large cities and metropolitan areas perform better than their neighbours

despite their geographical location. Andreoni and Galmarini (2016) highlight the existing heterogeneity in the distribution of wellbeing among European regions, with strong territorial disparities within countries and the evidence of clusters of well- and poor-performing areas that transcend national borders.

1.5 Regional disparities: the heterogeneous distribution of income within EU countries

Over the last decade great concern has been expressed at the prospect of rising inequality between EU countries and also within individual countries. Moreover, internal disparities might be the source of the increasing differences between countries (see Díaz-Dapena *et al*., 2018).

Due to data availability, inequality is commonly studied in terms of household income (as opposed to *individual* income). Although the *European Union Statistics on Income and Living Conditions* (EU-SILC) dataset provides *comparative* data on incomes and living conditions for the EU from 2005 to 2013, comparability across countries or over time has to be made with caution due to differences in, among others, the definition of a household, the definition of income, the inclusion of rental income (Frick and Grabka, 2007), the inclusion benefits from employers, the use of estimated figures in some countries, and tax contributions (see Nolan *et at.* 2011 for a critical review). Using the EU SILC information on household income, Table 1.1 shows the evolution from 2006 to 2013 of the Gini coefficient and the Theil index [i] for the 28 EU countries (plus Iceland, Norway, Serbia and Switzerland). According to this indicator, income disparities in EU countries do not seem to have risen as a consequence of the global economic crisis starting in 2008 or the austerity measures implemented thereafter, as the values of the Gini and Theil measures remain more or less constant over time without a clear long term tendency. There has been no tendency towards convergence between EU countries, with Eastern European countries (Estonia, Latvia and Lithuania or Bulgaria) on top of the inequality ranking with the lowest values corresponding to some Northern European countries (Table 1.1).

The EU-SILC has made a huge effort to gather and homogenise data from different sources and EU countries. However the basic spatial unit of analysis employed in that dataset is NUTS2 regions.

Using EU-SILC information on average income, Figure 1.1 shows the Gini coefficients calculated for each NUTS2 region[ii]. These coefficients can be interpreted as the degree of income inequality *within* the EU regions for which there is information: the larger its value, the higher the differences on income between the residents (households) living in that NUTS2 region[iii].

Table 1.1: Evolution of Gini and Theil indexes between 2006 and 2013 for 28 EU countries and more

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	*Gini index*	0.3377	0.3333	0.3321	0.3374	0.3545	0.3544	0.3608	0.3531	0.3517	0.3430
	Theil index	0.1923	0.1899	0.1842	0.1938	0.2134	0.2143	0.2239	0.2099	0.2113	0.1974
Belgium	*Gini index*	0.3366	0.3647	0.3584	0.3431	0.354	0.3401	0.3405	0.3454	0.3459	0.3434
	Theil index	0.1867	0.3344	0.264	0.1968	0.2294	0.1975	0.1956	0.2097	0.2000	0.1985
Bulgaria	*Gini index*				0.4095	0.4279	0.4063	0.3998	0.4124	0.4042	0.4171
	Theil index				0.2960	0.3172	0.2732	0.2742	0.2922	0.2813	0.3055
Croatia	*Gini index*		0.3421	0.3827	0.3216	0.3154	0.3059	0.3016	0.3211	0.3269	0.3279
	Theil index		0.2154	0.2829	0.1769	0.1695	0.1562	0.1512	0.1716	0.1842	0.1873
Cyprus	*Gini index*		0.3630	0.3616	0.3725	0.368	0.3712	0.3761	0.3643	0.3828	0.3849
	Theil index		0.2317	0.2331	0.2606	0.2458	0.2462	0.2567	0.2339	0.2678	0.2836
Czech Republic	*Gini index*		0.3330	0.3277	0.3275	0.3307	0.3339	0.3251	0.3251	0.3254	0.3217
	Theil index		0.1937	0.1878	0.1853	0.1891	0.1982	0.1840	0.1787	0.1795	0.1740
Denmark	*Gini index*	0.3308	0.3296	0.3312	0.342	0.3443	0.3381	0.3468	0.3623	0.3583	0.3601
	Theil index	0.1905	0.1822	0.1877	0.2182	0.2204	0.1988	0.2099	0.2328	0.2294	0.2594
Estonia	*Gini index*	0.4402	0.4192	0.4107	0.4148	0.3954	0.3909	0.3883	0.3925	0.3964	0.4036
	Theil index	0.3338	0.2976	0.2815	0.3181	0.2587	0.2517	0.2479	0.2539	0.2604	0.2703
Finland	*Gini index*	0.3409	0.3505	0.3510	0.3490	0.3547	0.3519	0.3428	0.3483	0.3499	0.3461
	Theil index	0.2203	0.2369	0.2268	0.2204	0.2207	0.2151	0.2036	0.2121	0.2146	0.2073
France	*Gini index*	0.3382	0.3337	0.3313	0.3244	0.3529	0.3531	0.3547	0.3574	0.3592	0.3536
	Theil index	0.2041	0.1912	0.1906	0.1815	0.2298	0.2357	0.2321	0.2485	0.2510	0.2358
Germany	*Gini index*		0.3282	0.3278	0.3659	0.3708	0.3626	0.3622	0.3607	0.3593	0.3672
	Theil index		0.1966	0.1948	0.2389	0.2472	0.2310	0.2344	0.2305	0.2214	0.2452
Greece	*Gini index*	0.3653	0.3709	0.3783	0.3796	0.3672	0.3713	0.3733	0.3738	0.3530	0.3686
	Theil index	0.2258	0.2334	0.2484	0.2498	0.237	0.2437	0.2439	0.2431	0.2174	0.2425
Hungary	*Gini index*							0.3959	0.3875	0.3839	0.3822
	Theil index							0.2562	0.2458	0.2407	0.2373
Iceland	*Gini index*	0.3362	0.3417	0.3421	0.3601	0.3575	0.3755	0.3446	0.3333	0.3299	0.3314
	Theil index	0.1957	0.2119	0.2135	0.2467	0.2362	0.2697	0.205	0.1932	0.1856	0.1883
Ireland	*Gini index*	0.3939	0.3889	0.3921	0.3821	0.3666	0.357	0.3601	0.3496	0.3539	0.3584
	Theil index	0.2796	0.2806	0.2909	0.2596	0.2382	0.2157	0.2264	0.2057	0.2151	0.2231
Italy	*Gini index*	0.3798	0.3774	0.3686	0.3684	0.3608	0.3635	0.3587	0.3617	0.3646	0.368
	Theil index	0.2596	0.2572	0.2337	0.2337	0.2239	0.2283	0.2244	0.2309	0.2347	0.2434
Latvia	*Gini index*		0.4246	0.4486	0.4310	0.4592	0.4575	0.4249	0.4156	0.4239	0.4195
	Theil index		0.3165	0.3558	0.3123	0.3595	0.3646	0.3056	0.2915	0.3100	0.2975
Lithuania	*Gini index*		0.4207	0.4175	0.411	0.4107	0.4315	0.4271	0.3999	0.3982	0.4175
	Theil index		0.2981	0.2901	0.2807	0.2921	0.3331	0.3188	0.2661	0.2616	0.2983
Luxembourg	*Gini index*	0.3080	0.3117	0.3258	0.3206	0.3169	0.3281	0.3199	0.3148	0.3180	0.3354
	Theil index	0.1588	0.1644	0.1808	0.175	0.1742	0.1932	0.181	0.1684	0.1771	0.2136
Malta	*Gini index*					0.3619	0.348	0.3495	0.3381	0.3383	0.3478
	Theil index					0.2162	0.1988	0.2062	0.1870	0.1939	0.2080
Netherlands	*Gini index*		0.3208	0.3245	0.3408	0.3405	0.3398	0.3263	0.3255	0.3295	0.3295
	Theil index		0.1828	0.1863	0.212	0.2125	0.2045	0.1806	0.1794	0.1846	0.1831
Norway	*Gini index*	0.3508	0.3781	0.3733	0.3375	0.3393	0.3349	0.3329	0.3306	0.3228	0.3233
	Theil index	0.2571	0.4340	0.3381	0.1944	0.2127	0.1953	0.1936	0.1872	0.1741	0.1749

Table 1.1: Evolution of Gini and Theil indexes between 2006 and 2013 for 28 EU countries and more, (continued).

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Poland	*Gini index*		0.3891	0.3710	0.3669	0.3729	0.3705	0.3666	0.3692	0.3631	0.3578
	Theil index		0.2651	0.2311	0.2317	0.2423	0.2400	0.2253	0.2327	0.2218	0.2133
Portugal	*Gini index*	0.4198	0.4255	0.4231	0.4139	0.4055	0.3947	0.3826	0.3849	0.3774	0.3777
	Theil index	0.3090	0.3242	0.3206	0.2995	0.2910	0.2828	0.2483	0.2564	0.2504	0.2454
Romania	*Gini index*				0.4248	0.4049	0.3914	0.3786	0.3718	0.3705	0.3709
	Theil index				0.3097	0.2775	0.2592	0.2387	0.2301	0.2259	0.2381
Serbia	*Gini index*										0.4091
	Theil index										0.2862
Slovakia	*Gini index*		0.3510	0.3710	0.3366	0.3391	0.3407	0.3411	0.3439	0.3423	0.3269
	Theil index		0.2129	0.2898	0.1858	0.1894	0.1906	0.2069	0.2078	0.1892	0.1725
Slovenia	*Gini index*		0.3362	0.3331	0.3268	0.3298	0.3274	0.3398	0.3405	0.3405	0.3416
	Theil index		0.1862	0.1818	0.1752	0.1788	0.1748	0.1878	0.1888	0.1883	0.1894
Spain	*Gini index*	0.3729	0.3655	0.3564	0.3535	0.3558	0.3653	0.3674	0.3732	0.3678	0.3639
	Theil index	0.2333	0.2224	0.2132	0.2071	0.2084	0.2242	0.2291	0.2415	0.2312	0.2244
Sweden	*Gini index*	0.3217	0.3203	0.324	0.3234	0.3276	0.3398	0.3328	0.3332	0.3372	0.3392
	Theil index	0.1682	0.1738	0.1762	0.1765	0.1811	0.2002	0.1899	0.1861	0.1885	0.1922
Switzerland	*Gini index*					0.3533	0.3519	0.3469	0.3467	0.342	0.3423
	Theil index					0.2325	0.2229	0.2165	0.2183	0.2003	0.207
United Kingdom	*Gini index*		0.3955	0.3801	0.3836	0.396	0.3798	0.3848	0.3863	0.359	0.3529
	Theil index		0.2875	0.2513	0.265	0.2964	0.2505	0.2605	0.2739	0.2259	0.2104

Source: Own elaboration using EU-SILC

Figure 1.1: Gini Coefficient from 2006 to 2013 for European regions

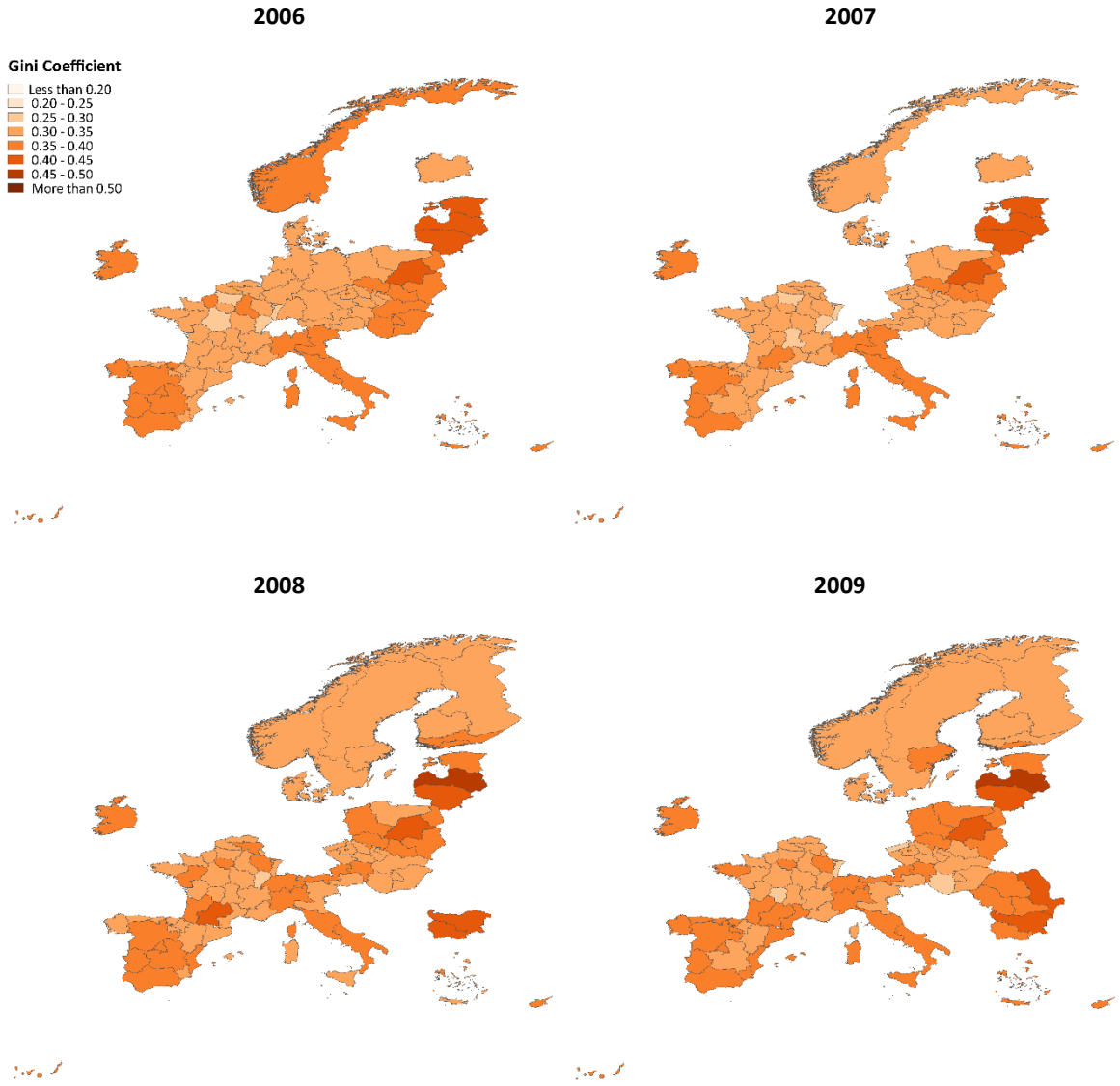
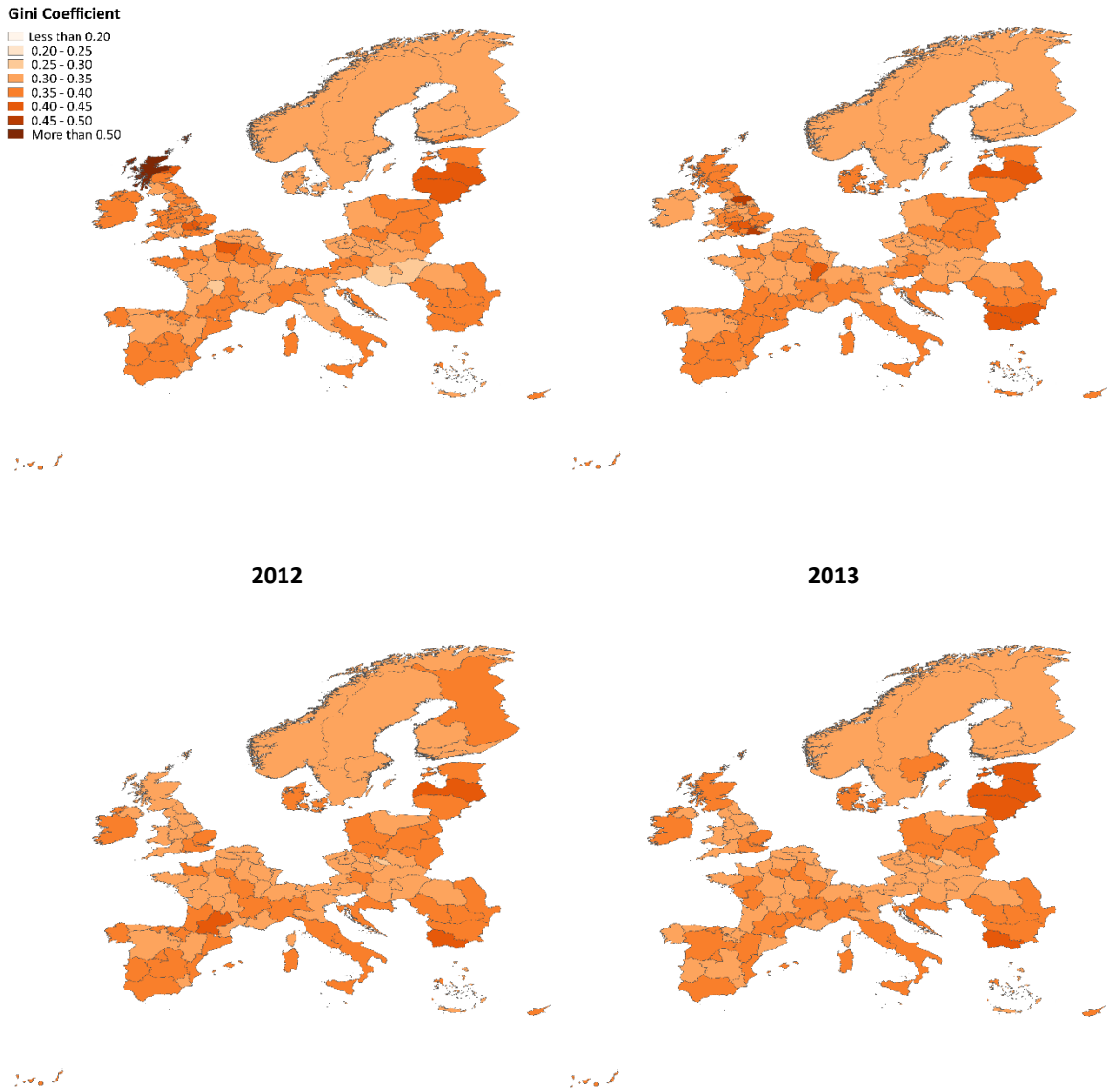


Figure 1.1. Gini Coefficient from 2006 to 2013 for European regions (continued)



Source: Own elaboration using EU-SILC

Income disparities across countries can indeed be caused by the growing differences between their regions. As can be observed in Figure 1.1 income inequality measured by the Gini coefficient varies considerably across UE countries but also across EU regions. However, in order to analyse the extent to which inequality is due to income differences *between* regions (and therefore how much is due to income differences *within* regions), we need to take advantage of the properties of the Theil index and its spatial decomposition into its *between-region* and *within-region* components. Thus, overall inequality for the country can be expressed as the sum of the between-region component (*B*), which captures the inequality due to variations in income across regions, and the within-region component (*W*), a weighted average of the inequality value of the region.

While in some developing countries such as China, India, Philippines, Ghana or Indonesia income disparities between regions (*B* component) explain from 30% to 75% of total inequality, the territorial inequalities observed in more developed countries are mainly caused by the uneven distribution of income *within* the regions (relatively high *W* component).[iv]

This is the also the case for the EU, where spatially-decomposed Theil values using the EU-SILC[v] database show (Table 1.2) that the share of the within-region component (*W*) ranges from 95% to 100% in spite of the number of regions[vi] provided by the EU-SILC (from 2 regions in Bulgaria to 22 in France or 19 in Spain). This underscores the need for a more profound analysis of the internal income regional disparities.

Table 1.2: Spatial decomposition of the Theil coefficient in Europe, 2004-2013

Country	No of regions in EU-SILC	Year	Theil index	Between %	Within %
		2004	0.1923	0.15%	99.84%
		2005	0.1899	0.01%	100.00%
		2006	0.1842	0.35%	99.67%
		2007	0.1938	0.44%	99.59%
Austria	3	2008	0.2134	0.29%	99.67%
		2009	0.2143	0.46%	99.53%
		2010	0.2239	0.46%	99.55%
		2011	0.2099	0.29%	99.71%
		2012	0.2113	0.34%	99.67%
		2013	0.1974	0.10%	99.90%
		2004	0.1867	1.31%	98.66%
		2005	0.3344	0.57%	99.43%
		2006	0.2640	0.64%	99.36%
		2007	0.1968	1.07%	98.93%
Belgium	3	2008	0.2294	1.12%	98.87%
		2009	0.1975	0.94%	99.09%
		2010	0.1956	1.28%	98.72%
		2011	0.2097	1.21%	98.81%
		2012	0.2000	1.27%	98.70%
		2013	0.1985	1.38%	98.64%
		2004			
		2005			
		2006			
		2007	0.2960	0.00%	100.00%
Bulgaria	2	2008	0.3172	1.79%	98.20%
		2009	0.2732	1.56%	98.43%
		2010	0.2742	2.88%	97.12%
		2011	0.2922	2.12%	97.88%
		2012	0.2813	1.62%	98.36%
		2013	0.3055	2.71%	97.28%
		2004			
		2005	0.1937	1.80%	98.19%
		2006	0.1878	1.91%	98.14%
		2007	0.1853	1.63%	98.33%
Czech Republic	8	2008	0.1891	1.74%	98.25%
		2009	0.1982	2.79%	97.23%
		2010	0.1840	2.88%	97.12%
		2011	0.1787	3.15%	96.87%
		2012	0.1795	2.39%	97.60%
		2013	0.1740	2.62%	97.41%

Table I.2: Spatial decomposition of the Theil coefficient in Europe, 2004-2013 (continued)

Country	No of regions in EU-SILC	Year	Theil index	Between %	Within %
		2004	0.2203	0.69%	99.32%
		2005	0.2369	1.00%	98.99%
		2006	0.2268	0.60%	99.43%
		2007	0.2204	0.88%	99.09%
Finland	4	2008	0.2207	2.32%	97.69%
		2009	0.2151	2.17%	97.81%
		2010	0.2036	2.07%	97.89%
		2011	0.2121	7.07%	92.93%
		2012	0.2146	2.18%	97.86%
		2013	0.2073	2.01%	97.97%
		2004	0.2041	2.28%	97.75%
		2005	0.1912	2.75%	97.23%
		2006	0.1906	2.47%	97.53%
		2007	0.1815	2.21%	97.80%
France	22	2008	0.2298	2.08%	97.91%
		2009	0.2357	2.34%	97.62%
		2010	0.2321	1.91%	98.10%
		2011	0.2485	2.72%	97.26%
		2012	0.2510	2.59%	97.41%
		2013	0.2358	2.55%	97.46%
		2004	0.2258	4.87%	95.13%
		2005	0.2334	2.90%	97.13%
		2006	0.2484	1.50%	98.51%
		2007	0.2498	2.85%	97.16%
Greece	4	2008	0.2370	2.29%	97.68%
		2009	0.2437	3.28%	96.72%
		2010	0.2439	4.22%	95.74%
		2011	0.2431	1.45%	98.56%
		2012	0.2174	4.69%	95.31%
		2013	0.2425	3.78%	96.25%
		2004			
		2005			
		2006			
		2007			
Hungary	3	2008			
		2009			
		2010	0.2562	2.79%	97.23%
		2011	0.2458	0.00%	100.00%
		2012	0.2407	0.00%	100.00%
		2013	0.2373	0.00%	100.00%

Table I.2: Spatial decomposition of the Theil coefficient in Europe, 2004-2013 (continued)

Country	No of regions in EU-SILC	Year	Theil index	Between %	Within %
		2004	0.2596	2.59%	97.38%
		2005	0.2572	2.92%	97.08%
		2006	0.2337	2.94%	97.09%
		2007	0.2337	2.99%	97.05%
Italy	5	2008	0.2239	2.69%	97.28%
		2009	0.2283	3.14%	96.85%
		2010	0.2244	2.64%	97.37%
		2011	0.2309	3.74%	96.23%
		2012	0.2347	3.33%	96.68%
		2013	0.2434	3.22%	96.80%
		2004			
		2005	0.2651	0.65%	99.32%
		2006	0.2311	0.91%	99.09%
		2007	0.2317	0.85%	99.14%
Poland	6	2008	0.2423	0.96%	99.05%
		2009	0.2400	0.95%	99.04%
		2010	0.2253	0.67%	99.33%
		2011	0.2327	0.37%	99.66%
		2012	0.2218	0.49%	99.50%
		2013	0.2133	0.44%	99.58%
		2004			
		2005			
		2006			
		2007	0.3097	0.00%	100.00%
Romania	5	2008	0.2775	5.66%	94.34%
		2009	0.2592	2.51%	97.49%
		2010	0.2387	3.11%	96.86%
		2011	0.2301	2.93%	97.09%
		2012	0.2259	2.98%	96.99%
		2013	0.2381	2.83%	97.14%

Table I.2: Spatial decomposition of the Theil coefficient in Europe, 2004-2013 (continued)

Country	No of regions in EU-SILC	Year	Theil index	Between %	Within %
Serbia	3	2004			
		2005			
		2006			
		2007			
		2008			
		2009			
		2010			
		2011			
		2012			
		2013	0.2862	0.00%	100.00%
Spain	19	2004	0.2333	2.42%	97.60%
		2005	0.2224	3.92%	96.09%
		2006	0.2132	3.61%	96.39%
		2007	0.2071	4.03%	95.99%
		2008	0.2084	4.18%	95.83%
		2009	0.2242	4.26%	95.76%
		2010	0.2291	3.92%	96.07%
		2011	0.2415	4.18%	95.82%
		2012	0.2312	4.54%	95.46%
		2013	0.2244	5.44%	94.56%
Sweden	3	2004	0.1682	0.00%	100.00%
		2005	0.1738	0.00%	100.00%
		2006	0.1762	0.00%	100.00%
		2007	0.1765	0.00%	100.00%
		2008	0.1811	0.67%	99.34%
		2009	0.2002	1.57%	98.40%
		2010	0.1899	0.71%	99.32%
		2011	0.1861	0.66%	99.36%
		2012	0.1885	0.77%	99.26%
		2013	0.1922	0.81%	99.17%
United Kingdom	12	2004			
		2005	0.2875	0.00%	100.00%
		2006	0.2513	0.00%	100.00%
		2007	0.2650	0.00%	100.00%
		2008	0.2964	0.00%	100.00%
		2009	0.2505	0.00%	100.00%
		2010	0.2605	4.57%	95.43%
		2011	0.2739	5.77%	94.23%
		2012	0.2259	4.13%	95.88%
		2013	0.2104	2.62%	97.39%

Source: Own elaboration from EU-SILC

Given the extension and the heterogeneous nature of the European NUT2 regions, where 95-100% of the territorial inequalities in household income correspond to disparities within the regions, a spatial analysis of inequality at a more disaggregated spatial level is required in the EU. Section II of this report is an attempt to collect (when they exist), harmonize (when possible) and econometrically estimate (when they do not exist), data at local level (LAU2 in most of the cases) for as many EU member states as possible.

2. Analysis of territorial inequality at local level: exploring in the intraregional heterogeneity in Europe

We can observe spatial disparities between countries in almost any socio-economic indicator for which we have information: wellbeing, income levels, consumption levels, educational levels, share of immigrant population, degree of economic specialization or concentration, natural resources endowments, dependency rates, etc.

However, disparities in those or many other variables can also be observed *within* countries and *within* region and this may be a source of regional disparities in economic welfare and economic growth, as well as a driver of convergence/divergence processes in per capita GDP (or *real convergence*), perpetuating the gap between *rich* and *poor* areas, between the *North* and the *South*, between the *core* and the *periphery*, and between the *urban* and the *rural*.[vii]

In Europe, territorial disparities exist in almost any socio-economic aspect we may think of. Reducing disparities has been one of the most explicit and resolute goals of the EU since the creation of the EEC, whose Treaty's Article 158 defends the reduction of "disparities between levels of development of the various regions and the backwardness of the least-favoured regions or islands, including rural areas". Two issues arise when interpreting this article: firstly, the indicators that should be used to measure the regional level of *development*; and secondly the appropriate *spatial level* needed to capture issues associated with the rural character of an area (as opposed to urban areas).

Regarding the first issue, it is common, albeit questionable, practise by the EU and the research community to evaluate territorial disparities and the degree of success of the EU Regional Policy almost exclusively on the basis of the reduction of regional differences in per capita Gross Domestic Product (GDP). Regarding the second aspect, data availability conditions the goals set and their future evaluation, as variables on regional GDP, household income, consumption expenditure or any other measure of economic development in Europe is available at country level or, in the best case, NUTS2 regional level.

2.1 Going spatially deeper: some insights about welfare disparities at local level (or urban-rural divide)

How can 'wellbeing' or 'living standards' be measured? There is a body of literature that tries to evaluate wellbeing employing both subjective and/or objective data and then analyse its uneven distribution across space in relation to other quantifiable variables. A second approach (followed in this report and described in detail in Section 2 consists of using 'household income' as the

best proxy for 'wellbeing'. This second approach is not, however, exempt from problems due to the lack of data on income beyond NUTS2 regions, an inconvenience that prevents any attempt to analyse EU territorial disparities at *local* level (as opposed to *regional* level).

Regarding the subjective quantification of "wellbeing" at local level, Shucksmith *et al.* (2009) evaluate the rural-urban divide using individual assessments on the rural or urban character of the homes included in the 2003 European Quality of Life Survey (EQLS). After classifying surveyed countries according to their GDP level (high, intermediate, low, and a group of candidate countries, which at the time were Bulgaria, Romania and Turkey), the authors found that the differences between higher and lower income clusters (objective data based on GDP levels) were more extensive than those between rural and urban locations (subjective). The largest inequalities between the rural and the urban areas existed for educational achievement and internet usage, but for these indicators the gap between high and low income countries was also large. In poor countries there were significant urban-rural inequalities in terms of income, deprivation, housing conditions, basic amenities and job insecurity (although there are more unemployed people in urban than rural areas of the high income countries). Results also show that social isolation and access to work and to school are similar in rural and urban areas, but although life satisfaction decreases with the income of the country, the degree of life satisfaction is slightly higher in rural areas than in urban areas of the high income countries. Although the objective indicators suggest the opposite, this multilevel analysis concludes that being in a rural or an urban location does not affect the subjective quality of life, which poses a paradox between the existing resource deprivation of rural areas and its apparent lack of impact on welfare perception.

The rural-urban divide is confirmed by Sørensen (2014), with lower quality of life in rural areas with respect to urban surroundings using objective indicators such as income, employment, housing conditions and access to services, with these disparities being more pronounced in the new EU Member States. In an attempt to explain the contrast between the objective and the subjective evaluation of the quality of life, Sørensen uses individual data from the 2008 *European Values Study* (EVS) for 27 member states. Classifying the areas objectively into three tiers depending on their degree of urbanization (rural areas with less than 5,001 inhabitants; town areas, from 5,001 to 100,000 inhabitants; and cities, with more than 100,000 inhabitants), results show that life satisfaction is higher in the second urban tier (towns), while there is no statistical difference between rural areas and cities. In relation to country disparities, individuals living in cities of high GDP countries are more satisfied, while in intermediate GDP-level countries those living in towns exhibit the highest life satisfaction levels. As for the low-level GDP countries, no significant territorial inequalities in life satisfaction are perceived between rural and urban locations.

Obviously, it is not only characteristics of the territory (such as its size) that are related to wellbeing but also individual characteristics. In general, females report a higher life satisfaction than males regardless of the place or location. Age displays a U-shaped relationship to wellbeing (more wellbeing in the earlier and later stages of life), while health, living with a partner, being retired or a student and, especially, having a higher monthly income are positively associated with wellbeing. Two individual characteristics are worthy of highlighting: i) labour status

(employed vs unemployed), as being unemployed is negatively associated with wellbeing; and ii) education level, which enhances overall life satisfaction.

If individuals' labour status and levels of education affect their perceptions about their wellbeing, then the labour- and education-related characteristics of the localities where those individuals carry on their social and economic life will affect the *local* wellbeing of the area. While the subjective perception of welfare cannot be underestimated, in the next section we will focus on objective measurement and quantification of territorial inequalities within EU regions. First we will provide an overview of labour market indicators and educational level indicators at *local* level (for the EU member states where information at such level of disaggregation is available), and then we will focus on the 'average household income' figures, estimated at local level using entropy-based estimation techniques to spatially disaggregated data (see Deliverable 2.2 for details).

2.2 Going spatially deeper: income disparities at local level

There are numerous individual data sets (European Community Household Panel Survey, the EU Statistics on Income and Living Conditions -EU-SILC-, Luxembourg Income Study –LIS-, the Standardised World Income Inequality Database -SWIID-, or the Cross National Equivalent File) that offer information on individual and household income and can be employed to study territorial inequalities as they provide information on the *region* where the individual resides.

Using 'household income' is the common practice when analysing income inequality.[viii] Income carries a large weight in the level of wellbeing and life satisfaction both at individual and also at territorial level (either by locality or region), and is therefore considered a good indicator of economic welfare and development. However, when it comes to the spatial level identified in those individual data sets we discover that, due to confidentiality reasons, in Europe in the best of the cases only information on the NUTS2 region of residence is provided. This implies that basically any study of European income inequality is spatially restricted to large, heterogeneous and, in many cases, geographically extensive regions. The broad NUTS2 administrative regions do not capture the rural-urban divergence or core-periphery dynamics that might be present within the regions.

There are some studies analysing inter-regional per capita income inequalities in Europe that decompose overall inequality into its within- and between-country components (Bouvet, 2010), while others use weighted coefficients of variation of regional per capita GDP (Lessman, 2014, Jovancevic *et al*, 2015).[ix] While differing in the approach adopted or the years covered, all these papers share one thing in common: they all use NUTS2 regions as the spatial unit of analysis as there is no official data on average income or GDP beyond that spatial level. Neither Eurostat nor the National Institutes of Statistics of the EU member states (with the exceptions of Germany, the Netherlands, Finland and Belgium) have estimations at higher levels of spatial disaggregation, which makes it impossible to conduct any comprehensive study of rural-urban divide on income (and many other aspects) in Europe.

Thus, one of the main objectives of the IMAJINE Project is to *collect* variables at local level when they exist, with the help of the corresponding National Institutes of Statistics of the different Member States and to econometrically *estimate* figures at local level when such information

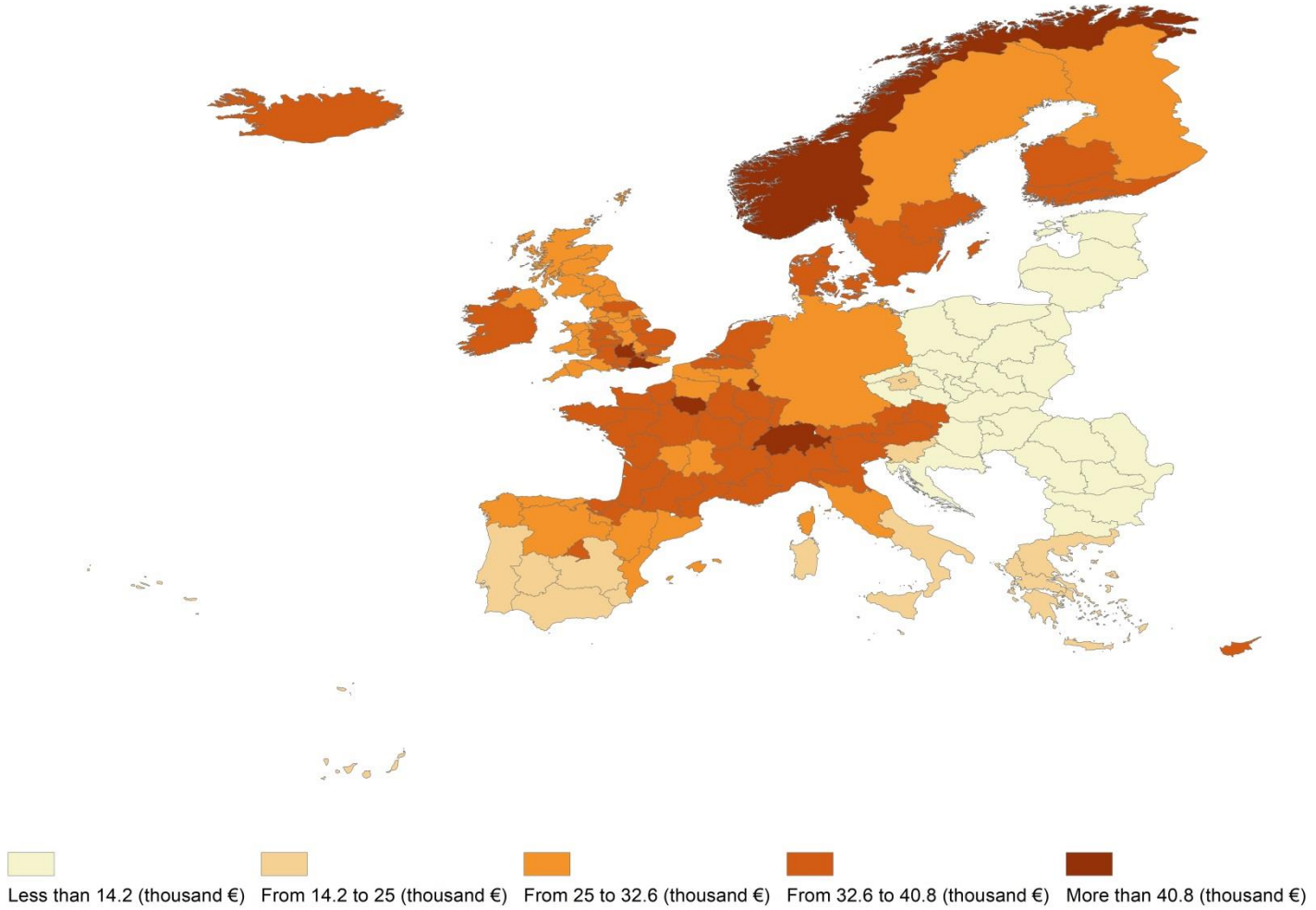
exists at *regional* level but is not available at *local* level. In view of the 'partition' of the official regional value into local units (municipalities) in such a way that the sum of the local units comprise the regional value, this process can also be referred as *disaggregation of regional data.*[x]

The methodology applied in the IMAJINE Project to disaggregate regional data into local units is based on Elbers et al. (2003) and Tazzoni and Deaton (2009). The point of departure of these works was the combination of household surveys - which contain detailed economic information that is only reliable at an aggregate spatial scale - with census data that is reliable at a small scale but does not contain such important economic indicators as *income*. Applied by the World Bank to map poverty and inequality in countries like Cambodia, Mexico, Morocco South Africa or Uganda, this methodology does not, however, guarantee consistency between the disaggregated (local) estimates and the (regional or national) aggregates derived from the household surveys.

The IMAJINE Project overcomes this issue and offers local estimates for several EU Member States which are consistent with official databases (EU-SILC). The methodology applied uses a Generalized Cross Entropy (GCE) estimator to solve the problem of spatial disaggregation which is similar to the approach in Bernardini-Papalia and Fernandez-Vazquez (2018) for small area estimation, exploiting auxiliary information related to observable population variables and adjusting them for consistency (for more details see Deliverable 2.2: 'Literature Review on Disaggregation Methodologies')

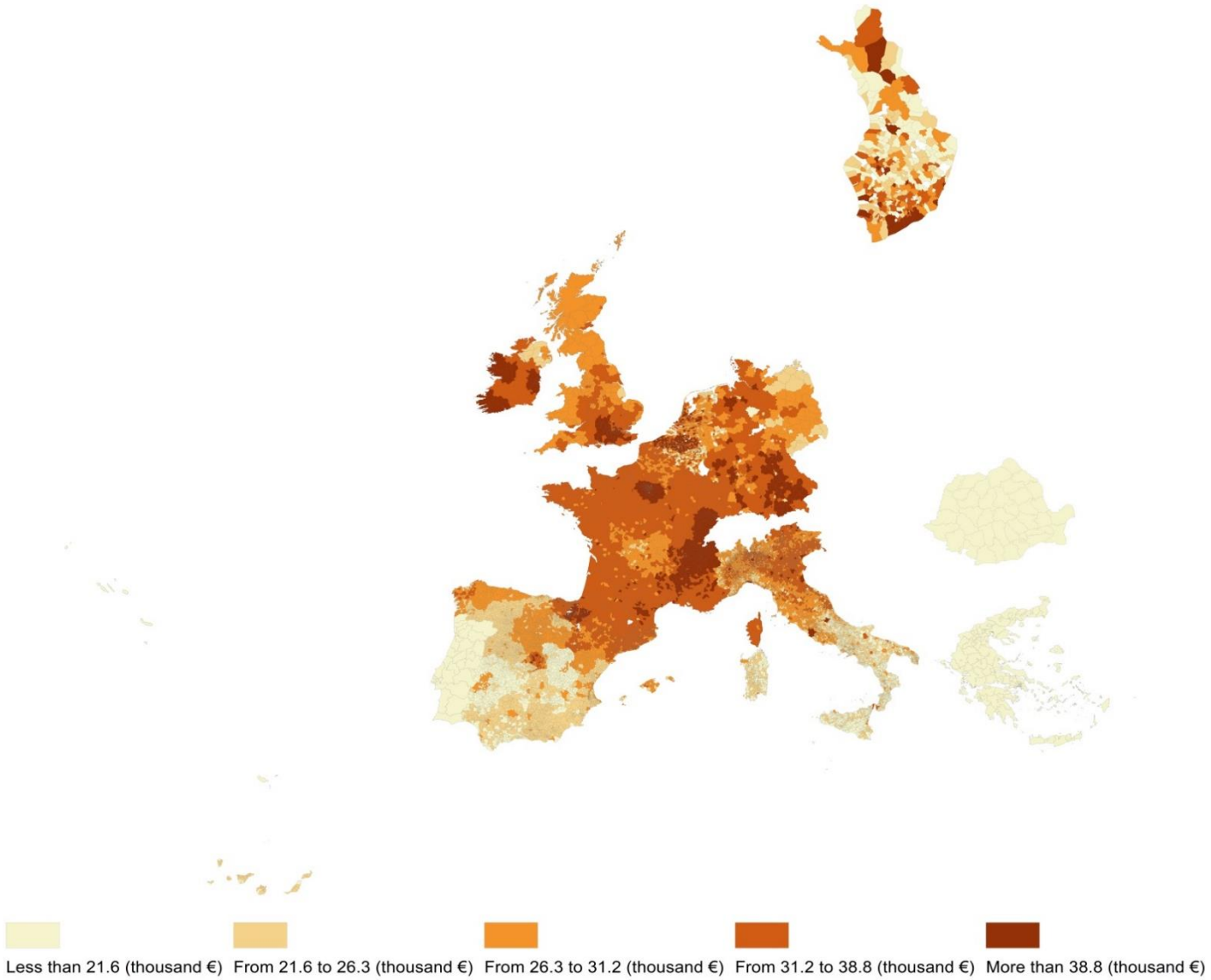
Applying this novel methodology, consistent estimates of average household income at *local* level and by natural intervals are shown in Figure 2.1. Detailed maps by country are shown in the Annex A.

Figure 2.1:EU-SILC average household income 2011 (country and/or region)



Source: EU-SILC

Figure 2.2: IMAJINE estimations of average household income in Europe at local level, 2011.



Source: IMAJINE Project estimations.

2.3. Going spatially deeper: population at the risk-of-poverty and exclusion

In June 2010 the European Council set a target for promoting social inclusion in the EU: lowering the population at-risk-of-poverty and/or living in severely deprived and/or in 'jobless' households by 20 million. This target would be assessed by a multidimensional single indicator known as AROPE (rate of people at risk of poverty or social exclusion).

The AROPE indicator considers that an individual is at risk of poverty or social exclusion if he/she meets at least one of the following three criteria:

Lives in a household with an income (including social transfers) below the poverty line, which is defined as an income that is 60% of the median of the national income's equivalent in consumption units.[1]

Lives in a household where its members cannot afford at least four of the nine basic consumption needs defined for Europe.[2]

Lives in a household with low work intensity. The intensity of work is defined as the ratio between the number of months actually worked by all the members of the household and the maximum number of months that all people of working age in the household could theoretically work. Households that are considered to have low work intensity are those with a ratio of less than 0.2.

In order to achieve the target set for promoting social inclusion in the EU, the European Commission plans on monitoring the three criteria that comprise the AROPE indicator in all Member States as they are free to set their national targets on the basis of the most appropriate indicators, taking into account their national circumstances and priorities. In times of austerity, combating poverty and social exclusion will depend very much on the national choice of priorities and the adequate design of policies targeting households at-risk-of-poverty and exclusion.

Defining "income" as the "total household disposable income", Atkinson and Marlier (2010) examine the territorial income distribution in the 27 EU Member States focusing on the households which are 'at-risk-of-poverty'. The average AROPE figure for EU-27 is 16.6 per cent, which means that 1 in every 6 of EU citizens (or around 80 million people) are at risk of poverty. Although the AROPE value for the 12 'new' Member States is slightly higher than the AROPE for EU-15 (16.4 per cent), its territorial distribution shows that out of the 80+ million people at risk

[1] The calculation of the units of consumption takes into account economies of scale in households and is based on the hypothesis that the joint expenditure of several persons residing in the same household is lower than what each would spend living separately.

[2] The nine basic consumption concepts used are (1) late payment of rent, mortgage or utility bills of the primary residence over the last 12 months; (2) inability to keep the home adequately heated; (3) inability to take at least a one-week holiday each year; (4) inability to eat meat or protein at least every two days; (5) not having sufficient money for unforeseen expenses; (6) not having a telephone; (7) not having a color television; (8) not having a washing machine; and (9) not having a car.

of poverty in EU-27, 64 million are to be found in the EU-15. Moreover, in Germany alone there are 12½ million inhabitants in risk of poverty (11½ million in the United Kingdom; 11½ million in Poland, 11 million in Italy; 17 million in France and Spain together).

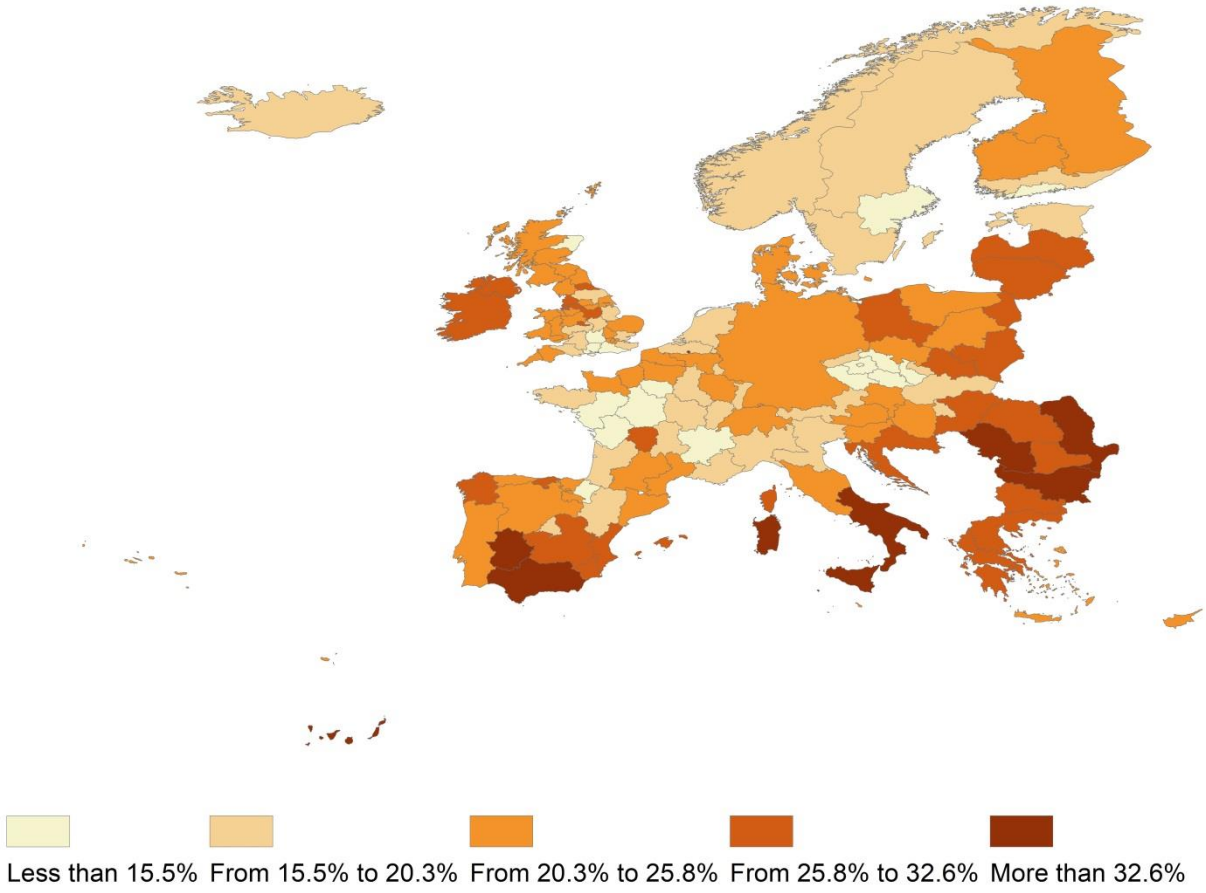
Despite the fact that AROPE is a major step forward in the analysis of poverty by providing an indicator based on a multidimensional concept that is also comparable across countries, regions and time, it is very limited in its *spatial* dimension as it is only available for NUTS 2 regions, which are very aggregated and extensive geographic areas that contain many diverse, individual realities (urban vs. rural, core vs periphery, coastal vs. interior). In other words, available data do not permit us to uncover what is happening in terms of poverty and social exclusion at smaller geographic scales, and ignore the internal distribution of poverty within regions, in particular the rural-urban divide.

One of the objectives of the IMAJINE Project is to generate data at local level using maximum entropy methodologies (more details in D2.2 'Literature Review on Disaggregation Methodologies'). Applied to the AROPE indicator for regions provided by the EU-SILC, this methodology permits estimation of consistent AROPE indicators at local level (LAU2 in most of the cases) for those EU countries where the proposed methodology could be applied to estimate average household income.[xi] While AROPE figures provided by EU-SILC are shown in Figure 2.3, IMAJINE estimated AROPE figures at local level are shown in Figure 2.4.

The spatial distribution of the population at risk of poverty follows a similar pattern to the low-income localities detected after disaggregating regional income figures. There is a spatial concentration of localities with high values for the population at risk of poverty in the European peripheral areas (South, East and North). Thus, in the United Kingdom the highest AROPE levels are detected in the North of Scotland, while in Spain or Italy they are located in the South. This concentration pattern is discernible at NUTS2 regional level, so what is the added value of the local AROPE estimations?

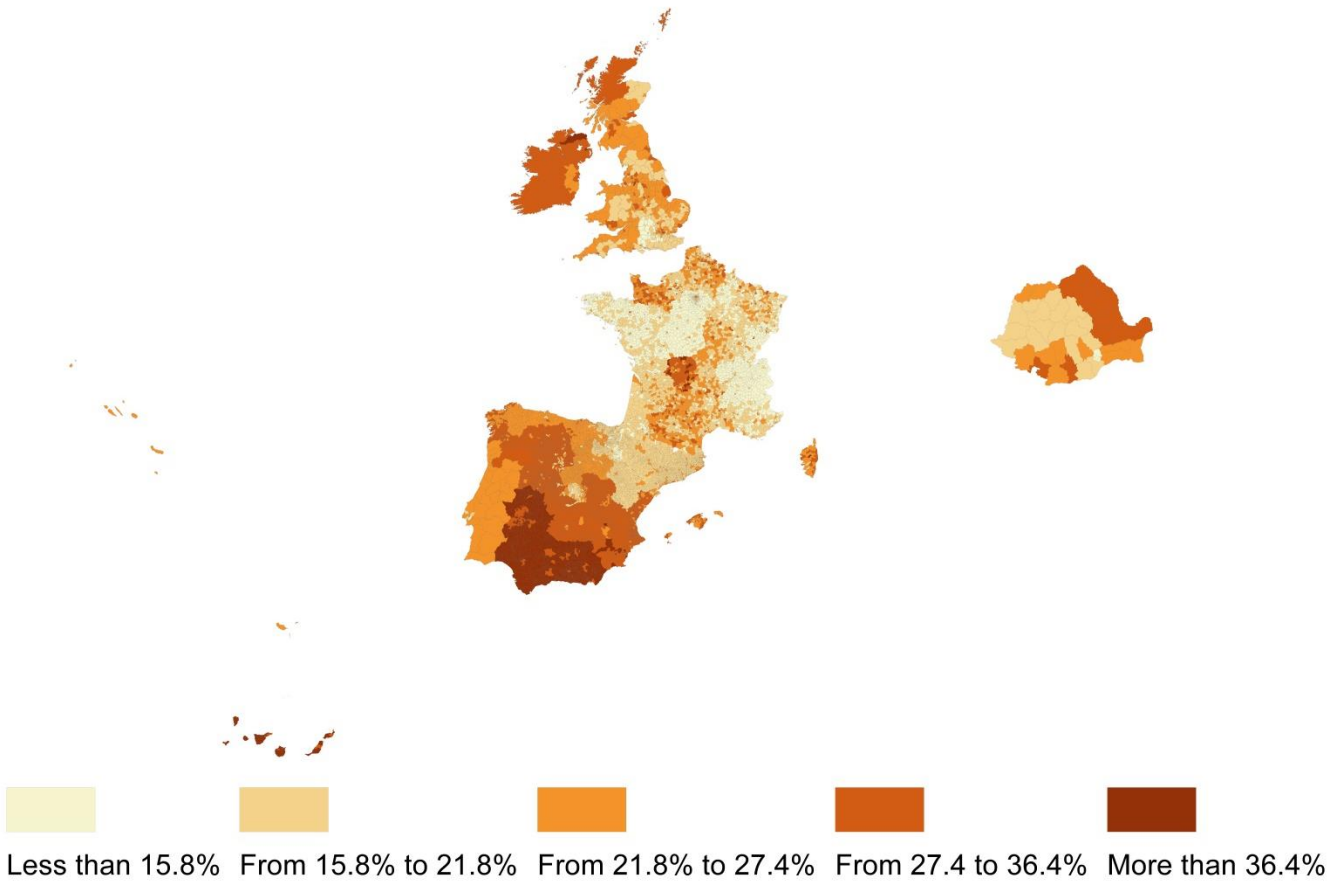
The local AROPE estimations allow us to see how *localities* belonging to *regions* with low AROPE values (even below the EU average) nevertheless exhibit high levels of population at risk of poverty. Pockets of poverty (within supposedly rich and well-developed regions) can be detected in localities along the Spanish and French Mediterranean coasts as well as in localities around the main metropolises of Europe. Detailed maps by country are shown in Annex B. Regional figures mask the significant intra-regional heterogeneity in terms of poverty and exclusion, especially between the urban and the rural areas, between the cities and their suburbs, or between the tourism-attractive locations and their less attractive surrounding areas.

Figure 2.3: EU-SILC data on AROPE (Population at risk-of-poverty and exclusion). Countries/regions of Europe, 2011.



Source: EU-SILC

Figure 2.4: IMAJINE estimations of population at risk-of-poverty and exclusion in Europe at local level, 2011



Source: IMAJINE Project estimations

The overall conclusions obtained from a more aggregate analysis are maintained at local level. We can verify that there is a centre/periphery dynamic on a continental scale as well as at the national scale. The central axis that connects the main metropolises of the Union (London, Paris, Amsterdam, Hamburg and Vienna among others) concentrates the highest level of income. When we move away from this central axis, either south or east or north, we can see a reduction in the average income levels. Inside of each country we also observe how the closer the area is to this European central axis, the higher on average is the income. But this general dynamic hides important internal differences. For instance, near the richest municipalities in Europe there are localities with income levels below the European average. This is especially clear around the main metropolis. For instance, the high development of Greater London contrasts with the average income of the municipalities of the periphery of the main metropolises of the United Kingdom. Although most of them are close to the European average, the average income distance compared to that of London is very relevant. The same can be seen in Paris or in other metropolises in central Europe. In some countries intense intra-regional heterogeneity is also observable. In Spain, for example, the South has significantly lower average income levels but there are specific municipalities with levels at the European average and significantly above the average for Spain in many cases. This presence of rich pockets surrounded by poor towns is also very evident in the Northern countries, although with greater apparent geographical randomness than in the South.

2.4 Going spatially deeper: employment/unemployment disparities at local level

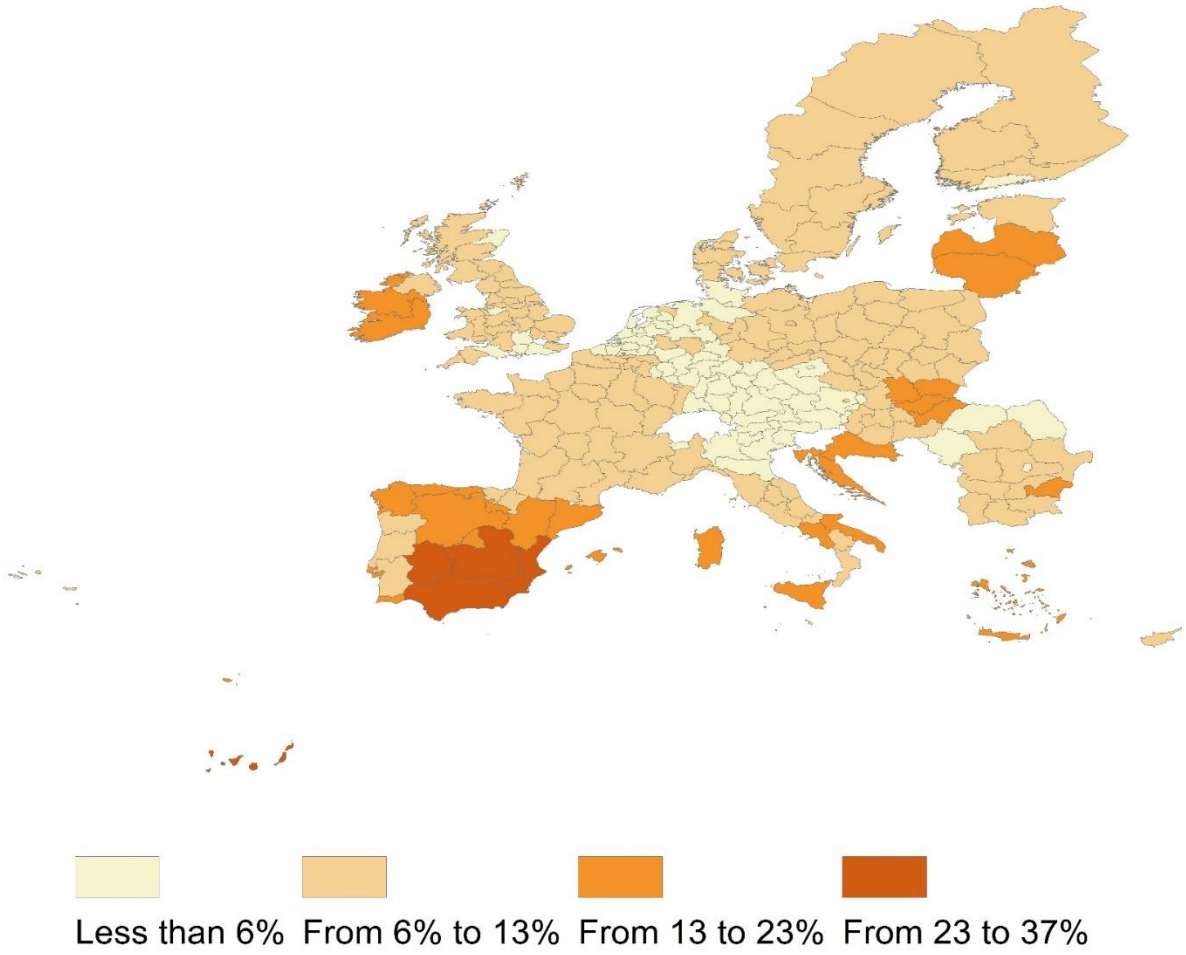
Territorial disparities in unemployment/employment levels, clearly connected to the subjective perception of wellbeing, have always been a relevant topic in Europe. There are distinct spatial differences between the North and the South, between the core and the periphery, and between the rural and the urban areas in each country.

According to Jahoda *et al.* (1933), from a psychological point of view the unemployed suffer the lack of a time structure, social contacts, collective purposes, status, and regular activity, which results in a loss of control over one's own life and a disconnection from society (Fryer 1986, Gallie and Paugam 2000, Hammer 2003). Apart from the financial constraints associated with "being unemployed", these events have an additional harmful effect on life satisfaction (Gallie and Russell 1998, Van Praag and Ferrer-i-Carbonell 2002, Carroll 2007, Khattab and Fenton 2009).

Under European welfare regimes, the unemployed population relies on state support, which makes them particularly sensitive to public policies, especially in times of austerity. Probably as a result of the 2008 global financial and economic crisis, some researchers have recently focused on the effect of labour market policies on subjective wellbeing, studying the impact of active and passive labour market initiatives on the life satisfaction of unemployed individuals (Di Tella *et al.* 2003, Helliwell and Huang 2011, Ochsen and Welsch 2012, Wulfgramm (2014). Results reveal that labour market policies as a whole play a significant role in mitigating the negative effect of unemployment on wellbeing, with more generous benefits (in terms of duration and amount) reducing dissatisfaction associated with both monetary issues and non-pecuniary aspects related to lower social stigmatization.

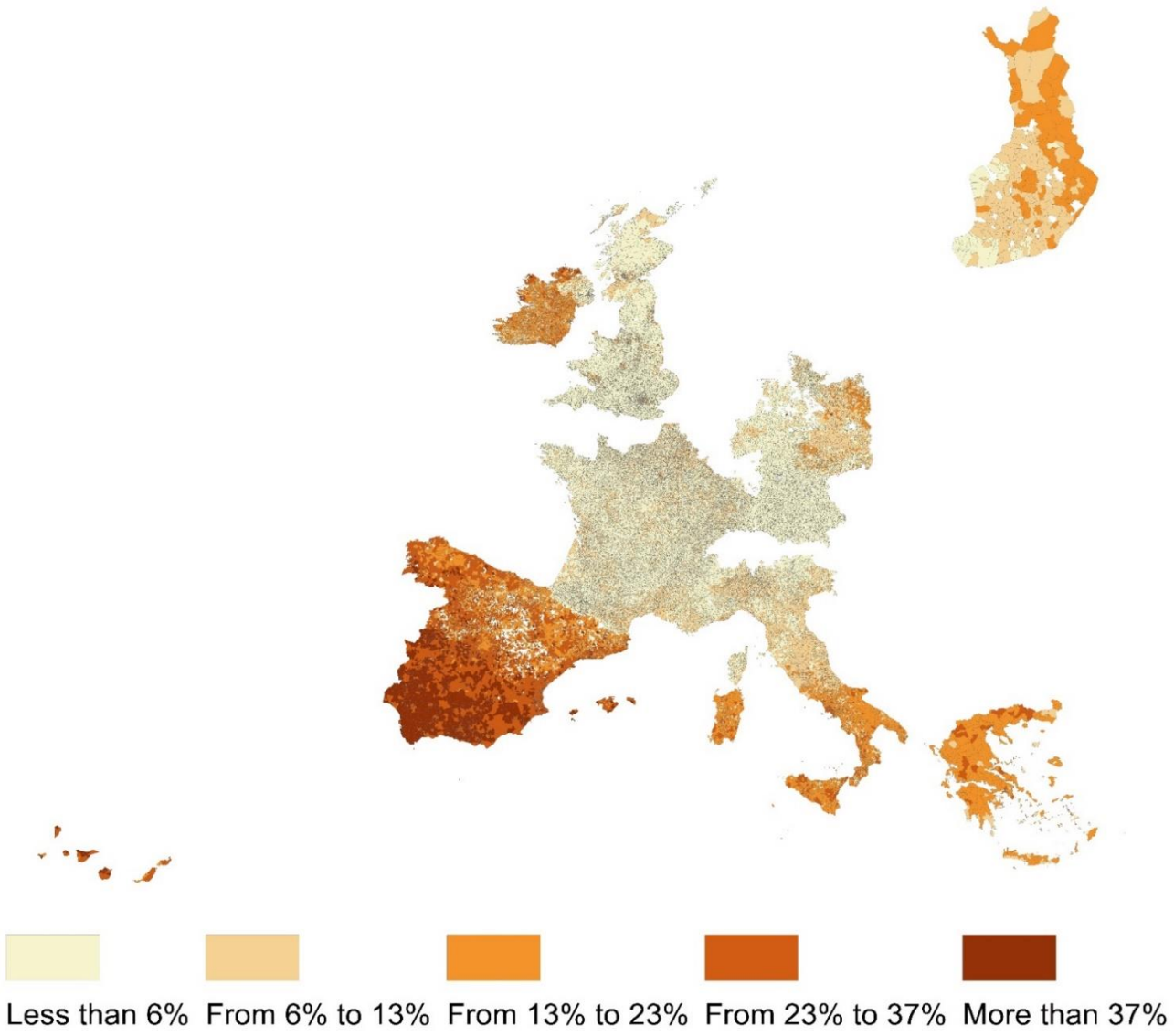
The uneven distribution of unemployment in Europe at country and regional level is a very well-known stylized fact that has been analysed in several studies - see Puga (2002) or, more recently, Rios (2017) or Hudson (2018). However, given the internal heterogeneity observed within the European regions, there is a lack of research studies focusing on the unemployment (or employment) disparities at local level that underlie the different labour realities co-existing within the same region (rural vs urban; core vs periphery) as well as the expected link between *local* unemployment and *local* wellbeing.

Figure 2.5: : European unemployment rates at regional level (NUTS2), 2011



SOURCE: 2011 Population and Housing Census of EU Member States

Figure 2.6: European unemployment rates at local level (LAU2), 2011



SOURCE: 2011 Population and Housing Census of EU Member States

2.5 Going spatially deeper: level of education

The level of education attained by each individual contributes to his or her wellbeing and increases the income and standards of living of the locality where that individual resides. Education generates positive externalities for the territory, improving social welfare without making anyone worse off (Sianesi et al 2003).

However, as along with many other socioeconomic variables, in Europe as well as in many parts of the world education is unevenly distributed across age, gender, social classes and also across space. Large territorial disparities in educational attainment exist between Northern and Southern European countries, between central and peripheral European countries and regions, and, more importantly, between the rural and the urban population.

Meschi and Scervini´s (2010) created a new data set with various measures of educational level and inequality for 31 countries, covering several years and organizing the population by birth cohorts (instead of survey years). However, this dataset was created to perform cross-country comparisons, and does not provide disaggregated information for regions or localities, making it impossible to analyse any territorial disparities. That is also the case of the data set created by Barro and Lee (2013). Although covering 146 countries and a long period of time (from 1950 to 2010) and providing information by sex and age, when it comes to territorial issues the authors focus merely on classifying countries by "region" (Europe and Central Asia, South Asia, East Asia and the Pacific, Latin America and the Caribbean, Middle East and North Africa and Sub-Saharan Africa) or by their degree of economic development (Advanced vs Developing), but no information *within* countries has been recorded.

On the other hand, Ulabasoglu and Cardak's (2007) cross-country analysis on educational attainment for 56 countries based on UNESCO Educational Yearbooks (1964-1999) provides rural-urban educational inequality figures for each country as a whole, without being able to show *where* education is concentrated in the country or where educational disparities are more or less pronounced.

Collecting official *local* data (LAU2 level) when available from the National Institutes of Statistics of several EU countries and following the simplified ISCED4 classification suggested in Mechi and Scernini (2010) to reduce coding mistakes and increase the homogeneity between countries, we can map the educational territorial inequalities of Europe at both regional and local levels, either representing the share of population with tertiary education or the share of population with just primary studies. However, these figures would only represent the tails of the distribution. In order to offer complete information on the educational level of the locality considering the whole population, we construct a weighted average of the educational level of the area. This indicator ranges from 1 (100% of the population living in the locality attained just primary education or below) to 4 (if for instance 100% of the population holds a university degree).

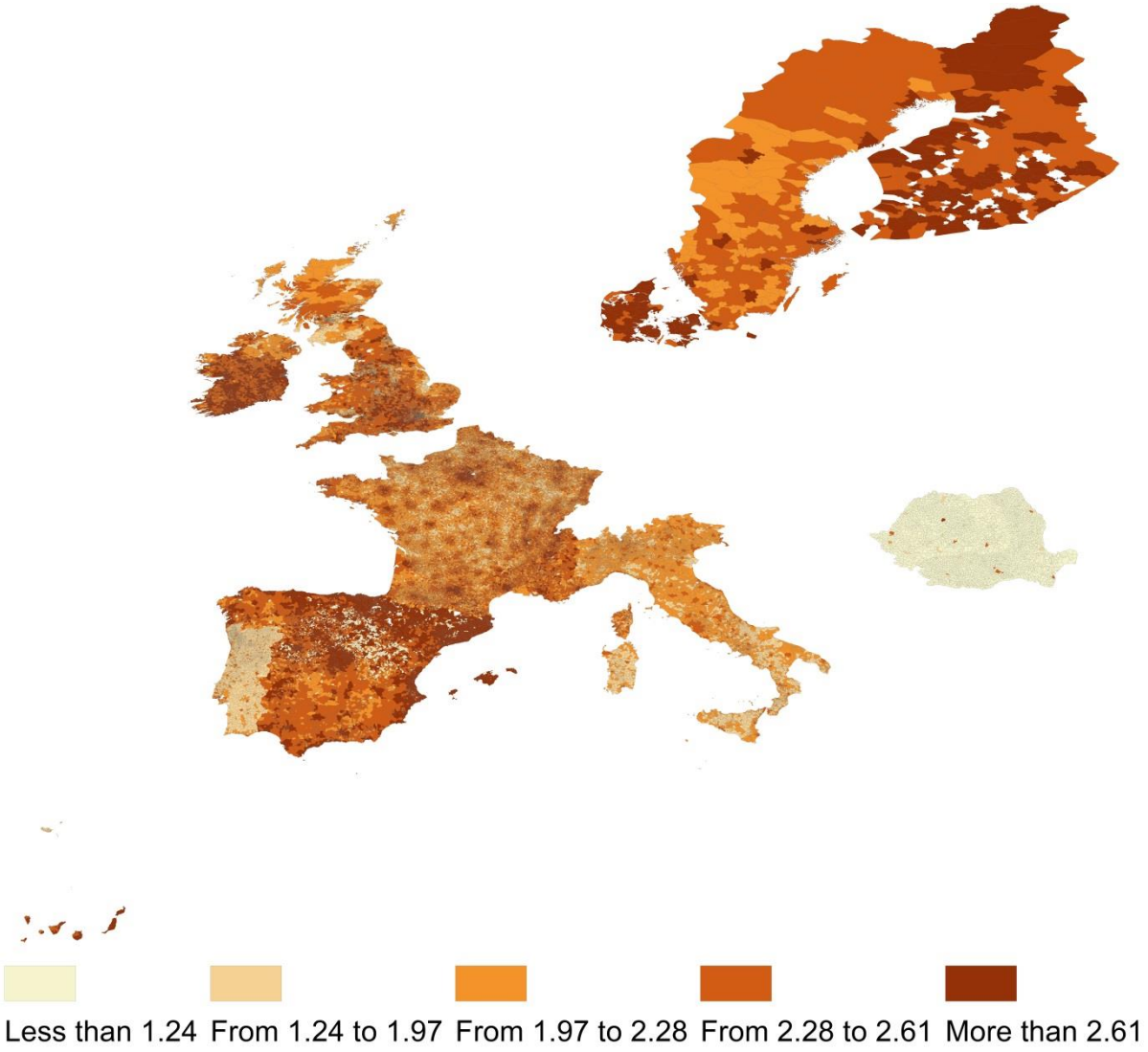
Educational disparities in Europe between countries and regions are illustrated in Figure 2.7. More importantly, however, this map proves the existence of large internal regional disparities. Only at a higher level of disaggregation than NUTS 2 regions can the European educational urban-rural divide be detected. The overall urban-rural divide observed in Figure 2.7 regarding

educational disparities has not been explored in detail in Europe, mainly due to the difficulties in accessing and collecting local data.

Recent studies on territorial educational inequality confirming the (growing) disparities between the rural and the urban population can be found only for developing and emerging countries such as China (Hannum and Wang, 2006; Fu and Ren, 2010), India (Agrawal, 2014), Taiwan (Ling and Yang, 2009), Thailand (Lounkaew, 2013) or Russia (Amini and Nivorozhkin 2015).

The lack of studies for developed countries could suggest that such an educational divide is not relevant or does not exist in OECD countries. On the contrary, in Europe there is a territorial educational divide across countries and regions but also between localities (rural vs urban). Thanks to the European Community Household Panel dataset, which provides information at regional level, the existing regional educational disparities can be analyzed and the positive relationship between *regional* income inequality and *regional* human capital endowments demonstrated (Rodriguez-Pose and Tselios, 2009). Unfortunately, no data is provided at *local* level in such dataset.

Figure 2.7: Weighted educational levels in Europe at local level, 2011



SOURCE: 2011 Population and Housing Census of EU Member States

3. On the relevance of the spatial unit of analysis: the IMAJINE Project local dataset and future lines of research

3.1 Introduction: the relevance of the spatial unit in the spatial economic inequalities analysis

The use of an adequate spatial unit to analyse to topic under discussion seems is a prerequisite in any territorial analysis. Regional researchers have been traditionally limited in their empirical analyses to the use of data collected for administrative regions, which are large in extension, scope and diversity. National or regional institutions responsible for collecting and providing the information required are not able to provide information at local level. However, the current regional policy agenda as well as modern regional analysis techniques requires and allows respectively a deeper understanding on what is going on within the regions, within the metropolitan areas and even within the neighbourhoods. The recent theoretical frameworks and ideas of the New Economic Geographic claim that most of the economic processes are taking place at local level, such as spill-over effects, agglomeration economies or network connections.

Having a data set of comprehensive information on relevant socio-economic indicators is one of the objectives of the IMAJINE Project. Thanks to the methodology described in Deliverable 2.2, we now have information on average household income at local level, as well as many other socio-economic variables which are consistent with the official sources and comparable among EU countries. Having new data is always exciting as it allows us to tackle some unsolved research questions.

While the main figures at local level were presented in Section 2, in this last Section we would like to briefly show some potential research uses of this new local data set that has been generated. Thus, the main ideas of five on-going research papers that use this new local dataset will be explained and their preliminary results shown. We believe these are just a few examples of the many potential applications of this local database generated by IMAJINE.

3.2 Research Line #1. Ideas for exploring the spatial patterns of poverty at local level

Studying spatial inequalities in Europe at local level is one of the aims of the IMAJINE project. There are two on-going papers which are good examples of the possibilities of this new local dataset generated thanks to this project.

In the work titled "*Poverty at a local level: comparative analysis between Spain and United Kingdom*" we begin by identifying the rapid growth of the percentage of population at risk of poverty in Europe and the relevant differences observable among countries. In terms of the percentage of population at risk of poverty and exclusion (AROPE), there is substantial variability across countries. In 2011 the overall rate was 24.2%, with countries like Bulgaria (49.1%), Romania (40.9%) or Latvia (40.1%) with poverty rates well above this figure, while the Czech Republic (15.3%), the Netherlands (15.7%) or Denmark (17.6%) having the lowest rates. Given these circumstances, significant efforts have been made by the European Union to understand the spatial patterns of socio-economic phenomena across the member states. Several projects have been carried out within the framework of the European Territorial Observatory Network (ESPON), aimed at bringing together territorial evidence than can promote the development and cooperation pursued by the Cohesion Policy. Specifically, the Territorial Dimension of Poverty and Social exclusion project (TiPSE) (ESPON, 2014), dealt with the mapping and geographical analysis of poverty and social exclusion as a means to establish policy targets and a set of recommendations. The analysis provided additional evidence concerning the urban-rural divide, pointing to differentiated profiles between old and new members taking into account dimensions

as remoteness or connectivity. In general, urban areas are the ones bearing a higher risk of poverty and social exclusion in the former and rural areas in the latter. The project's conclusions highlighted that more spatially disaggregated and comprehensive data are needed in order to understand the territorial processes of poverty and exclusion and monitor their evolution along time, which in turn can foster an improved coordination between the governance agencies at local, national and supra-national levels.

Building on the work of projects such as TiPSE, in this paper we aim to provide additional evidence on the spatial distribution of income and the characterisation of poverty at the local level for Spain and the United Kingdom. For this, we will use the estimations of local income and the AROPE rate in 2011 computed in the IMAJINE project along with data from the national censuses of the countries considered. The model proposed will include demo-economic and geographic features of the localities such as the employment rate, age profile, population density, distance to the main urban areas, or natural amenity endowment. Methodologically, our objective is to explain local poverty by means of the Foster-Grier-Thorbecke indexes (Foster *et al*., 1984). With these tools we try to characterise the incidence, intensity and inequality of poverty (Jenkins and Lambert, 1997), focusing first on its quantile distribution through a spatial quantile model (Koenker and Bassett, 1978; Kostov, 2009) showing the reaction of poverty rates to the factors in terms of how diverse their effects are for the different poverty rate quantiles, taking into account its surrounding spatial structure. Turning the emphasis to the impacts that the explanatory variables may have on each part of the territory, the geographically weighted regressions (GWR) approach (Brunsdon *et al*., 1996 and 1998) provides additional insights on the heterogeneous spatial distribution of the effects to complement the previous assessment of spatial dependence.

In the preliminary results we can observe that the differences already shown at more aggregated levels grow larger when localities are considered, and that the more detailed spatial depiction of the processes at work brings out local clusters of poverty that had remained hidden or inadequately portrayed due to the averaging effect produced when larger units are considered.

Comparisons like this one among different countries can shed light on the spatial patters that remain among different geographical or political contexts. But it is also possible to focus on specific issues relevant to particular countries. This is the case of the on-going paper titled "*The spatial dynamics of the risk of poverty among employees in Spain*".

Usually, poverty risk is associated with households whose members are unemployed and/or affected by social exclusion. Nevertheless, the recent global economic crisis has generated strong adjustments in wages and less labour stability, and as a consequence a significant growth in the number of families at poverty risk even though some of its members are employed. This is a particularly relevant problem in the case of the Spanish economy. According to the National Institute of Statistics, in Spain in 2017 some 26.1% of Spanish employees were at risk of poverty, 11 percentage points above the figures from ten years previously and 13 percentage points above the EU average. This illustrates how poverty risk and employment in Spain seem to be co-existing and forming a dangerous liaison. The objective of this research is to study the spatial dynamics observed along the Spanish territory between poverty risk and employees at local level as opposed to regional level.

Risk of poverty figures are estimated at local level under the IMAJINE Project first for the total population and then only for employed population. These estimations help us to understand the complexity of the spatial distribution of in-work poverty in Spain after the crisis and to compare with the overall population figures. As expected, there is considerable intra-regional heterogeneity within the NUTS II regions, but the most important discovery is that in-work poverty risk seems to be especially concentrated in some peripheral areas of the large urban areas and not necessarily in areas with high overall AROPE figures. Localities where being employed does not necessarily mean being out of the risk of poverty should be a special focus of the Social Cohesion Policies.

3.3. Research Line #2. Ideas to connect the socio-political consequences of the spatial inequalities: contributions to the geography of discontent literature

Combining the IMAJINE Project data set with other official sources opens many research opportunities and the possibility to answer complex research questions. The work titled "*The grass is greener on the other side of the hill: relationship between the Brexit referendum results and income inequality*" aims to study how spatial differences can affect socio-political decisions.

Brexit has been attracting a great deal of attention in both the political and academic arenas ever since the results of the referendum in 2016 revealed the preference to leave the EU of a little over than 50% of the voters. Given the importance of the issue, it comes as no surprise that many recent studies have tried to provide evidence on the prospective impacts that Brexit will have on the UK and European economies. Likewise, some studies have focused on the possible determinants of the result of the vote as it reflects the profound differences that prevail in UK society and that are a source of discontent and conflict. This latter line of research shows that a large part of the variation in the vote outcome can be related to demographic, educational and economic factors, which shaped the spatial patterns observed across the country.

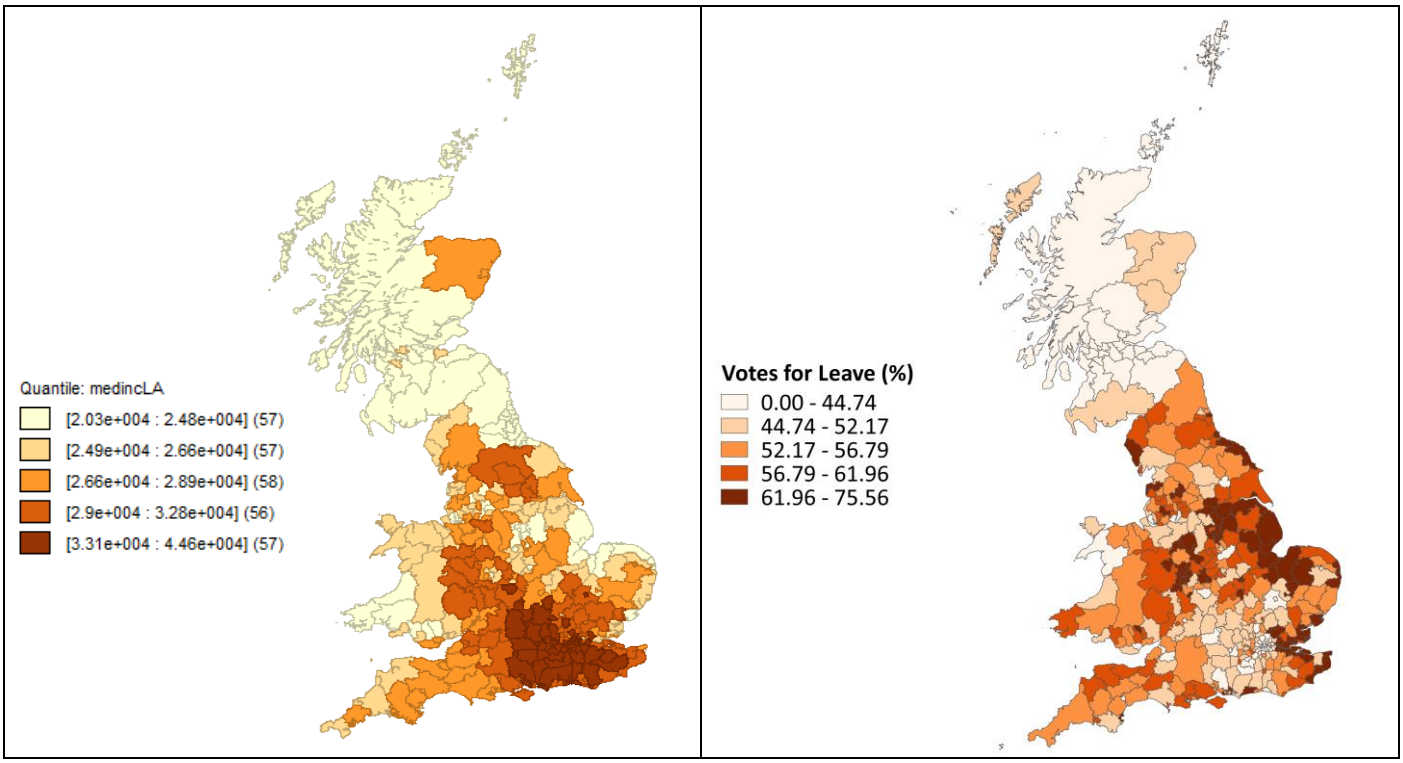
One of the causes discussed is the growing inequality in the UK in recent decades, which is regarded as a possible explanation for both the lower turnout of young population and the high leave support among the older electorate. Acknowledging the importance of the spatial context in political issues, the aim of this research is to provide an assessment of the influence of the existing economic disparity on the support for Brexit, taking into account the level of inequality in an area in relation to its neighbouring regions. We implement a spatial specification in order to evaluate the direct and indirect marginal impacts of several characteristics, focusing attention on the relative effect of income on the referendum results.

Recent studies show that the voting patterns appear to differ along the lines of age, social attitudes and education, with older citizens with a conservative ideology and lower educational level more favourable to leaving the EU than younger, liberal and better-educated people (Harris *et al*., 2017; Manley *et al*., 2017). The underlying hypothesis is that the better-educated population perceive belonging to the EU as beneficial in terms of international opportunities and as a source of funding and access to the single market. Under this assumption, well-paid jobs are readily available for their profile, as opposed to the position of the less-well educated who feel that competition from EU immigrants is harming their prospects. Economic inequality, which has widened in the UK in recent decades, has been another factor contributing to deepening this negative belief among certain parts of the population. Consistent with this, the older electorate might have associated the EU with the decline in their living standards as the UK has been a member state over the same period that economic inequality has accelerated. As a result, a large share of the leave votes can be interpreted as a reaction from those who have felt more and more powerless in a scenario of greater openness but also greater economic inequalities that had not been appropriately addressed by the government. The lower turnout of the younger generations can also be interpreted from this perspective, as higher indebtedness, a precarious and expensive housing market and harsher labour conditions (Clarke and Whittaker, 2016) could channelled lower political engagement and participation.

The effect of economic inequality on the referendum outcome is patent when the regional distribution of income and that of the leave vote are taken into account. Figure 3.1 shows a heterogeneous landscape where some areas exhibit a high concentration of income, such as London and its neighbouring Local Authorities to the west (Oxfordshire and Hampshire) and the south (Surrey, West Sussex and East Sussex), which coincides with areas with a lower share of leave votes. On the other side, some localities in eastern Britain, namely the coasts of Lincolnshire and Norfolk, are in the lowest part of the income distribution and also show the highest support for the leave option. This spatial

distribution suggests that the location of both variables is not random, and that there exists an interplay between the regional economic situation and the attitude towards Brexit. These points to the necessity of analyzing any associated phenomenon using a methodology that accounts for the possible spatial spill-over effects that may arise from the interaction of both factors.

Figure 3.1: Income (left) and leave votes share (right) in Local Authorities in the UK



Source: Own, elaboration with data on income and with data from The Electoral Commission of the UK

As mentioned earlier, the literature on this issue considers demographic, educational and cultural variables as drivers of the vote result, along with the labour market conditions, the ideological position regarding international economic integration (*Euroscepticism*), and economic inequality. Following existing studies on the subject, in this research we include a variety of the aforementioned possible drivers to explain the share of leave votes in Local Authorities across the UK, where the main focus of the analysis is to capture the effect of the spatial relative economic inequality. This indicator is expressed as the relative average difference in the local median income (as estimated in D2.2) between a Local Authority and its nearest fifteen neighbours:

$$\mathrm{Diff_i} = 1/\mathrm{n} \sum_{\mathrm{i,j}}^{\mathrm{n}} \left(\frac{\mathrm{Minc_i} - \mathrm{Minc_j}}{\mathrm{Minc_i}} \right)$$

$$\mathrm{i} \neq \mathrm{j}\,;\, \mathrm{n} = 15$$

The absolute value of this factor shows how close (far) a Local Authority is to (from) its neighbours in terms of median income, being positive if the region is above the average of the defined vicinity and negative if it is below. This latter case is especially interesting, as some sociological studies suggest that perceived economic deprivation with respect to the surrounding areas might be one of the reasons that motivated certain segments of the population to vote for leaving the EU. These claims are supported by the economic studies of Los et al. (2017) and Rodríguez-Pose (2018), which show how the referendum gave an opportunity to those discontent with their lagging-behind situation to take "revenge" on the "metropolitan elites". In accordance with this, we expect a negative and significant relationship

between the leave vote share and the spatial relative inequality indicator introduced earlier: the lower the value of the indicator (meaning more negative, and subsequently, a worse relative economic performance of the area in comparison to its neighbours), the higher the share of leave votes.

Although studies of the effect of economic inequality on the result of the Brexit referendum already exist, to our knowledge this is the first study to use local income data to assess the spatial effect of relative income differences. From a methodological point of view, the indicator included is also a novelty, its use complemented by the several options available to deal with spatial dependence (autocorrelation in the error term induced by the spatial structure of the data). In order to assess the influence of the neighbouring localities from a global perspective, in this analysis we rely on a definition of a neighbourhood as the fifteen nearest municipalities (the same used in the construction of the relative income difference indicator), forming the matrix of nearest neighbours W, using centroids as reference points.

Given our focus on the potential role played by the spatial spill-overs, indicated by the clustering of Local Authorities with a high and low share of leave votes as shown in the Exploratory Spatial Data Analysis (ESDA) (Anselin 1999) and a Moran's I test confirming the existence of spatial autocorrelation, the specification chosen is the *Spatial Lag model*:

$$\mathrm{Pct\_Leave_i} = \alpha + \rho \mathrm{WPct\_Leave_i} + \beta_1 \mathrm{Diff_i} + \beta_2 \mathrm{Theil_i} + \sum_{j=3}^{6} \beta_j \mathrm{Dem\ Struc_i} + \sum_{j=7}^{9} \beta_j \mathrm{Ed\ Struc_i} + \sum_{j=10}^{12} \beta_j \mathrm{Tenure\ reg_i} + \sum_{j=13}^{16} \beta_j \mathrm{HH\ size_i} + \sum_{j=17}^{20} \beta_j \mathrm{Occupation_i} + \sum_{j=21}^{32} \beta_j \mathrm{Sector_i} + \sum_{j=33}^{34} \beta_j \mathrm{Labourmkt_i} + \varepsilon_i$$

where the percentage of leave votes is regressed against the proposed income difference indicator, the Theil index of income inequality in the Local Authority, demographic and educational variables, the household tenure regime and size, the occupational and sectoral shares of employment, and the labour market.

Table 3.***1*** summarizes the preliminary results of this first estimation. As expected, the income inequality indicator has a negative and significant coefficient. The spatial effect is positive and also significant, reflecting the clustering of deprived areas in the UK, which also corresponds to Local Authorities whose citizens had a higher preference for leaving. The other variables present in the model have effects consistent with the previous studies: a younger population (lower mean age in the area) is related to a lower leave share, a higher share of native population corresponds to a greater preference for leaving, as does a higher local unemployment rate. Regional specialization in the mining and construction sectors (manifested by higher employment shares in these sectors) is also related to a higher leave vote.

Table 3.1 Spatial Lag Model estimation

Spatial Lag Model estimation

	SLM	
Constant	-2.988	***
Rho	0.190	***
Diff. income neighbours	-0.147	***
Theil	0.123	*
Demographic Structure	Yes	
Education	Yes	
Household tenure regime	Yes	
Household size	Yes	
Occupation	Yes	
Sector	Yes	
Labour market conditions	Yes	
Akaike Information Criterion (AIC)	*-1198.2*	
Log Likelihood	*638.12*	
Likelihood Ratio Test	*12.77*	***
LM Test for residual sp. autocorrel.	*6.85*	

Source: Own elaboration

3.4. Future lines of research: questions possible to answer with the new local data

Thanks to the IMAJINE Project data set, we can not only map local *income* but local *consumption*. In the ongoing research titled "*Mapping consumption impacts: combining IO models with consumption estimates for small areas*" we combine Input-Output models with Household Surveys (HS) reported consumption to calculate consumption impacts.

The sample on which HS are based are not representative enough to produce reliable estimates at a local (sub-regional) spatial scale, which implies that quantifying impacts derived from household consumption are limited to the regional or national scale. Applying the methodology described in D2.2 of the IMAJINE Project and taking advantage of the local data set generated, we can avail of consumption information at a highly disaggregated geographical scale, which allows us to calculate the impacts of changes in household consumption for a particular local (sub-regional) spatial unit, such as cities, metropolitan areas or municipalities. Preliminary results for Spain show that the effect of private consumption changes varies significantly across space and depends on, not only the region but also on the locality *within* the region.

The use of local consumption information is very useful for addressing many other unsolved research questions. For example, in the ongoing research "*Urban sprawl and energy consumption: a CGE approach to the case of Madrid*" we are interested in exploring the effect of urban sprawl on the environment through the changes in consumption.

Urban sprawl is rapidly occurring in many Spanish urban areas. According to statistical data from the Household Budget Survey of the National Statistical Institute, in 2014 approximately 35% of the population of Spain lived in houses, with 11% living in detached houses and 24.2% in semi-detached houses. The remaining percentage of the population is

distributed among other types of dwellings, such as flats. The important changes in income per capita, social customs and land use pressures are responsible for high levels of urban sprawl in Spain. When evaluating the effects on energy consumption it may be relevant for policy makers to have a deeper insight into the consequences of urban sprawl on energy efficiency. This will facilitate the development of urban polices aimed at pursuing greater efficiency from both economic and environmental perspectives.

Energy-related policies have very commonly been explored within a computable general equilibrium (CGE) framework. Since sprawl directly influences energy consumption, in this research our aim is to introduce CGE as a framework to evaluate consequences of changing sprawl on the general economy of a city focusing on the Madrid case. We develop a static CGE model for Madrid province for 2010, with 66 sectors, in which the energy sector covers both electricity and gas. There are two productive factors, labour and capital. The production process is follows a nested production function. For the benchmark equilibrium we use the input-output table (IOT) for the province of Madrid for 2010.

The key element to be able to apply this evaluation though the CGE model is to have figures of the aggregate changes in consumption depending of the level of sprawl. In our previous work we have obtained an objective measure of the level of sprawl of each urban area in Spain. And now, thanks to the new IMAJINE project data set, we can have information on aggregate consumption by products and at local level, which makes it possible to estimate the relationship between urban sprawl and changes in aggregate consumption of gasoline, electricity or other consumption items. With these tools - namely the data set to establish a relationship between sprawl and changes in the consumption patterns, and the CGE model to evaluate the environmental impacts of this changes - it is possible, for the first time, to provide an empirical analysis of the real impact of the form of urban land expansion. To the best of our knowledge this would be a novel research relating CGE models and the concept of sprawl. In order to evaluate different sprawl scenarios, we simulate changes in the urban sprawl for the city of Madrid. The effects on energy consumption are incorporated into our CGE model to compute effects on the rest of the sectors and urban economy.

Finally, we would like to show an application of the IMAJINE Project local data set related to the labour markets. For most workers, access to employment is severely restricted to the offers available in their municipalities or surrounding areas. Thus, the probability of being employed will depend not only on your personal characteristics - educational level, age, gender, civil status, number and age of children, etc. - but more importantly on the socioeconomic characteristics of your environment or locality. The study titled "*Local characteristics and employability in the EU*" aims to analyse the extent to which the chances of being employed depend on personal characteristics, the characteristics of the locality where people reside, or the characteristics of the region. Applying a multilevel logit model we will be able to identify the weight of the personal characteristics of the individuals in comparison to the exogenous factors, i.e., the socio-economic context of the locality and region of residence.

The 2011 Microcensus databases for the UK, France and Spain include the relevant individual variables for performing this type of analysis at local level (LAU2). Thanks to these microcensus individual data and the identification of the locality where those individuals reside, we can link the personal information with the local database comprising economic information at LAU2 level (10,664 wards in the UK, 36,683 communes in France and 8,111 municipalities in Spain). Information on the region is also considered. Ceteris paribus individual characteristics, the expected results will show the relevance of size and the differences between the rural and urban settings (even within the same region). Also, peripheral localities should be associated with lower chances of being employed than central areas. However, given the size and heterogeneity of the NUTS III regions in Europe, regional characteristics may not have as much influence on individual´s employability as the features of the locality of residence. In other words, patterns observed at local level might not necessarily hold at regional level.

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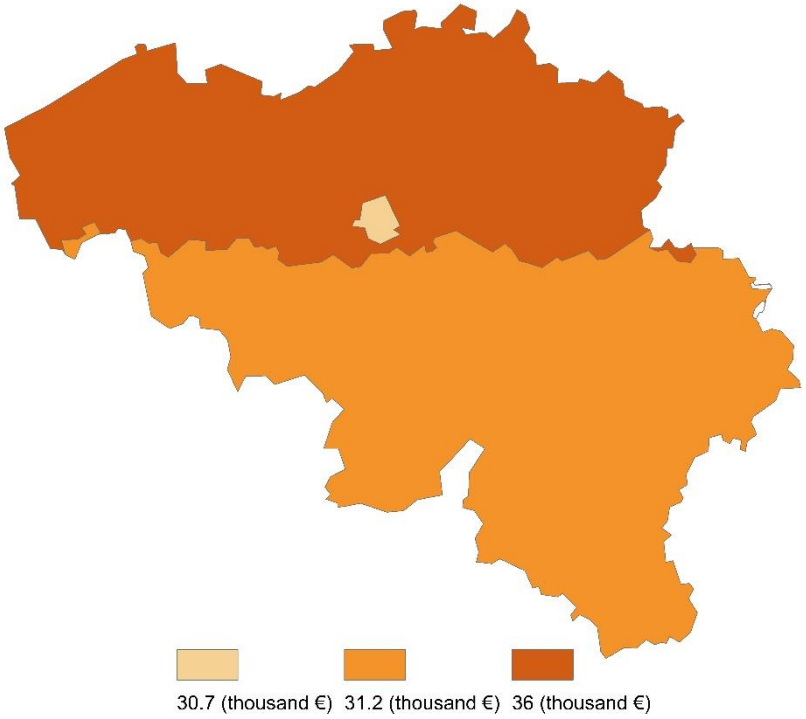
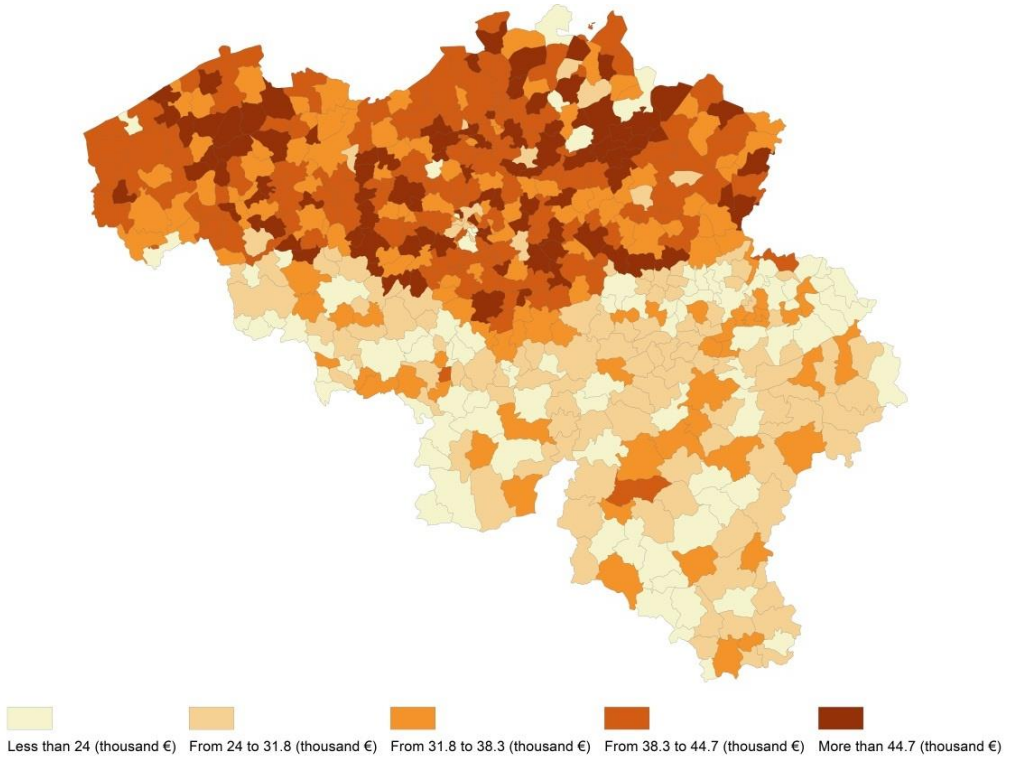
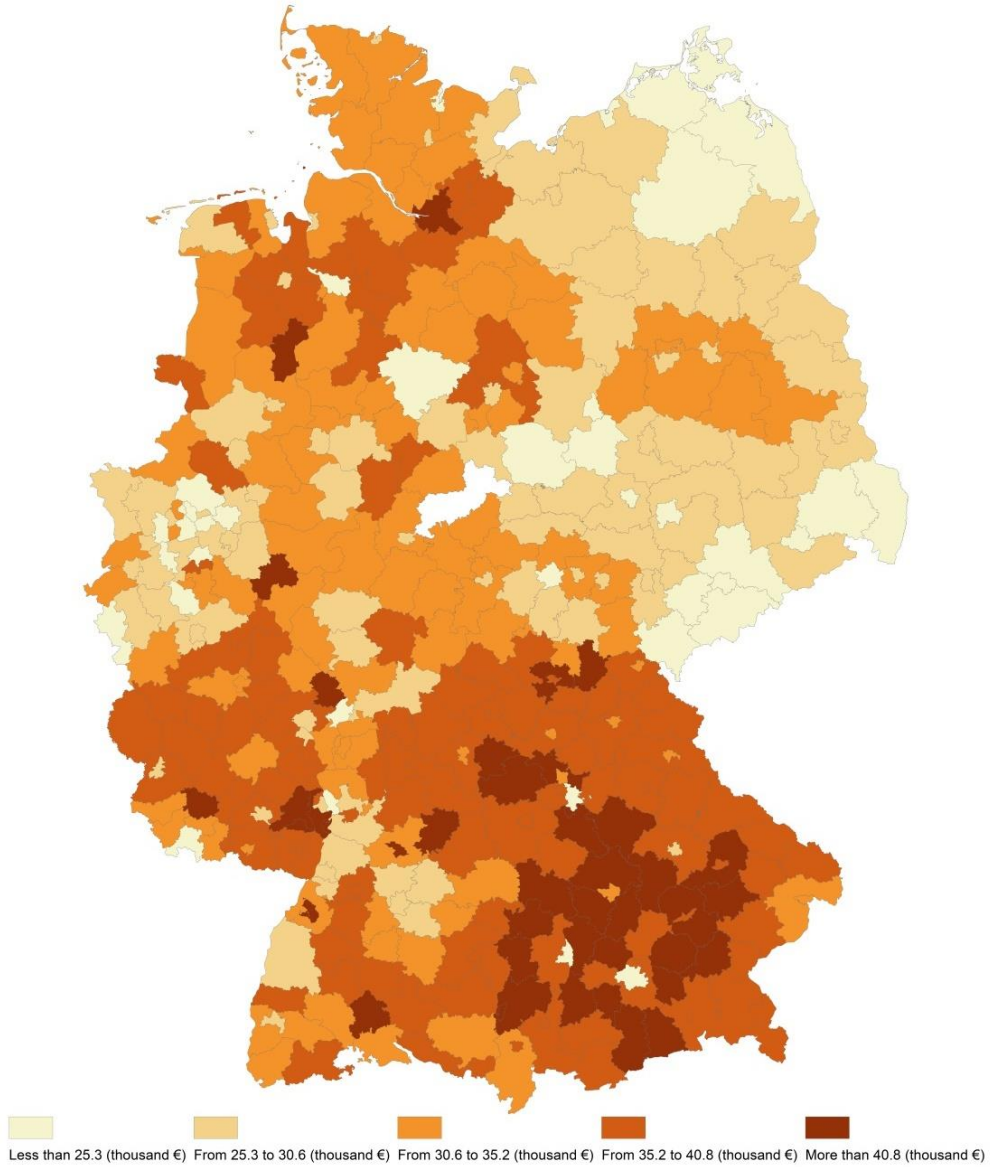
ANNEX A

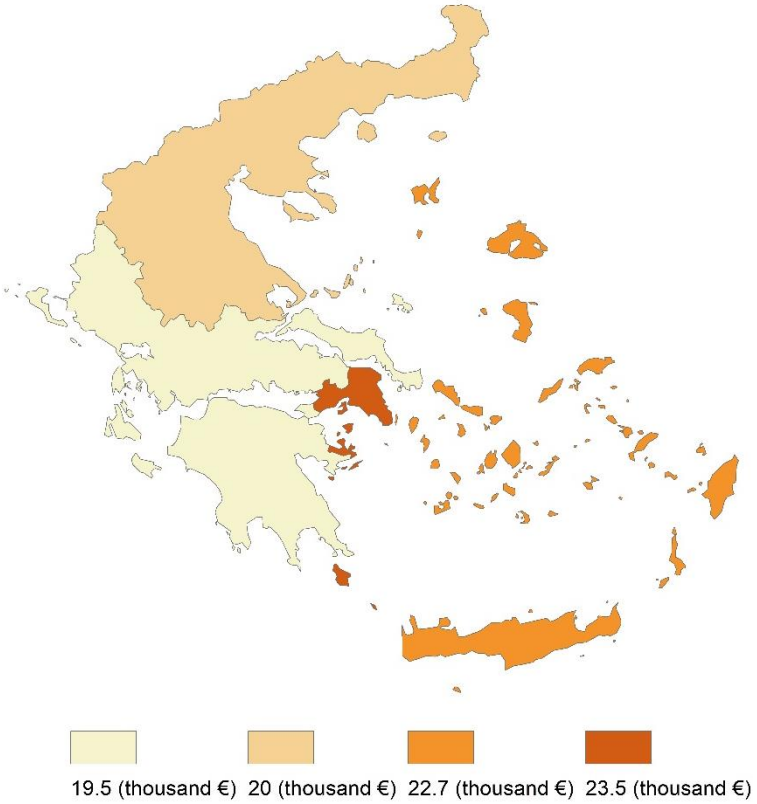
All figures represent Average Household Income at the level provided by EU-SILC (national or regional) and estimated Average Household Income at local level by the IMAJINE Project (Jenks Natural Breaks)

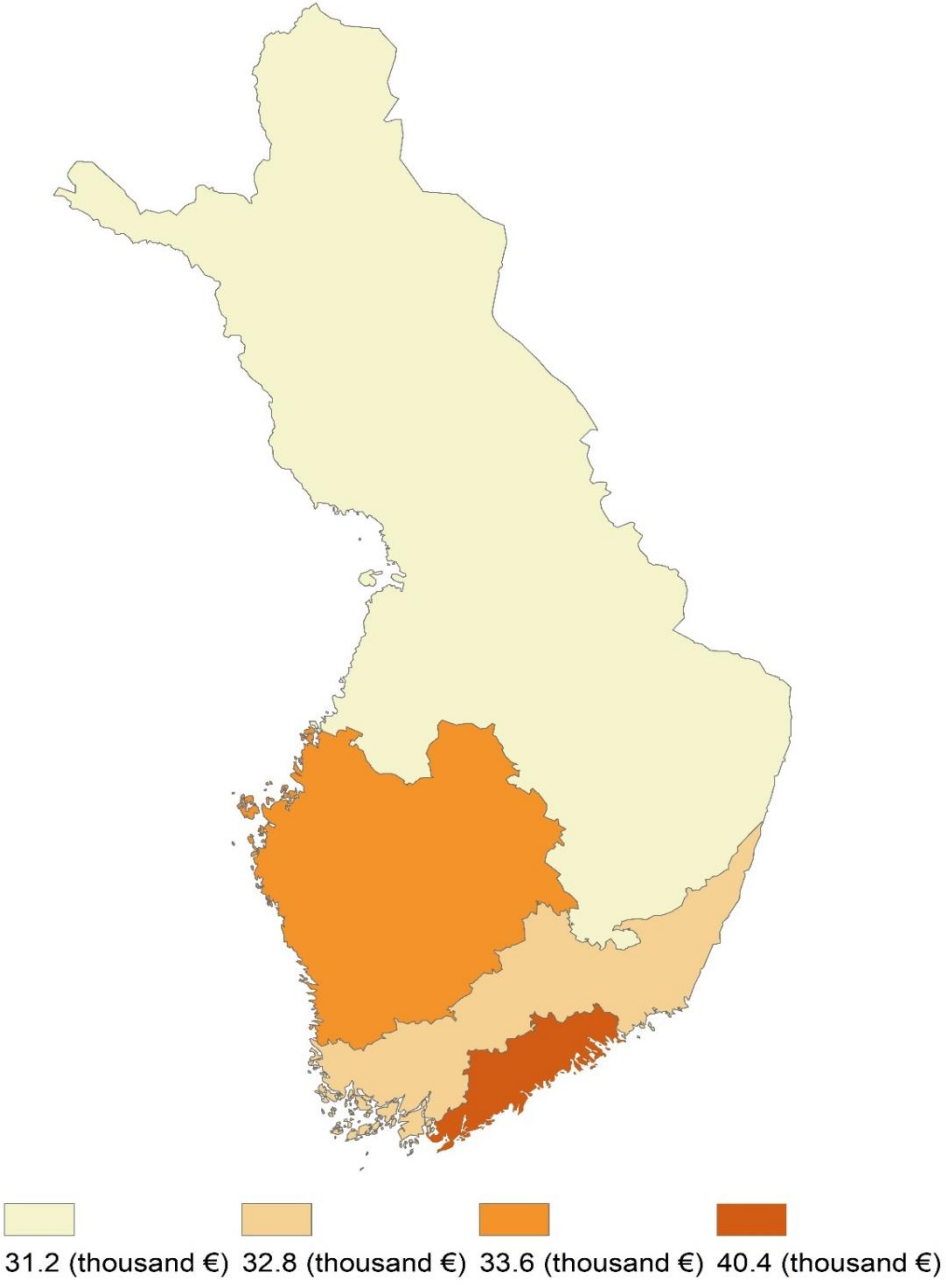


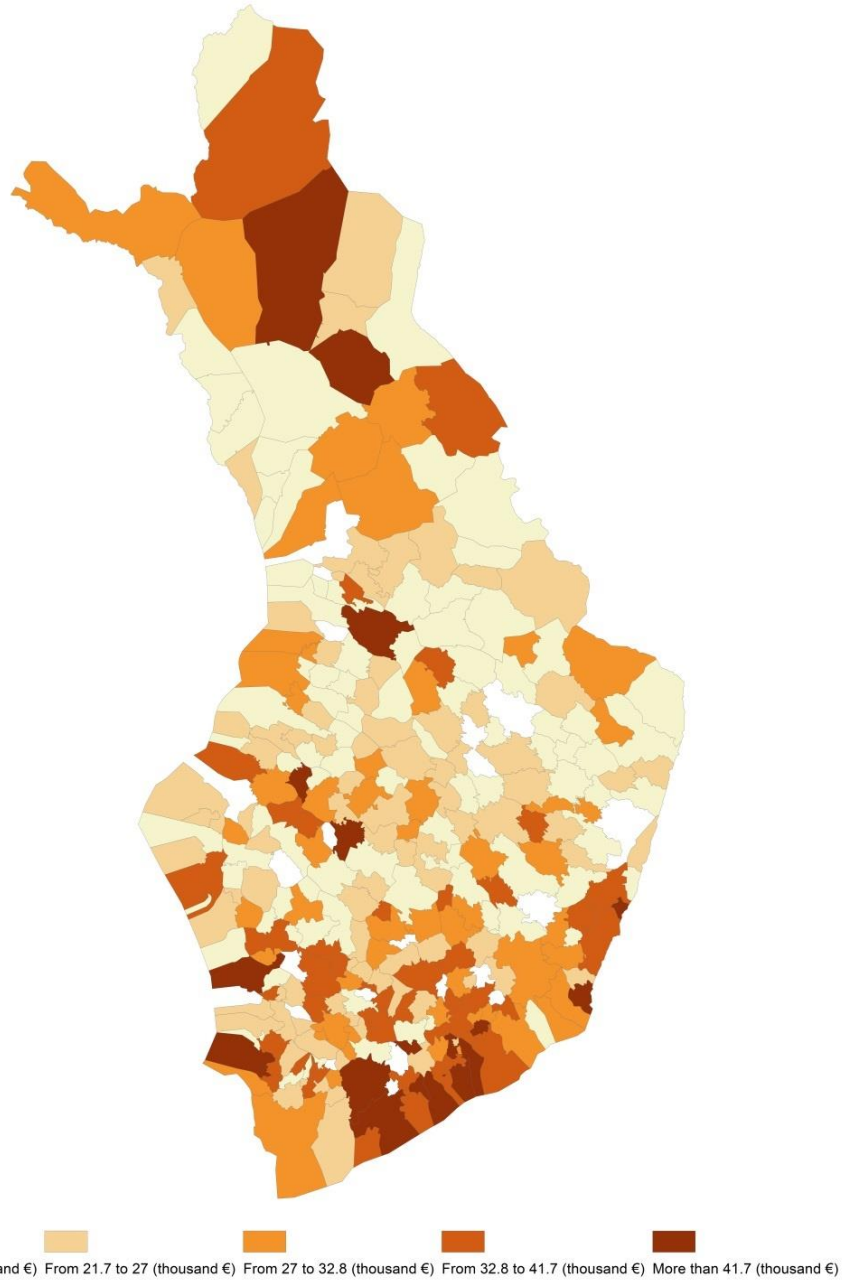


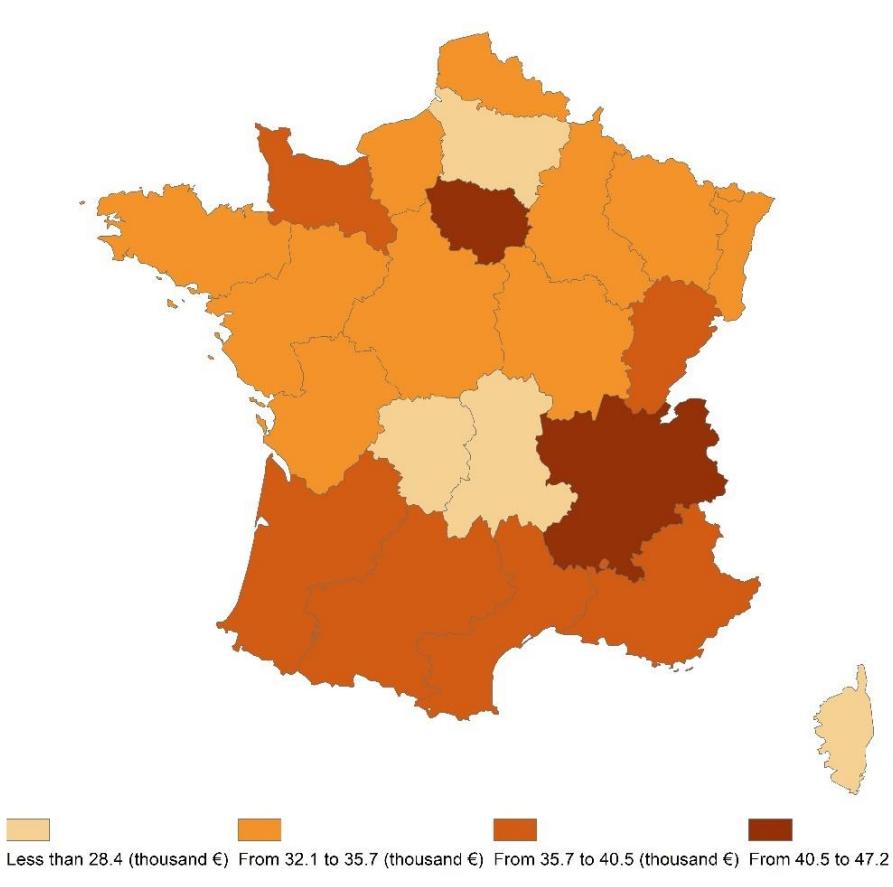

31 (thousand €)


Less than 25.3 (thousand €)
From 25.3 to 30.6 (thousand €)
From 30.6 to 35.2 (thousand €)
From 35.2 to 40.8 (thousand €)
More than 40.8 (thousand €)


19.5 (thousand €)
20 (thousand €)
22.7 (thousand €)
23.5 (thousand €)


31.2 (thousand €)
32.8 (thousand €)
33.6 (thousand €)
40.4 (thousand €)


Less than 21.7 (thousand €)
From 21.7 to 27 (thousand €)
From 27 to 32.8 (thousand €)
From 32.8 to 41.7 (thousand €)
More than 41.7 (thousand €)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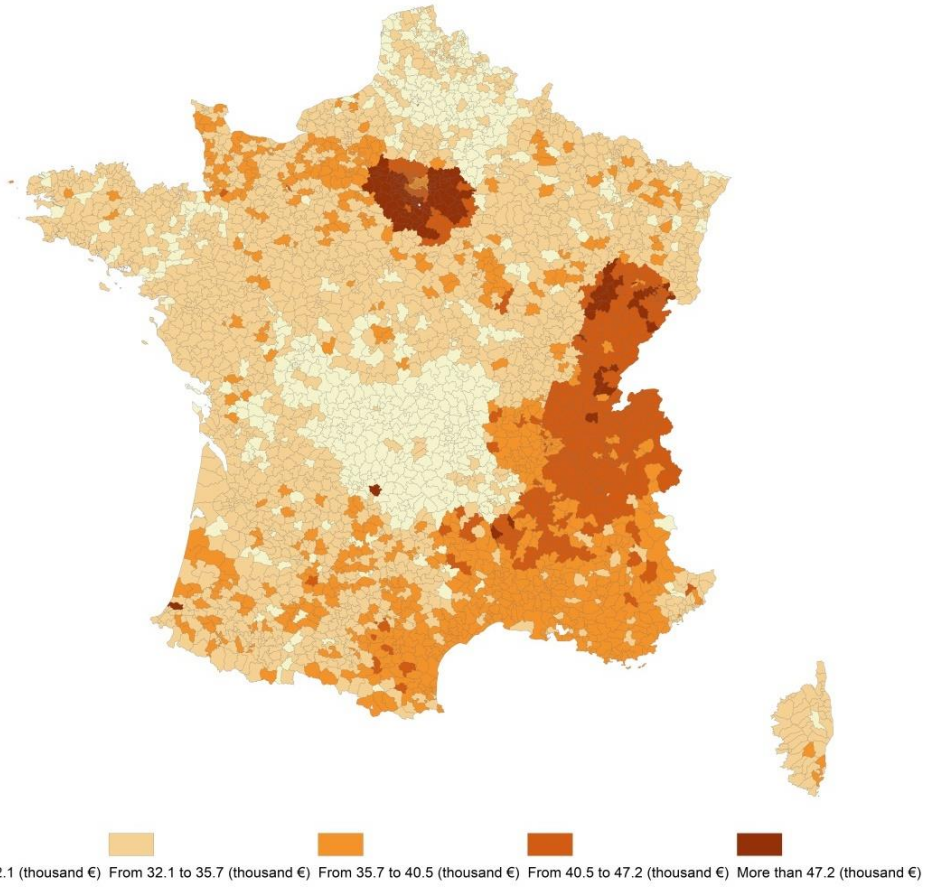
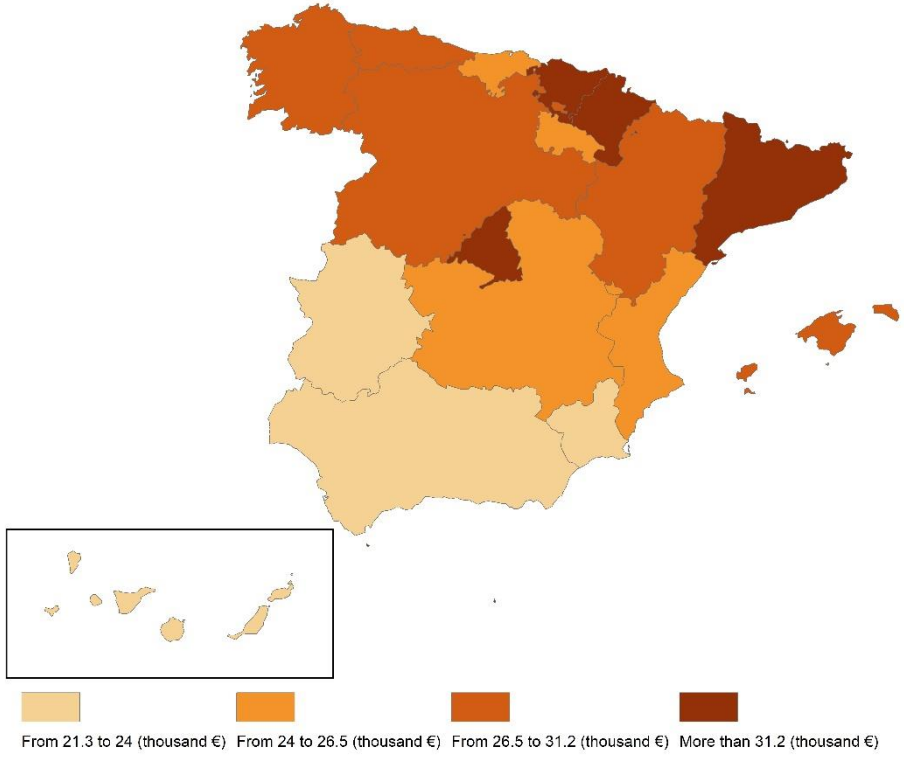
From 32.1 to 35.7 (thousand €)
From 35.7 to 40.5 (thousand €)
From 40.5 to 47.2 (thousand


Less than 32.1 (thousand €)
From 32.1 to 35.7 (thousand €)
From 35.7 to 40.5 (thousand €)
From 40.5 to 47.2 (thousand €)
More than 47.2 (thousand €)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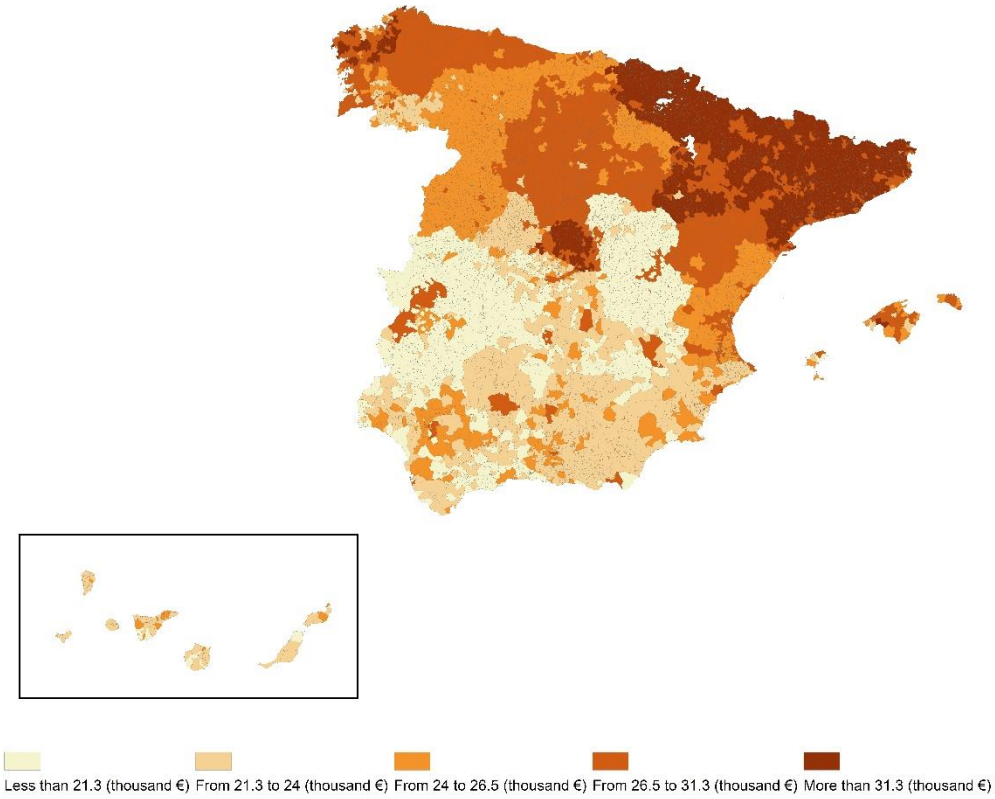
From 24 to 26.5 (thousand €)
From 26.5 to 31.2 (thousand €)
More than 31.2 (thousand €)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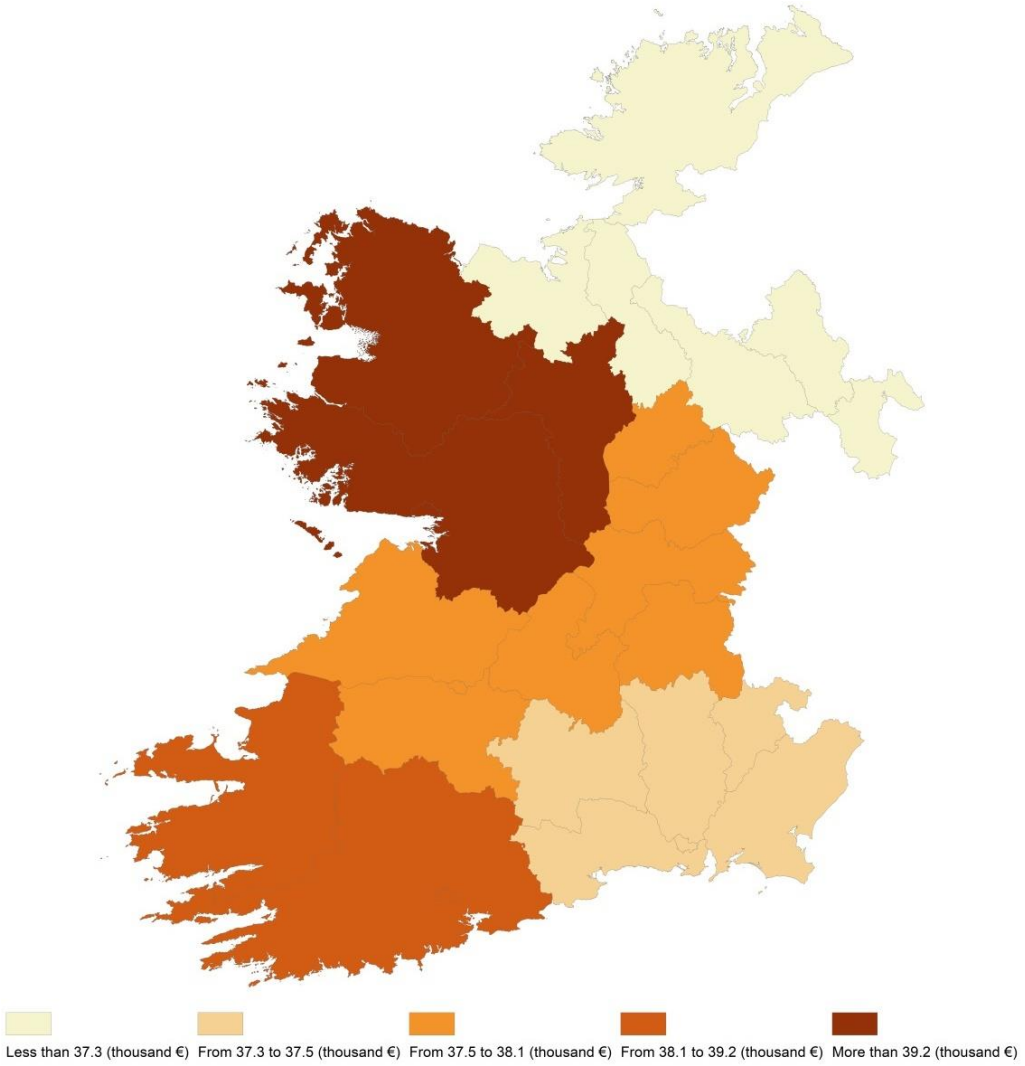
From 21.3 to 24 (thousand €)
From 24 to 26.5 (thousand €)
From 26.5 to 31.3 (thousand €)
More than 31.3 (thousand €)


39 (thousand €)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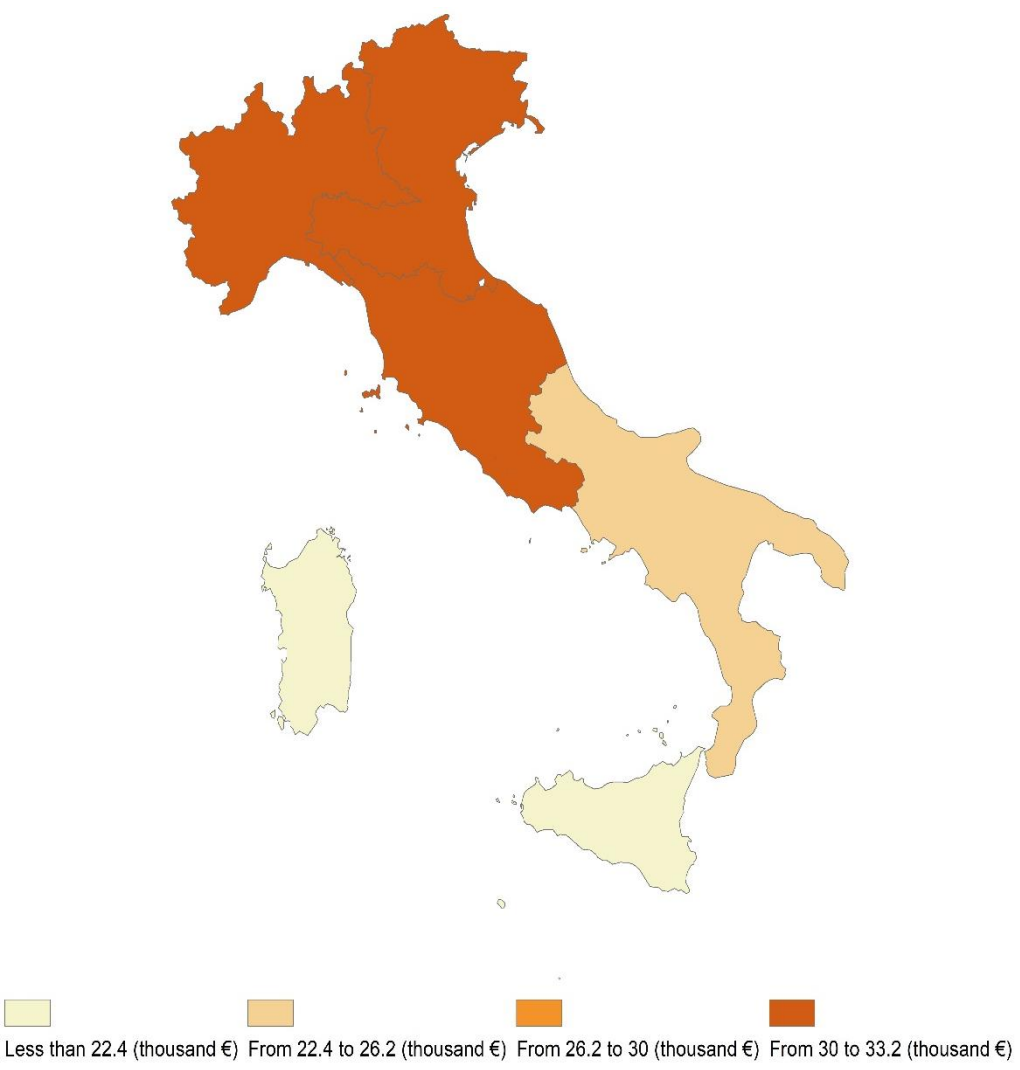
From 37.3 to 37.5 (thousand €)
From 37.5 to 38.1 (thousand €)
From 38.1 to 39.2 (thousand €)
More than 39.2 (thousand €)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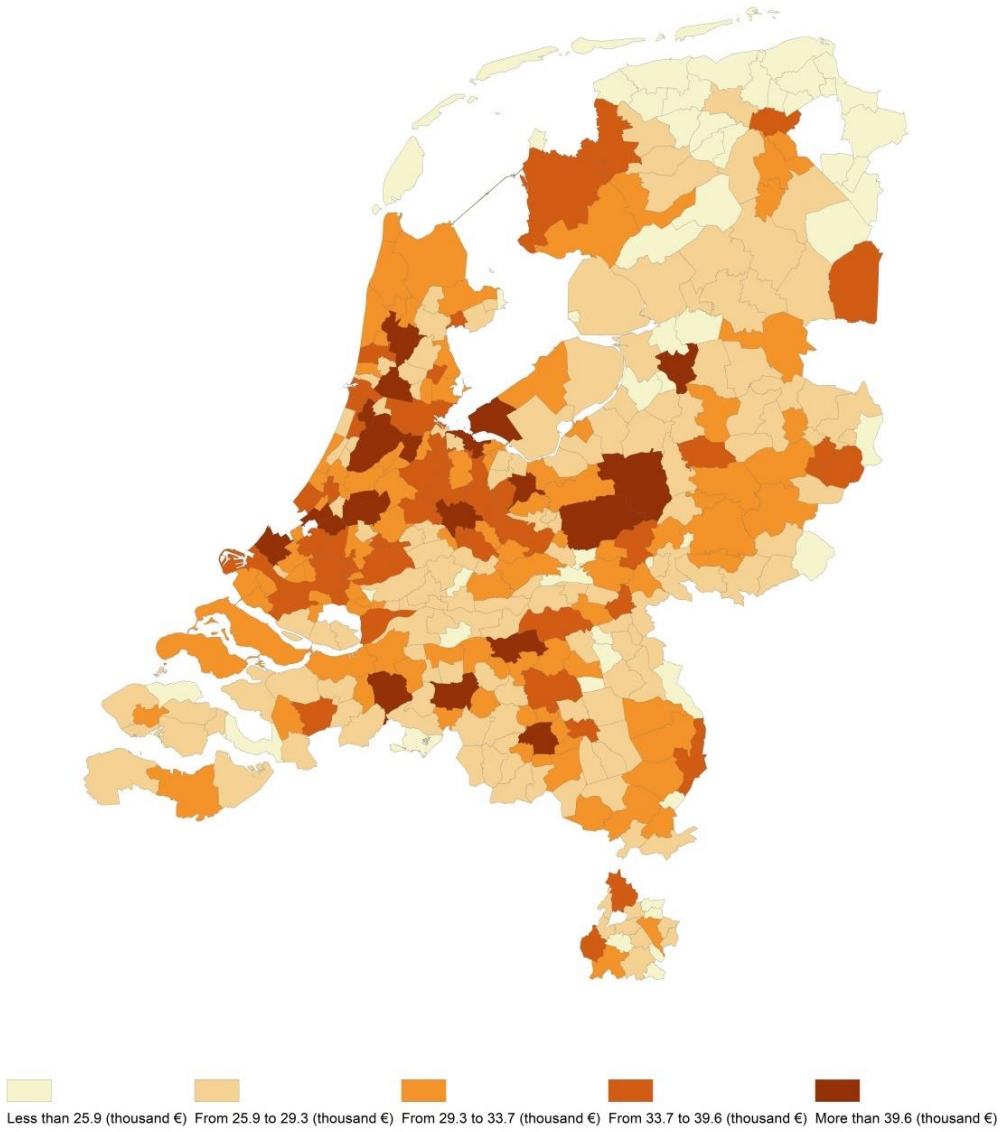
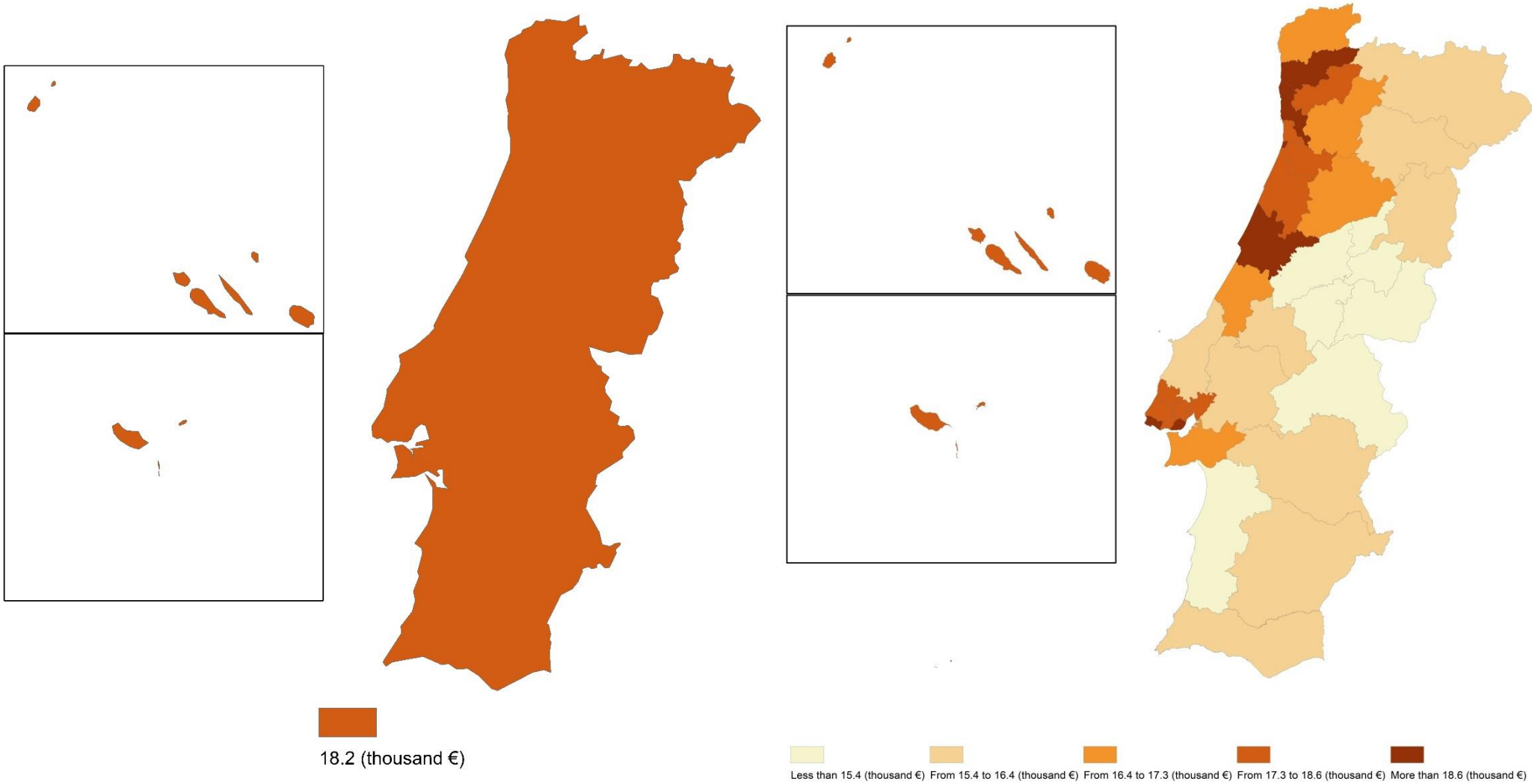
From 22.4 to 26.2 (thousand €)
From 26.2 to 30 (thousand €)
From 30 to 33.2 (thousand €)


Less than 22.4 (thousand €)
From 22.4 to 26.2 (thousand €)
From 26.2 to 30 (thousand €)
From 30 to 33.2 (thousand €)
More than 44.5 (thousand €)


34.5 (thousand €)


Less than 25.9 (thousand €)
From 25.9 to 29.3 (thousand €)
From 29.3 to 33.7 (thousand €)
From 33.7 to 39.6 (thousand €)
More than 39.6 (thousand €)


18.2 (thousand €)
Less than 15.4 (thousand €)
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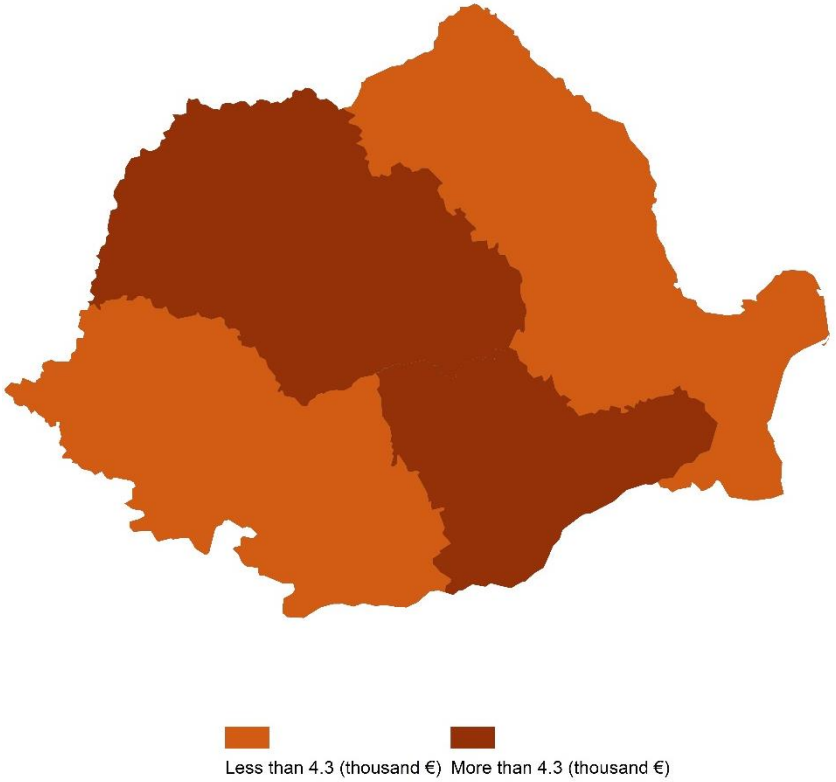
From 16.4 to 17.3 (thousand €)
From 17.3 to 18.6 (thousand €)
More than 18.6 (thousand €)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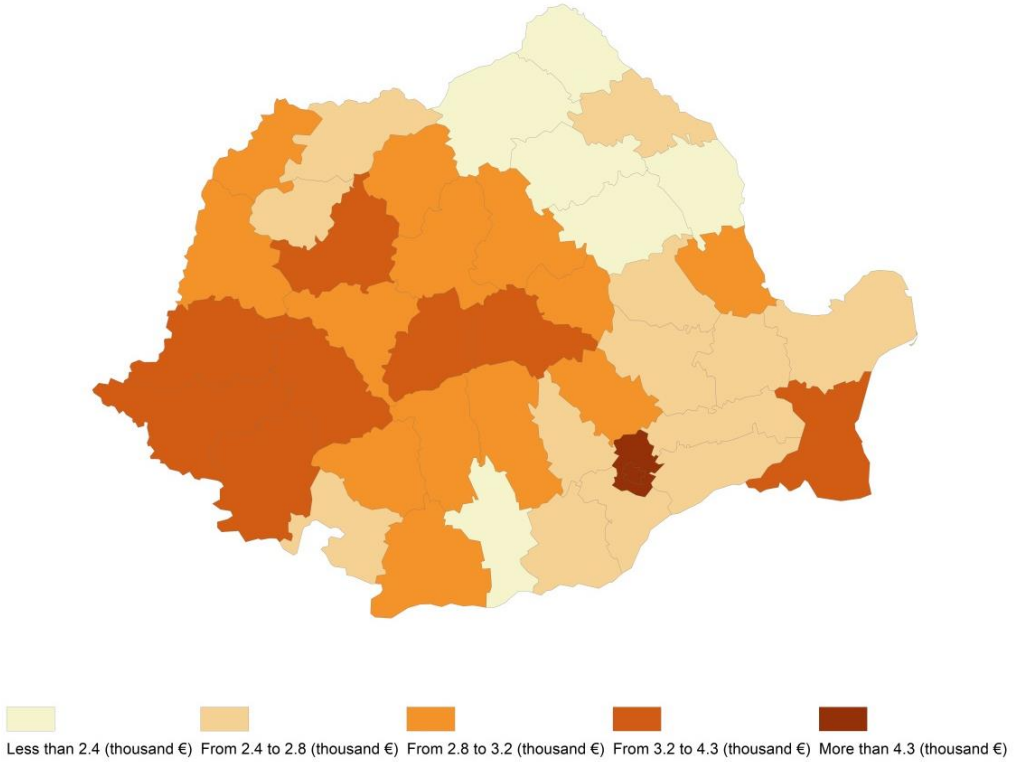
Less than 2.4 (thousand €)
From 2.4 to 2.8 (thousand €)
From 2.8 to 3.2 (thousand €)
From 3.2 to 4.3 (thousand €)
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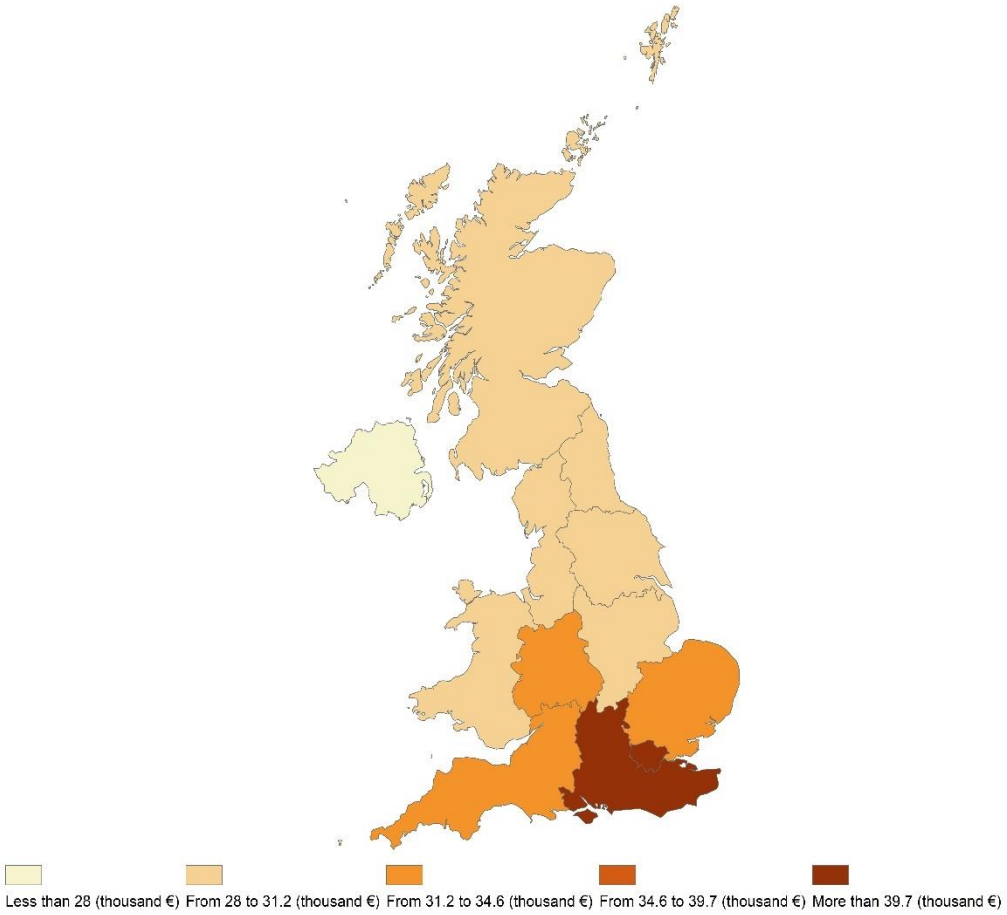
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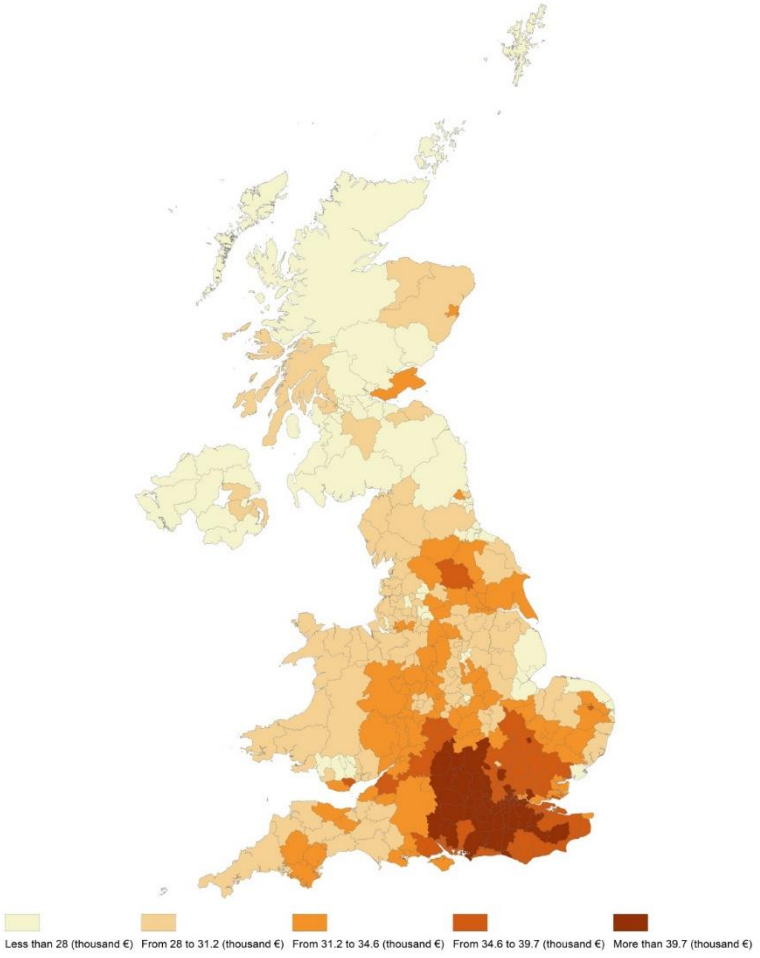
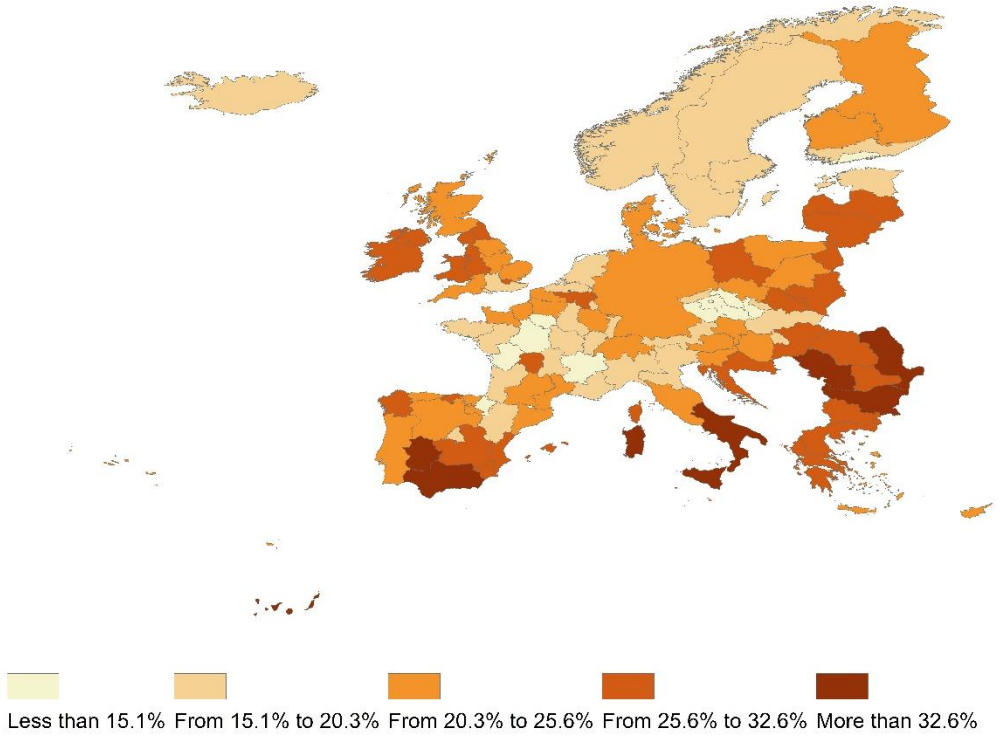
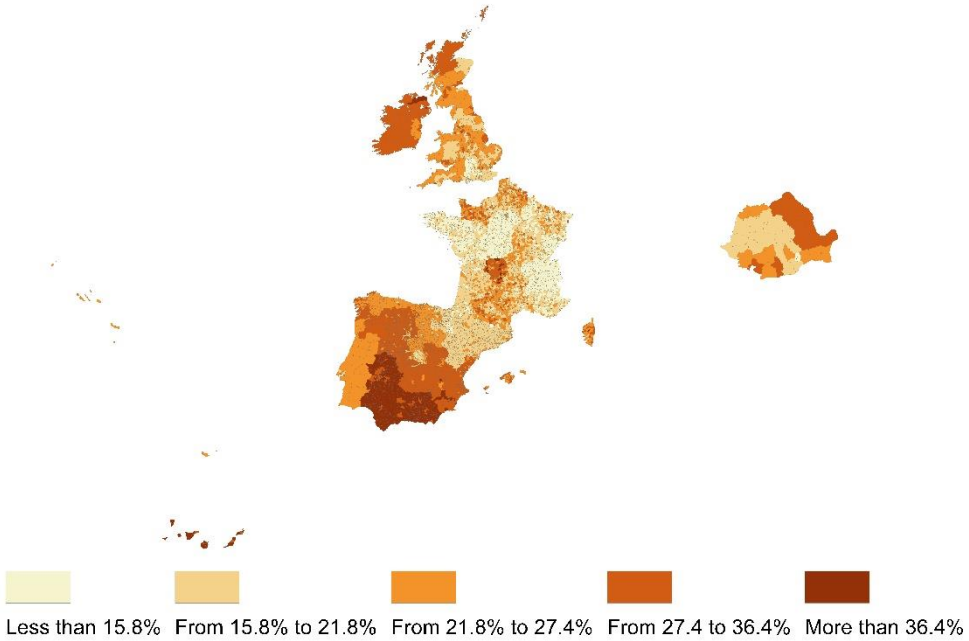
From 28 to 31.2 (thousand €)
From 31.2 to 34.6 (thousand €)
From 34.6 to 39.7 (thousand €)
More than 39.7 (thousand €)

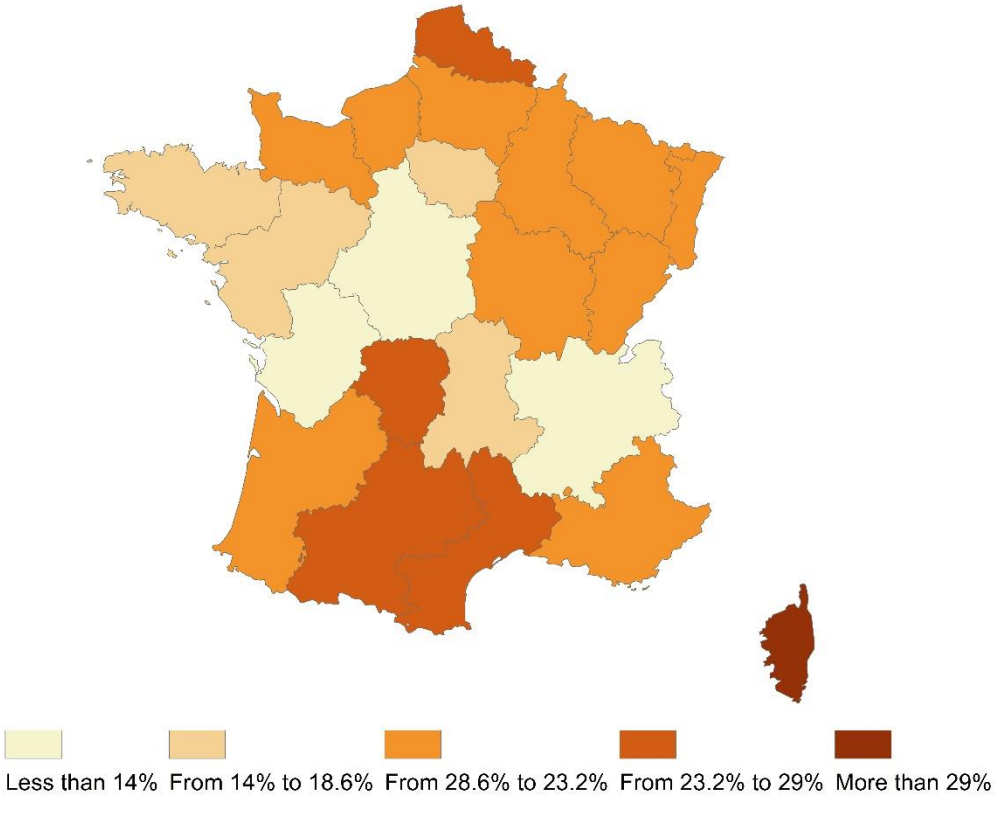

Less than 28 (thousand €)
From 28 to 31.2 (thousand €)
From 31.2 to 34.6 (thousand €)
From 34.6 to 39.7 (thousand €)
More than 39.7 (thousand €)

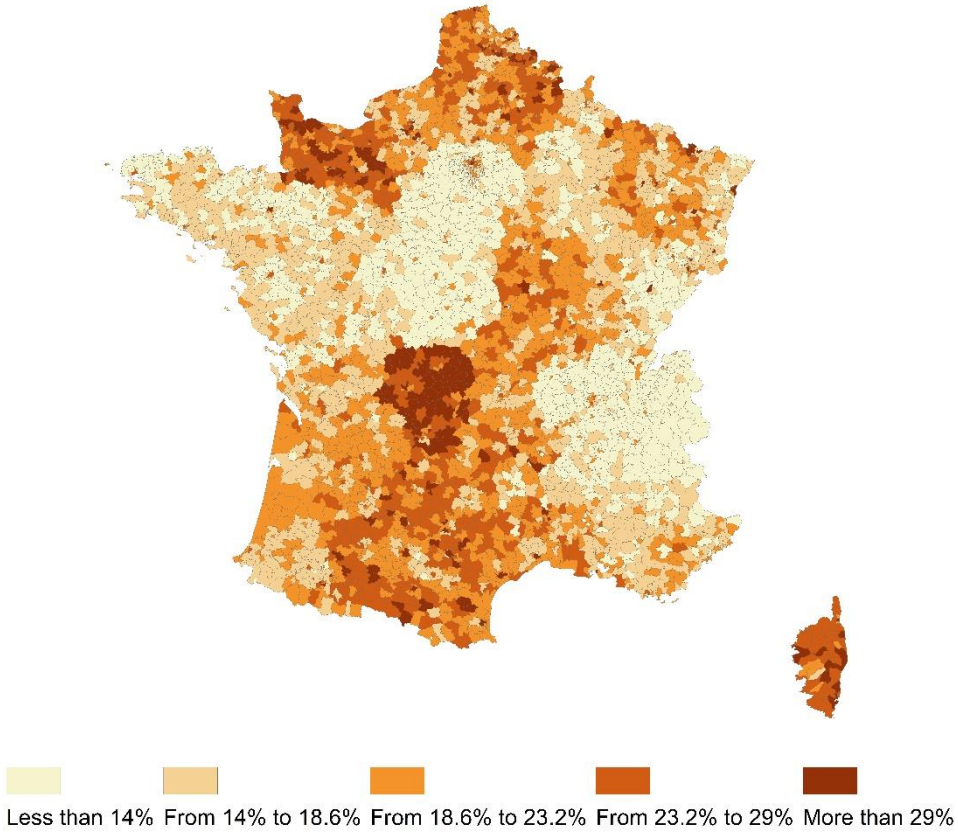
ANNEX B

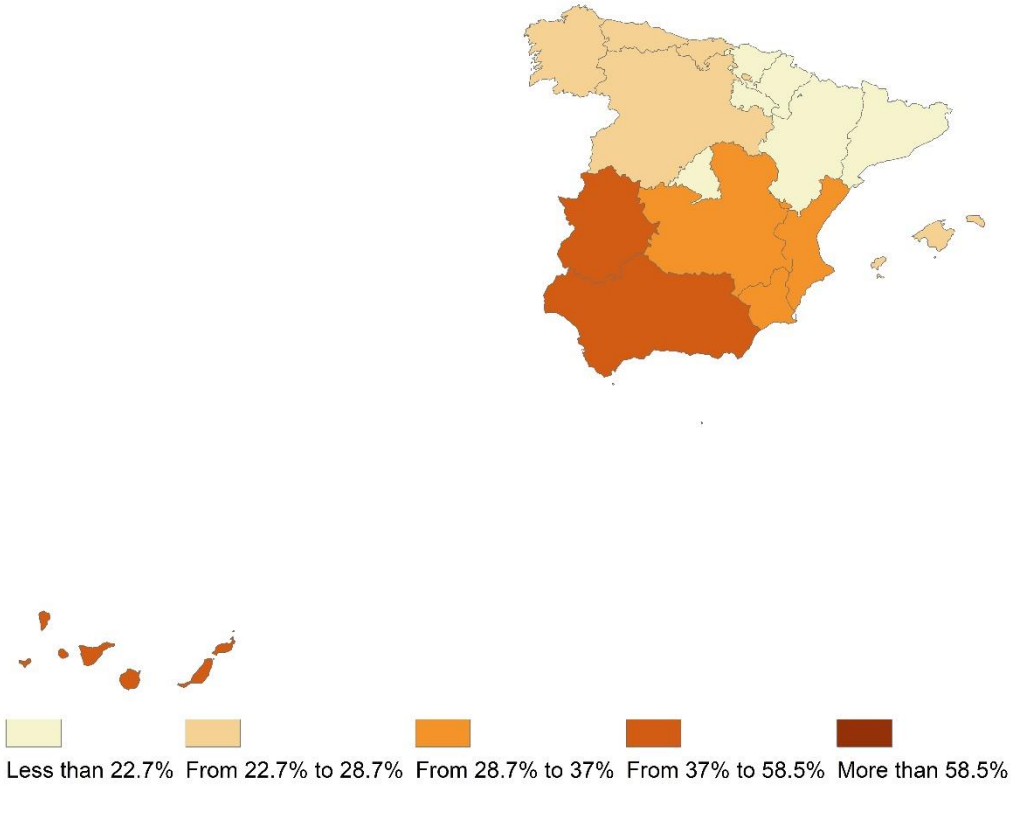
All figures represent the AROPE indicator provided by EU-SILC (national or regional level) and the estimated figures by the IMAJINE Project (Jenks Natural Breaks)

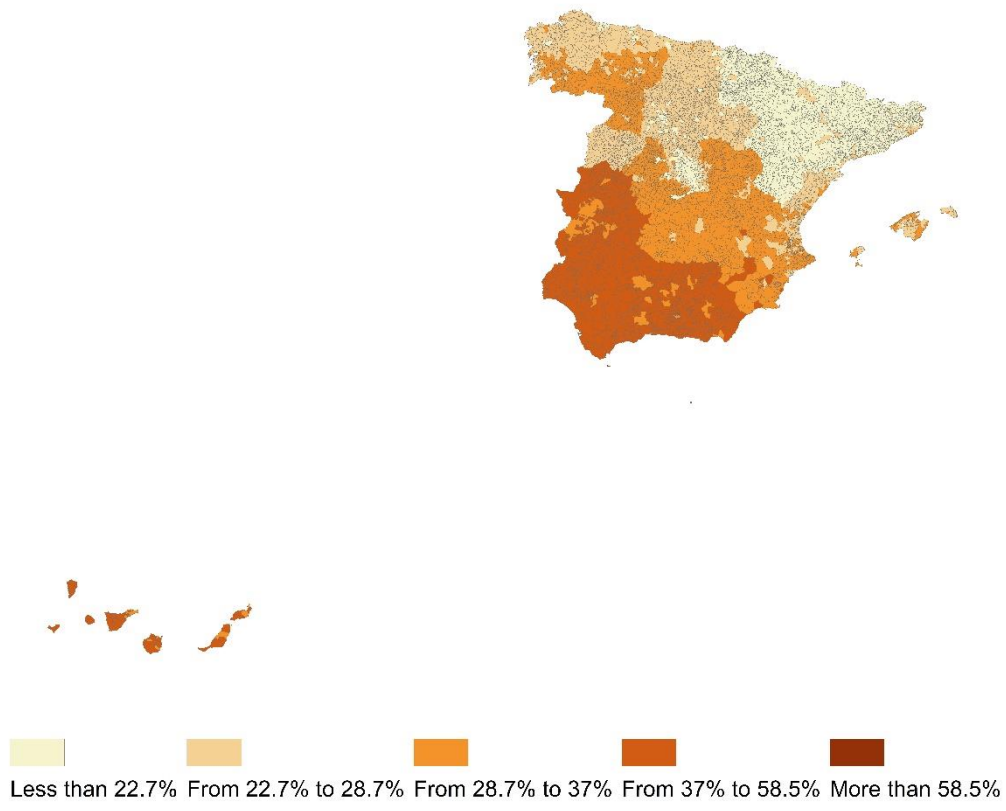




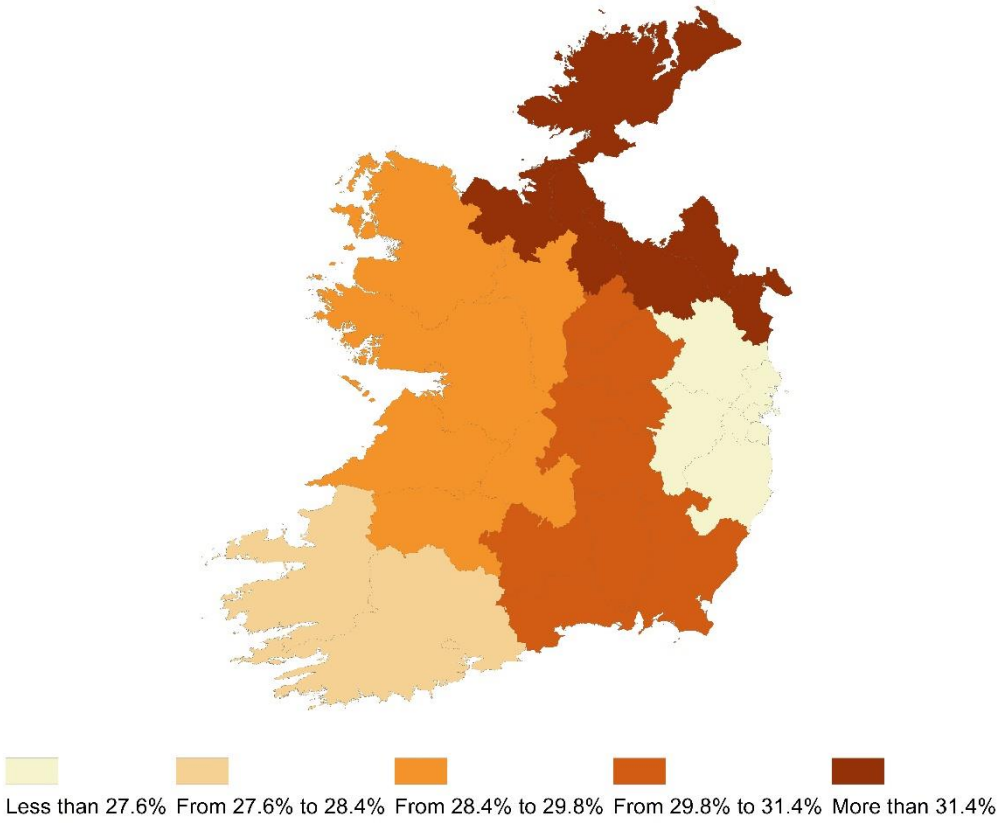

Less than 14%
From 14% to 18.6%
From 28.6% to 23.2%
From 23.2% to 29%
More than 29%

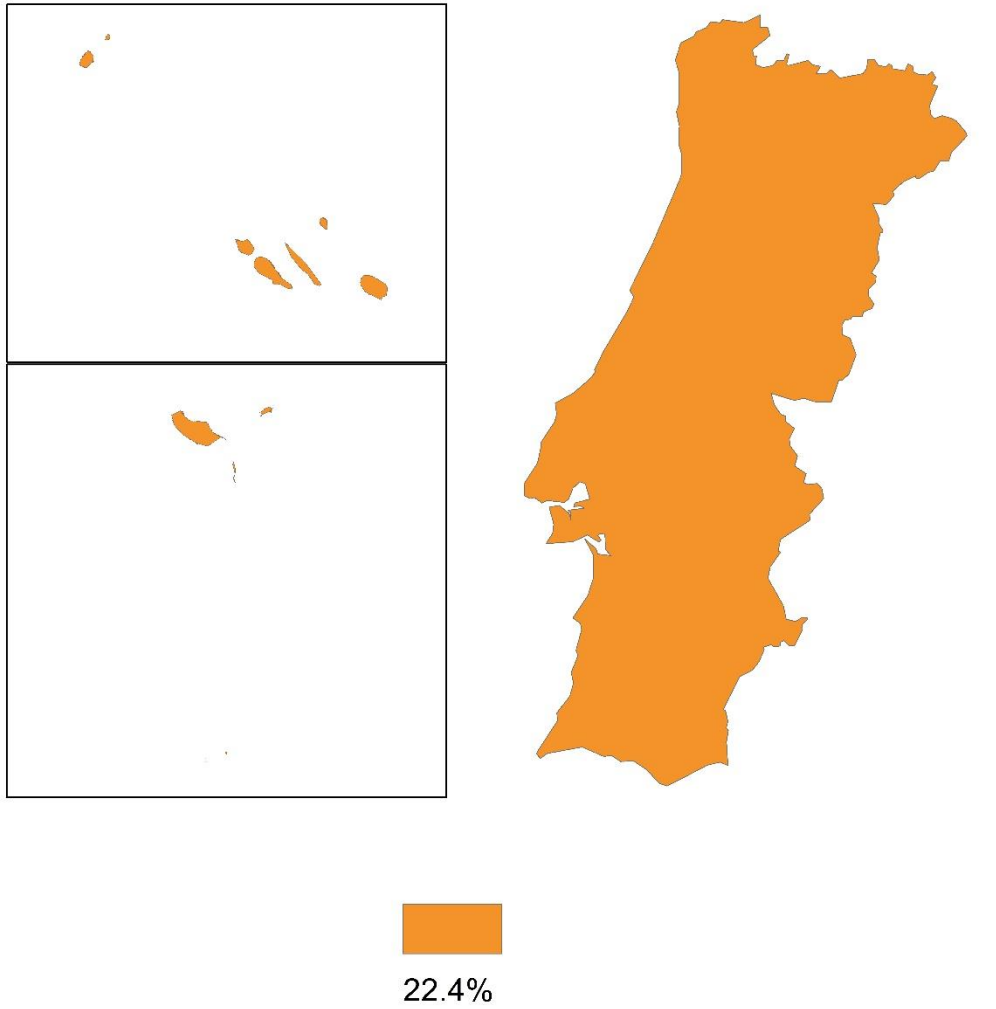

Less than 14%
From 14% to 18.6%
From 18.6% to 23.2%
From 23.2% to 29%
More than 29%

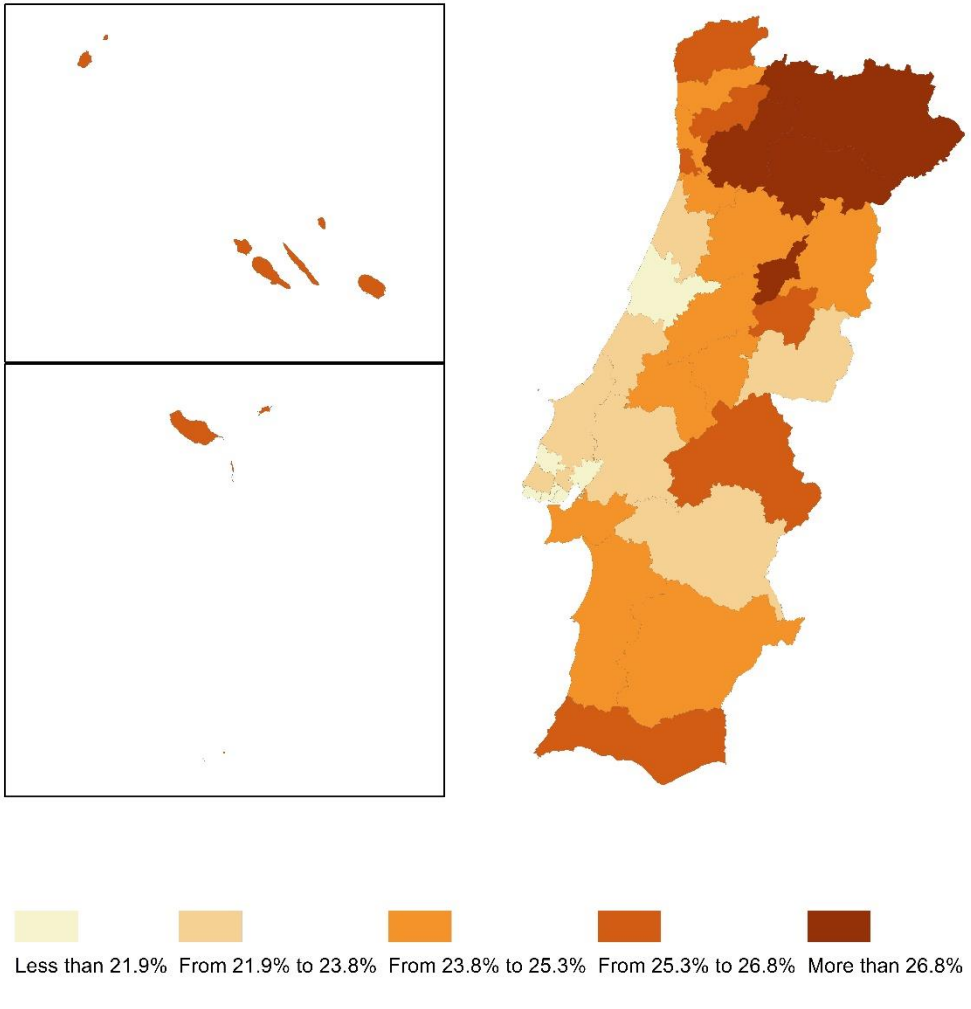

Less than 22.7%
From 22.7% to 28.7%
From 28.7% to 37%
From 37% to 58.5%
More than 58.5%

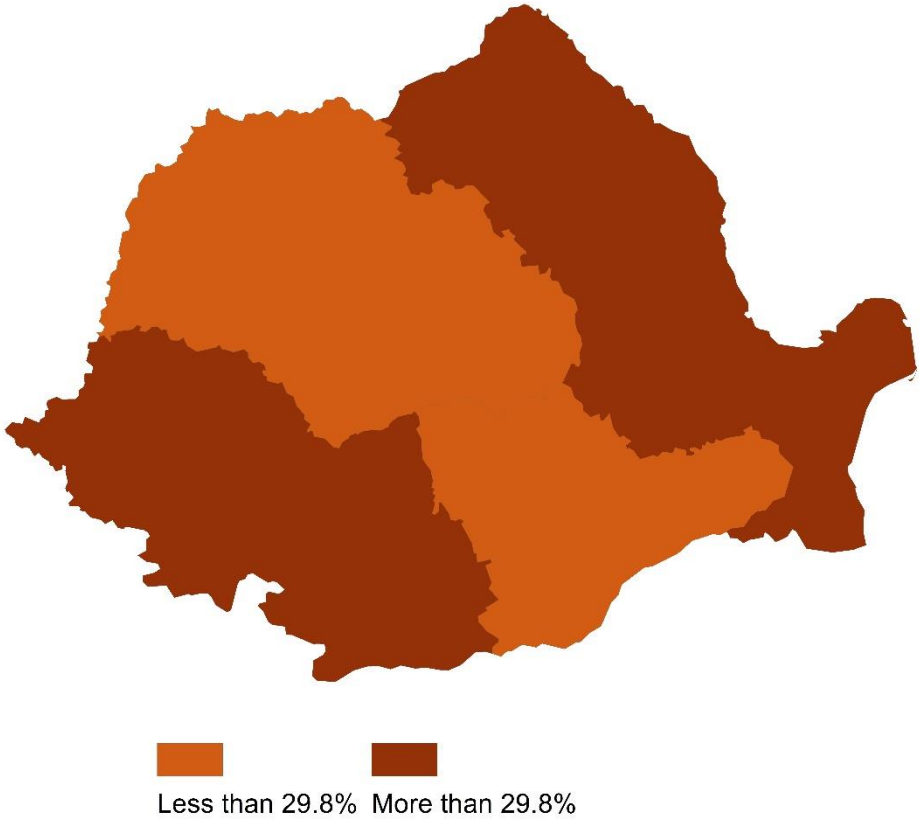

Less than 22.7%
From 22.7% to 28.7%
From 28.7% to 37%
From 37% to 58.5%
More than 58.5%

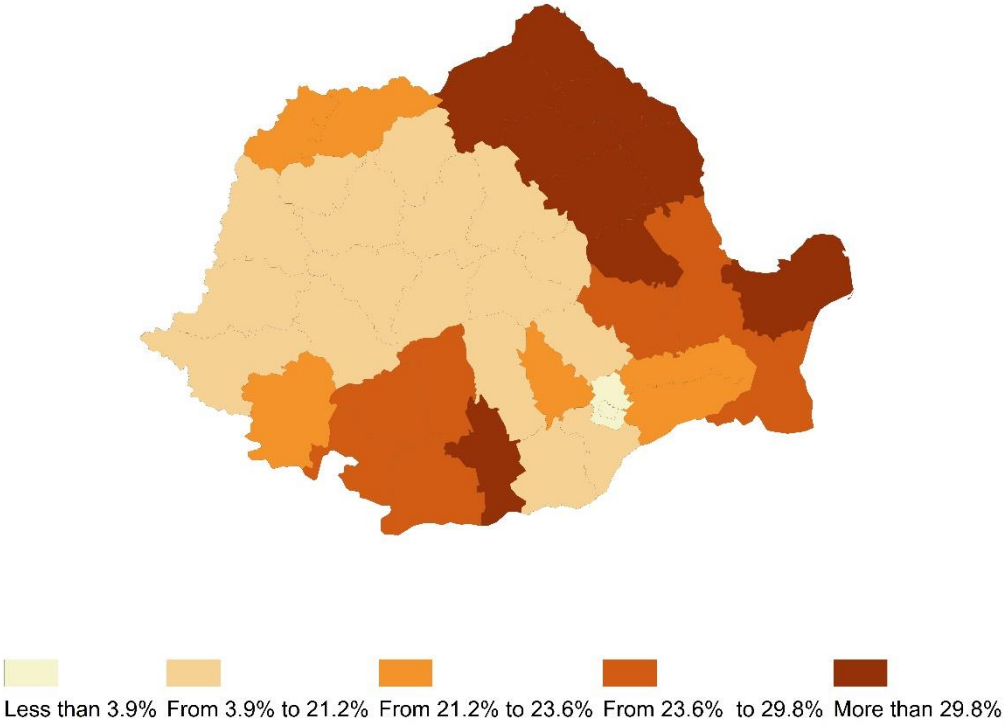

27%

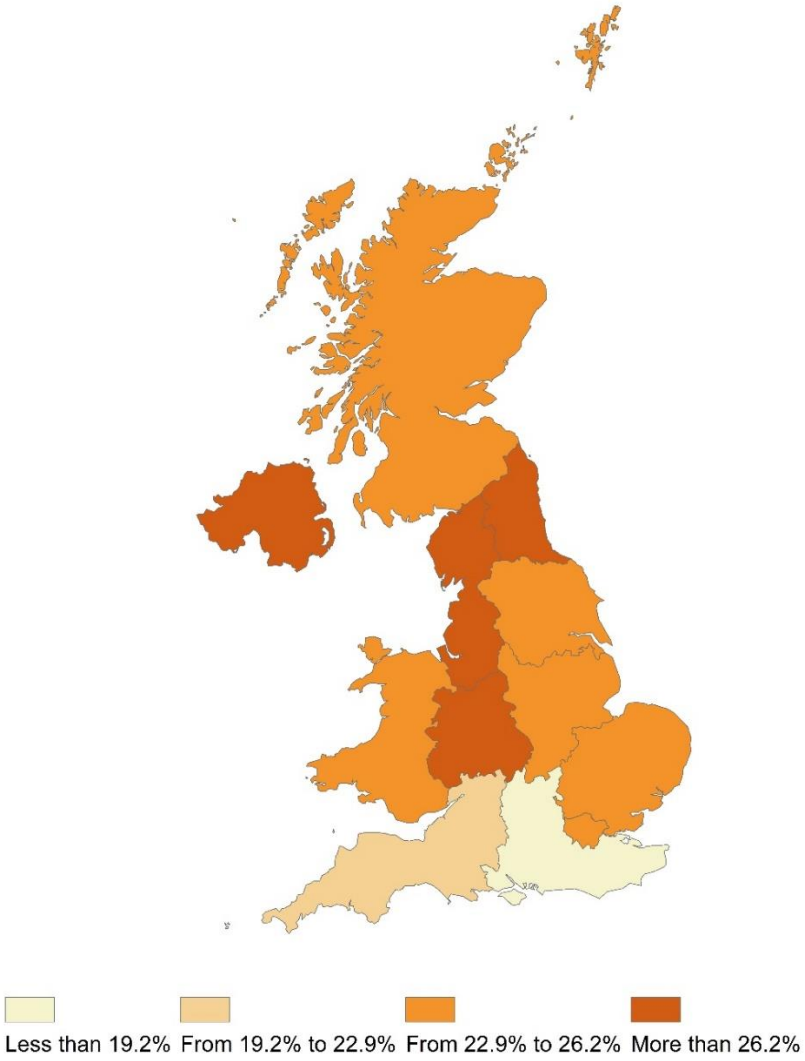

Less than 27.6%
From 27.6% to 28.4%
From 28.4% to 29.8%
From 29.8% to 31.4%
More than 31.4%

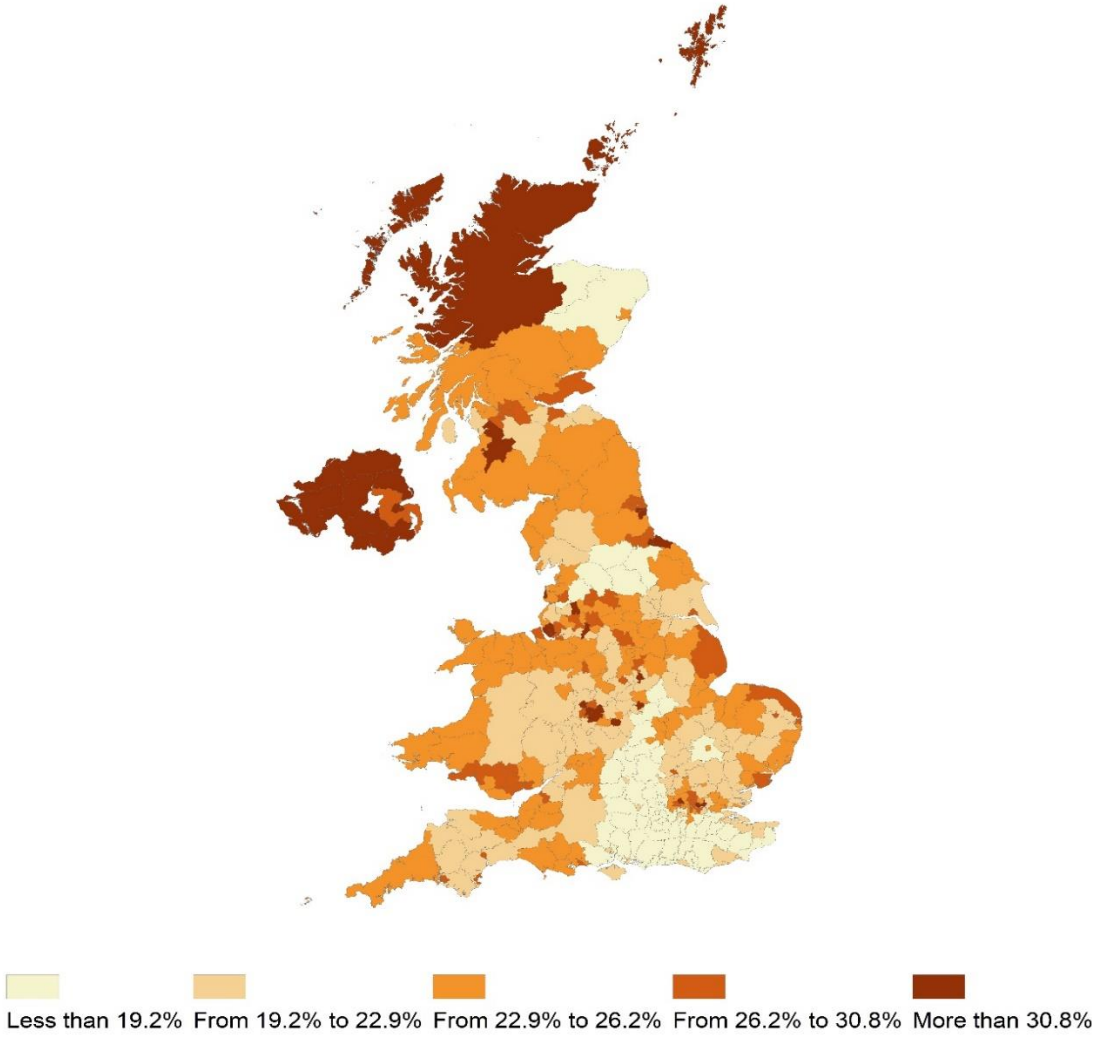

22.4%


Less than 21.9%
From 21.9% to 23.8%
From 23.8% to 25.3%
From 25.3% to 26.8%
More than 26.8%


Less than 29.8%
More than 29.8%


Less than 3.9%
From 3.9% to 21.2%
From 21.2% to 23.6%
From 23.6% to 29.8%
More than 29.8%


Less than 19.2%
From 19.2% to 22.9%
From 22.9% to 26.2%
More than 26.2%


Less than 19.2%
From 19.2% to 22.9%
From 22.9% to 26.2%
From 26.2% to 30.8%
More than 30.8%

[i] For a discussion on the inequality measures, see *Deliverable 2.1 Review of Official Data*

[ii] For few countries EU-SILC only provides information at NUTS1 regional level

[iii] Germany did not provide to EU-SILC information on the region of residence

[iv] For a comprehensive review of the inequality spatial decomposition methodology and summary of results for a number of countries, see Shorrocks and Wan (2005).

[v] The Theil index cannot be spatially decomposed for those countries where EU-SILC does not provide regional information (Croatia, Cyprus, Denmark, Estonia, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Slovenia and Switzerland)

[vi] As Shorrocks and Wan (2005) remark, the between-group component (*B*) tends to increase with the number of regions.

[vii] The link between inequality, economic growth and economic convergence will be analyzed in detail in *WP3 Economic Growth, Territorial Cohesion and Regional Autonomy*

[viii] Issues regarding the definition and measurement of income across countries and time, or the definition of a household, have been broadly discussed in Nolan *et al* (2011).

[ix] The *dynamics* of interregional income inequality and its determinants, i.e. the EU regional economic convergence/divergence processes will be dealt with in detail in *Economic Growth, Territorial Cohesion and Regional Autonomy*.

[x] The methodology applied to disaggregate regional income figures into local units is explained in detail in *Deliverable 2.2 Literature Review on Disaggregation Methodologies*

[xi] Due to strict output controls imposed by the ISTAT, there are no AROPE estimations for Italy. AROPE figures for Germany and Netherlands could not be estimated due to restrictions to the Microcensus Population restrictions for those countries.