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ORIGINAL ARTICLE

EU Cohesion Policy can't buy me love? Exploring the regional determinants of EU image

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Abstract

By investing in the development of European territories, EU Cohesion Policy can be expected to have a positive impact on the citizens' views on the European Union. Whether and how the policy actually affects what people think about the EU remains unclear. This paper explores a range of regional determinants of EU image, from socio-economic to territorial factors and the intensity of EU Cohesion Policy funding, based on the data available for 2008–2015 period. It finds a positive relation between the size of the regional European Structural and Investment Funds' allocation and less negative EU image, while highlighting how a declining regional economic situation fuels more negative views on the EU. It also reveals that lower level of education and higher migration have a strong influence on negative EU image, albeit only in some European regions.

KEYWORDS

cohesion policy, EU image, European structural and investment funds

JEL CLASSIFICATION

R; R00

1 | INTRODUCTION

The series of crises engulfing The European Union (EU) since the late 2000s, from the global economic crisis, the sovereign debt crisis in the Eurozone, the refugee crisis, to the rise of the anti-European populist movements, has dented the image of the EU among the European citizens (European Commission, 2018). In reaction to this erosion of the

EU's image, the discourse on EU Cohesion Policy, the community's main investment policy supporting place-based interventions to promote the development of regions and cities, has been changing. The justification of Cohesion Policy shifted from the need to reduce territorial disparities across the EU that undermine the operation of the Common Market and hinder economic growth and competitiveness in Europe, towards a discourse stressing how the policy contributes to improvement of daily lives of all EU citizens. In the aftermath of the Eastward enlargement of the EU, the then Commissioner for Regional Policy Danuta Hübner claimed that "cohesion policy aims to facilitate structural change throughout Europe, and to enable regions to respond more effectively to the opportunities generated by the world's largest single market" and called for all regions to "contribute to raising Europe's growth and competitiveness."[1] In the post-crisis context, the discourse has changed radically. In 2017 Commissioner for Regional Policy Corina Creţu argued that "cohesion policy is the most visible, the most tangible illustration of a caring Europe. It improves the daily lives of all citizens, wherever they live [...] Cohesion policy is the cement that holds Europe together, because it cares for individuals, because its aim is to improve everybody's life." [2] Reflecting that shift, the EU strives to make Cohesion Policy more visible to citizens. The underpinning goal behind this change is to counteract the declining support for European integration and undermine support for Eurosceptic parties and movements. Thus, in 2017 the Council of the EU adopted conclusions on "making Cohesion policy more effective, relevant and visible to our citizens,"[3] while the European Parliament argued in favour of improving the visibility of Cohesion Policy "to fight against Euroscepticism" and "contribute to regaining citizens' confidence and trust."[4]

Cohesion Policy represents a third of the EU's budget and has been channelling investment in regional and urban development for more than three decades. The policy clearly has the potential to create jobs, to enhance the infrastructure, to support regeneration of urban areas, or to better the quality of life of the citizens of the recipient territories. The citizens are reminded of this by the banners with EU flags and acknowledgement of EU funding adorning the site of every investment supported by European Structural and Investment Funds (ESIF). However, the impact of Cohesion Policy on the citizens' views of the EU remains unclear and contested. Duch and Taylor (1997) argued that regional funding did not translate into increased support for European integration, with the poorer regions receiving more funding staying less "euro-enthusiastic." That said, other studies pointed to positive effects of Cohesion Policy spending funds on public support for the EU, however, these were mediated by the degree of awareness of the EU funding, which in turn was related to the level of education (Osterloh, 2011). Whereas others found no direct link between the size of European Regional Development Fund allocation and EU support, and that the effect of this funding was at best conditional upon pre-existing views on the EU and education levels (Chalmers & Dellmuth, 2015). Against this background, there is a need for further investigation of the relations between Cohesion Policy and the perceptions of the EU.

Cohesion Policy offers support for regional development and is to a large extent managed and implemented at the regional level, with varying sizes of allocation, governance approaches, thematic focus of spending, absorption rates and effectiveness of interventions. Consequently, one can expect that impacts of Cohesion Policy on the citizen's views on the EU vary considerably across European regions. Moreover, a range of regional characteristics, from socio-economic variables (that have changed sometimes dramatically in the post-crisis context) to territorial and governance features of regions may also important factors shaping the citizens' views on the EU. This calls for a clearer understanding of the regional drivers of the citizens' EU image, especially since most studies on that topic to date focus on the national level.

Against this background, and building on the research conducted as part of the Horizon 2020 COHESIFY project (COHESIFY-Understanding the Impact of EU Cohesion Policy on European Identification) project,[5] this paper answers

[1]Commissioner Danuta Hübner's speech in European Parliament, Brussels, 15 February 2005: http://europa.eu/rapid/press-release_SPEECH-05-95_en.htm

[2]Commissioner Corina Creţu's speech in Molenbeek, Belgium, 6 June 2017: https://ec.europa.eu/commission/commissioners/2014-2019/cretu/announcements/speech-commissioner-cretu-molenbeek_en

[3]"Making Cohesion Policy more effective, relevant and visible to our citizens", 8463/17, adopted by the Council of the EU on 25 May 2017.

[4]"Report on Building Blocks for a Post-2020 EU Cohesion Policy", 2016/2326(INI), European Parliament, 24 May 2017.

[5]The COHESIFY project investigated how Cohesion Policy affects EU identification at the regional scale. For more information see www.cohesify.eu.

the following research questions. What factors shape positive EU image among the citizens across the European regions? Do such factors vary across the different regions? And, critically, is EU Cohesion Policy an important determinant of EU image? In other words, can 'EU money' buy 'EU love'?

The remainder of the paper is divided into five sections. The next one outlines the theoretical background for the research and formulates hypotheses. Section 3 explains the methodology used. Section 4 presents the results. Section 5 discusses them. The paper closes with a concluding section, summing up the study's findings and outlining policy implications and avenues for further research.

2 | THEORETICAL BACKGROUND AND HYPOTHESES

The literature investigating EU identification (for a review see Mendez & Bachtler, 2016) tends to consider three dimensions of this phenomenon. The cognitive dimension refers to the perception of oneself as European. The affective dimension corresponds to the "we-feeling" or feelings of belonging to a (European) community. The evaluative aspect, based on economic utilitarian theory, refers to support based on the perceived individual benefits stemming from European integration (see Gabel & Palmer, 1995; Verhaegen, Hooghe, & Quintelier, 2014). In this study, our focus is on the evaluative dimension related to utilitarian theory, because we expected it to be the most relevant for understanding the impacts of Cohesion Policy, supporting regional growth and development, on the ways in which the citizens view the EU.

There is an extensive literature on the factors that may shape the citizens' perceptions of the EU, many of these, in fact, related to the costs and benefits associated with European integration. Thus, the winners of this process are more likely to view the EU in a positive light than those who lose out from this process (Bellucci, Sanders, & Serricchio, 2012; Fligstein, 2008, 2009). Therefore, research covering the period of the late 1990s, when Cohesion spending was increasing, indicated a positive impact of Structural Funds on the positive perceptions of the EU (Brinegar, Jolly, & Kitschelt, 2004; Osterloh, 2011), particularly among the direct recipients of funding. An increase of *per capita* transfer from the EU to a region by 100 euro is said to boost the likelihood of one being positive about the EU by approximately 5 to 15% (Osterloh, 2011). However, other studies found no evidence that higher amounts of Cohesion Policy funding received by a given country would be related to more or less support for European integration (Verhaegen et al., 2014). More recent work offered an even more nuanced perspective indicating that the local policy context matters for the appreciation of Cohesion Policy and that the citizens tend to be satisfied with Cohesion Policy (which may in turn result in more satisfaction with the EU) only when the funding is used to satisfy the individuals' perceived needs (as opposed to objective needs of their regions) (Capello & Perucca, 2018, 2019). Others argued that Cohesion Policy does contribute to building EU identity in regions as long as their citizens are aware of it (Borz, Brandenburg, & Mendez, 2018). Notwithstanding, one may formulate the following hypothesis:

> **Hypothesis 1** Inhabitants of regions receiving higher amounts of funding as part of Cohesion policy are more positively inclined towards the EU.

Moreover, literature on "cognitive mobilization" suggests that socio-demographic characteristics also may play a role in determining the citizens perceptions of the EU. Among those, education is one of the most prominent determinants of attitudes *vis-à-vis* the EU (e.g., Hakhverdian, Van Elsas, Van der Brug, & Kuhn, 2013). These findings seem to be related to those from studies on the Structural Funds impacts indicating that awareness of EU funding is related to socio-economic background and translated into support for the EU (Osterloh, 2011); and that education level plays a mediating role in the effect of EU transfers on the perceptions of the European integration project (Chalmers & Dellmuth, 2015). Thus, one can advance the following two additional hypotheses to socio-economic variables. Perceptions of the EU are likely to be less positive in:

Hypothesis 2 Regions with less favourable economic situation (though these are the poorer regions that receive more EU funding).

Hypothesis 3 Regions with lower level of education (making awareness of EU Cohesion policy less likely).

Moreover, in the wake of the refugees crisis affecting the EU and the rise of Euroscepticism fuelled by anti-immigration discourse one can also expect that immigration rates also matter for the citizens' perceptions of the EU. Indeed, recent research showed that inflows of migrants have reinforced anti-EU attitudes at the local level, explaining the predominance of "leave" vote in those areas of the United Kingdom in the 2016 referendum on Brexit (Goodwin & Milazzo, 2017). Hence, one may advance a hypothesis that:

Hypothesis 4 Regions with higher immigration rate inhabitants are more negative about the EU

Last but not least, there is an emerging literature linking the surge in Eurosceptic and populist attitudes and voting to resentment about one's place being left behind in a context of growing economic polarization across territories and policy focus on investment in places that already are "winners" of globalization processes (Dijkstra, Poelman, & Rodríguez-Pose, 2018; Rodríguez-Pose, 2018). These often peripheral, de-industrializing, rural and/or shrinking regions tend to witness a rise in populist vote and anti-EU sentiment. Thus, one may hypothesize that:

Hypothesis 5 Citizens in peripheral and shrinking regions would tend to have more negative image of the EU.

3 | DATA

3.1 | Dependent variable and case study

The dependent variable of this study is percentage of residents with negative image of EU in 2015. The spatial units of the study are the so-called NUTS (Nomenclature of Territorial Units for Statistics) regions. The data is extracted from Eurobarometer 84.4 survey in 2015 (European Commission, 2017). Specifically, we considered answers to the following question on EU image: "in general, does the EU conjure up for you a very positive, fairly positive, neutral, fairly negative or very negative image?"

In total 182 NUTS regions are included in the study, from which 149 regions are at NUTS 2 level of scale, and 33 are at NUTS 1 level of scale. The reason for use of two levels of scales is that the Eurobarometer survey in Germany, UK and Italy is only conducted at NUTS 1 level, unlike NUTS 2 in most other countries. The study area is limited to the regions for which the data on socio-economic between 2008 and 2015 were available. The sample for this study, hence, covers most of the regions of the EU member states, except some of the Greek regions, Slovenian regions and La Rioja in Spain (see Figure 1).

3.2 | Independent variables

This study is conducted on twenty independent variables (Table 1). Four of the variables represent the age groups and the level of educations of the citizens in 2015. Age dependency is the ratio of the number of citizens younger than 19 years old or older than 60 years old to that of the citizens between 20 and 59 years old. Old dependency is the ratio of the number of citizens older than 60 years old to the number of citizens aged between 12 and 59. Two variables reflect the level of education of the citizens aged 25–64 in the NUTS regions: percentage of citizens with education level of 0–2 (pre-primary, primary and lower secondary education); percentage of citizens with 5–8 level of education (tertiary education).

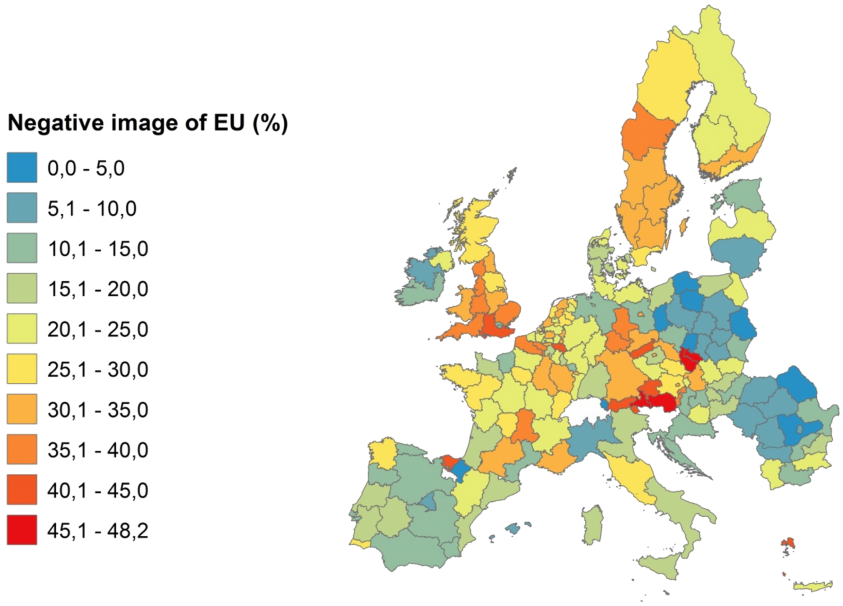

FIGURE 1 percentage of residents with negative image of EU (dependent variable of this study)
Source: Authors on the basis of Eurobarometer data.

Sixteen of the variables show the status of the certain socio-economic characteristics in 2015, as well as the changes in those characteristics between 2008 and 2015. This period was chosen mainly because during those years the EU was engulfed in economic crisis and gradually emerged out of it, but also because it corresponds roughly to an entire period during which ESIF were distributed (programming period 2007–2013). Net migration shows the increase, or decrease, in population. The value is expressed as change in 1,000 persons. The change does not include the natural change of population, namely, birth and mortality. Population change shows the growth of population between 2008 and 2015, which is due to births, mortality and migration. Population density shows the number of citizens per square kilometre of the region in question. Purchasing power standard (PPS) is a virtual currency which measures economic affluence of citizens. Theoretically, with one unit of PPS, one can buy the same amount of goods or services across all regions of EU. PPS, in other words, reflects the purchasing power of citizens while the regional variation in price of goods and services is taken into account. Eight variables relate to employment: they show the percentage of overall unemployment, employment of the labour forces from the respecting country with different education levels in 2015, as well as the changes of the variables in the period of 2008–2015. Finally, two variables, labelled as EU Cohesion Policy funds, show the total *per capita* annual payments of EU to the regions in 2008 and 2015.

The data on the cohesion funds are extracted from European commission's portal on ESIF (European Commission, 2019). The socio-economic data are extracted from Eurostat's data on the EU regions (Eurostat, 2019a), and the definitions of variables are taken from the portal of Eurostat—Statistics Explained (Eurostat, 2019b).

3.3 | Factor analysis of the independent variables

As there is high level of multicollinearity between the 20 independent variables, to avoid the potential biases, factor analysis, with extraction method of principal component analysis and rotation method of oblimin with Kaiser normalization, is employed. As a result, the variables with inter-correlated effects are compressed into five factors, which explain 77% of the variation of the 20 independent variables (Table 2).

TABLE 1 Descriptive statistics of the independent variables

Variable	Minimum	Maximum	Mean	SD
Age dependency ratio (2015)	0.64	1.12	0.86	0.10
Old dependency ratio (2015)	0.26	0.68	0.47	0.08
Education Level 0–2% (2015)	3.30	61.50	21.66	12.11
Education Level 5–8% (2015)	11.60	55	30	8.82
Net migration (2015)	−0.92	2.24	0.32	0.59
Average annual change of net migration % (2008–2015)	−0.96	1.81	0.20	0.39
Population density (2015)	3.40	7408.00	341.96	841.43
Average annual change of population % (2008–2015)	−1.76	2.19	0.16	0.65
Purchasing power standard, PPS, in euro (2015)	8400	77400	27258	10737
Average annual change of PPS % (2008–2015)	−2.80	8.79	1.87	1.72
Unemployment % (2015)	2.80	31.60	9.25	5.29
Average annual change of unemployment % (2008–2015)	−7.31	43.63	6.01	8.42
Average annual change of employment for workforces with education Level 0–2 from respecting country % (2008–2015)	−4.90	9.27	−1.05	1.97
Employment ratio of workforces with education Level 0–2 from respecting country % (2015)	15.70	65.40	40.55	11.96
Average annual change of employment for workforces with education Level 3–4 from respecting country % (2008–2015)	−3.25	2.48	−0.36	1.03
Employment ratio of workforces with education Level 3–4 from respecting country % (2015)	46.60	84.40	68.99	8.14
Average annual change of employment for workforces with education Level 5–8 from respecting country % (2008–2015)	−2.47	1.27	−0.14	0.58
Employment ratio of workforces with education Level 5–8 from respecting country % (2015)	65.40	92.50	83.52	4.69
EU Cohesion Policy funds *per capita* in euro (2008)	6.56	594.35	99.47	91.58
EU Cohesion Policy funds *per capita* in euro (2015)	0.17	777.25	111.73	147.69

Source: Authors, on the basis of the Eurostat and European Commission's data.

The first factor, labelled as *FAC1 Economic growth*, is positively loaded onto average annual change of PPS % (2008–2015), Average annual change of employment for workforces with education Level 0–2, 3–4, and 5–8 from respecting country % (2008–2015), and employment ratio of workforces with education levels 3–4 from respective country % (2015). The factor is negatively loaded onto unemployment % (2015) and average annual change of unemployment % (2008–2015), and EU Cohesion Funds *per capita* in euro (2008). The second factor, labelled as *FAC2 Migration*, is positively loaded onto net migration (2015), average annual change of net migration % (2008–2015), average annual change of population % (2008–2015), and purchasing power standard, PPS, in euro (2015). *FAC3 Ruralilty and ageing population*, is positively loaded onto age dependency ratio (2015) and old dependency ratio (2015), and negatively onto population density (2015). *FAC4 EU Cohesion Policy funding* is positively loaded onto EU Cohesion Policy funds *per capita* in euro (2008) and EU Cohesion Policy funds *per capita* in euro (2015), and negatively onto education level 5–8% (2015). The fifth factor, labelled as *FAC5 Low level of education*, is positively load onto education levels 0–2% (2015) and employment ratio of workforces with education levels 0–2 from respecting country % (2015).

TABLE 2 Pattern matrix showing the loading of factors on independent variables

Variable	FAC1 Economic situation	FAC2 Migration and population growth	FAC3 Rurality and ageing population	FAC4 EU Cohesion Policy funding	FAC5 Low level of education
Age dependency ratio (2015)	−0.023	−0.011	**0.870**	−0.123	0.168
Old dependency ratio (2015)	0.006	−0.077	**0.928**	0.102	0.072
Education Level 0–2% (2015)	**−0.614**	−0.053	−0.089	0.214	**0.613**
Education Level 5–8% (2015)	0.008	0.411	−0.076	**−0.760**	0.018
Net migration (2015)	0.473	**0.733**	0.161	−0.020	0.070
Average annual change of net migration % (2008–2015)	0.093	**0.925**	0.008	−0.022	0.052
Population density (2015)	−0.098	0.466	**−0.508**	−0.065	0.033
Average annual change of population % (2008–2015)	−0.156	**0.789**	−0.208	−0.296	0.042
Purchasing power standard. PPS, in euro (2015)	0.237	**0.651**	−0.171	−0.439	0.176
Average annual change of PPS % (2008–2015)	**0.743**	−0.184	−0.226	0.025	−0.355
Unemployment % (2015)	**−0.905**	−0.114	−0.113	0.106	0.040
Average annual change of unemployment % (2008–2015)	**−0.772**	−0.097	0.076	−0.166	0.214
Average annual change of employment for workforces with education Level 0–2 from respecting country % (2008–2015)	**0.525**	−0.141	−0.324	0.409	0.184
Employment ratio of workforces with education Level 0–2 from respecting country % (2015)	0.007	0.183	0.193	−0.154	**0.899**
Average annual change of employment for workforces with education Level 3–4 from respecting country % (2008–2015)	**0.852**	0.034	0.013	0.385	−0.020
Employment ratio of workforces with education Level 3–4 from respecting country % (2015)	**0.801**	0.230	0.247	−0.071	0.186
Average annual change of employment for workforces with education Level 5–8 from respecting country % (2008–2015)	**0.843**	0.040	−0.008	−0.164	−0.005
Employment ratio of workforces with education Level 5–8 from respecting country % (2015)	**0.862**	0.103	0.024	−0.295	0.153
EU Cohesion Funds *per capita* in euro (2008)	**−0.646**	−0.040	0.063	**0.546**	−0.077
EU Cohesion Funds *per capita* in euro (2015)	−0.128	−0.109	−0.169	**0.630**	−0.557

Notes: Coefficients with value greater than 0.500 are marked bold and underlined. Those with confident value smaller than −0.0500 are marked boldSource: Authors, on the basis of the Eurostat and European Commission's data.

4 | METHODOLOGY

The methodology of this study is based on application of linear regression models with geographical weight. The choice of methodology is dictated by the nature of data available to this study. The dependent and independent variables of this study are the aggregated values for geographic units, NUTS regions. Application of an ordinary linear regression model, in this respect, could possibly result in spatially concentrated residual values, and thus not being trustworthy. By application of geographically weighted regression models, in contrast, such a problem could be tackled, as such models allow for introduction of different coefficient values for different locations and thus avoid the spatially concentrated residual. The latter models, additionally, could provide an insight on location-specific determinants of negative image on EU, which could not be gained otherwise. The geographically weighted models, due to such advantages, have been previously used by a variety of researchers in studies across various disciplines and research topics from criminology (Stein, Conley, & Davis, 2016), poverty (Vaziri, Acheampong, Downs, & Majid, 2018), prenatal care (Shoff, Yang, & Matthews, 2012) to household gas and electricity consumption as well as energy poverty (Mashhoodi et al., 2019a, 2019b), and real estate (Geniaux & Napoléone, 2008).

The methodology consisted of two steps. The first step of the analysis aimed at identifying the independent factors with spatially variant effect, labelled as regional-scale determinants, and the factors with spatial invariant effect, labelled as EU-scale determinants, and to measure the level of multicollinearity between the independent factors. To do so, first, an ordinary least square regression model (OLS) was developed. The model assumed that all the independent factors are continental-scale determinants. The results of the OLS model were mainly used to test the level of multicollinearity between the independent factors. Subsequently a geographically weighted regression model (GWR) was developed. The GWR model assumed that all the independent factors are regional-scale determinants. The GWR model is also used for carrying out the geographical variability test, which identifies the regional-scale and EU-scale factors. The formulation of the OLS model was as follows Equation (1):

$$y_i = \beta_0 + \sum_k \beta_k x_{ik} + \varepsilon_i, \tag{1}$$

where y_i is the estimated percentage of negative image of EU in the region *i*, β_0 is the intercept of the model, and β_k shows the standardized coefficient of the *k*th independent factor. x_{ik} and ε_i represent the values of the *k*th independent factor and error term in region *i*. Subsequently, a GWR model of the negative image of EU is developed Equation (2):

$$y_i = \beta_0(\mu_i, v_i) + \sum_k \beta_k(\mu_i, v_i) x_{ik} + \varepsilon_i, \tag{2}$$

where (μ_i, v_i) is the geographic coordination of the centroid of the region *i*. $\beta_k(\mu_i, v_i)$ and $\beta_0(\mu_i, v_i)$ are the estimated standardized coefficient of the kth independent factor and intercept value specific to region *i*. The regional standardized coefficients are calculated on the basis of the Equation (3):

$$\hat{\beta}(\mu, \vartheta) = \left(X^T W(\mu, \vartheta) X\right)^{-1} X^T W(\mu, \vartheta) y, \tag{3}$$

where $\hat{\beta}(\mu, \vartheta)$ is the unbiased estimate of the regional standardized coefficient, and $W(\mu, \vartheta)$ is an adaptive bisquare spatial weight matrix Equation (4):

$$W_{ij} = \begin{cases} \left(1 - \frac{{d_{ij}}^2}{\theta}\right)^2, \text{ if } d_{ij} < \theta \\ 0, \text{ otherwise} \end{cases}, \tag{4}$$

W_{ij} is the value of the spatial weight matrix which reckons the impact of neighbouring region *j* on the region in

question, *i*. d_{ij} is the geodesic distance between the centroids of region *i* and that of region *j*. θ is the bandwidth size, namely, the number of closest regions of the region *i* which are taken into consideration. The optimal value of θ is calculated in a manner that the value of the corrected Akaike information criterion (AIC) of the GWR model is minimized.

The results of the GWR model are used to identify regional-scale and EU-scale determinants of negative image of EU. Employing geographical variability test of GWR 4.0 tool is employed (developed by Nakaya, Fotheringham, Charlton, & Brunsdon, 2009), the performance of multiple GWR models are compared. In order to assess whether the *k*th independent factor is a regional-scale determinant or an EU-scale determinant, two GWR models are developed: first, a model that holds all the variables as spatially-variant factors and only the kth independent factors as a spatially-invariant factor; second, a model that holds all the independent factors, among them the *k*th factor, as spatially-variant factors. Should the AIC of the first model be lower than that of the second model, identified by a positive value of *DIFF of Criterion*, it is concluded that the *k*th independent factor is a continental-scale determinant. Should the value of *DIFF of Criterion* be negative, it is concluded that the *k*th factor is a regional-scale determinant. Subsequently, in the second step of the analysis, a semi-parametric geographically weighted model (SGWR) is developed. The model simultaneously estimates the impact of regional-scale and EU-scale determinants. The formulation of the SGWR model is as follows Equation (5):

$$y_i = \beta_0(\mu_i, v_i) + \sum_m \beta_m(\mu_i, v_i)x_{im} + \sum_n \gamma_n z_{ni} + \varepsilon_i, \tag{5}$$

where $\beta_m(\mu_i, v_i)$ denotes the estimated standardized coefficient of the *m*th regional-scale determinant of negative image of EU at region *i*, and γ_n denotes that of the *n*th EU-scale determinant. Similar to the GWR model, an adaptive bisquare spatial weight matrix with a bandwidth size which minimizes AICc is used. Ultimately, the performance of OLS, GWR and SGWR models are compared based on four measurements of the models' performance: adjusted R2, AICc; cross-validation (CV); spatial distribution of the residual values tested by means of Moran's Index. Accordingly, the best model for the analysis is selected.

5 | RESULTS

5.1 | Identification of EU-scale and regional-scale determinants

In the first step, an ordinary least square regression model (OLS) is employed. The model is based on the assumption that holds all the independent factors as EU-wide determinants. The results of the OLS model shows that the effect of only two factors are significant (p-value < 0.01): *FAC2 Migration and population growth* and *FAC4 EU Cohesion Policy funding*. The important finding of the OLS model is that the Variance of Inflation Factor (VIF) is equal to 1.0. That implies that the factors are totally independent from one another (Table 3).

Subsequently, a geographically weighted regression model (GWR) is employed. The bandwidth of the model is 135 NUTS regions, the bandwidth at which the AICc is minimized. The basic assumption of the GWR model is that all the effects are regional-scale determinants of negative image of EU. The geographical variability test, associated with the GWR model, is used to further identify the EU-scale and regional-scale determinants (Table 3). The EU-scale determinants, indicated by positive values of the DIFF of Criterion of the geographical variation test, are:

1. *FAC1 Economic situation*;
2. *FAC3 Rurality and ageing population*;
3. *FAC4 EU Cohesion Policy funding*.

TABLE 3 Estimates of OLS and GWR models, and identification of EU-wide and regional effects by the geographical variability test

	OLS results		GWR results				Geographical variability test	
Variable	β	VIF	β mean	β min	β max	β SD	DIFF of Criterion	Type of spatial variation
Intercept	0.047**		0.146	−0.154	0.304	0.111	−0.82	heterogonous (regional scale)
FAC1 Economic situation	−0.007	1.00	−0.106	−0.382	0.212	0.180	1.71	homogenous (EU effect)
FAC2 Migration and population growth	0.288**	1.00	0.176	−0.047	0.416	0.162	−2.20	heterogonous (regional scale)
FAC3 Rurality and ageing population	0.088	1.00	−0.079	−0.259	0.174	0.124	1.44	homogenous (EU effect)
Fac4 EU Cohesion Policy funding	−0.258**	1.00	−0.199	−0.294	−0.068	0.057	2.59	homogenous (EU effect)
FAC5 Lower level of education	−0.019	1.00	0.098	−0.298	0.365	0.183	−8.90	heterogonous (regional scale)
R-square	0.452		0.393					
Adjusted R-square	0.182		0.307					

Notes: β: standardized regression coefficient.

**p-value* < 0,05.

***p-value* < 0,01.

Source: Authors.

The results of the test identify two of the factors as regional-scale determinants, indicated by negative values of DIFF of criterion:

1. *FAC2 Migration and population growth*;
2. *FAC5 Lower level of education.*

These results are used to develop a semi-parametric geographically weighted regression (SGWR), which model both EU-wide and regional effects.

5.2 | Estimating the impact of EU-scale and regional-scale determinants of negative image of EU

In the second step, the results of the geographical variability test is used to develop a SGWR model which hold some of three of the factors as continental-scale determinants of the negative image of EU, and two of the factors as regional-scale determinants. A comparison between the performance of the SGWR model and GWR and OLS models, show that the former significantly outperform the other two models. In other words, distinguishing between the EU and regional-scale of the effects results in a better understanding of citizens' negative image of EU. The adjusted R-square of SGWR model is more than 45% (compared to 30% in the GWR model and 18% in the OLS model). AICc and

TABLE 4 Comparison between the performance of OLS, GWR and SGWR models

Method	OLS	GWR	SGWR
AIC	442.96	416.65	380.92
AICc	443.60	421.13	404.10
CV	0.6618	0.5826	0.5319
R-square	0.452	0.3930	0.605
Adjusted R-square	0.182	0.3070	0.457
Residuals Moran's *I*	−0.0555	−0.0352	0.0107
Bandwidth (number of regions)	NA	135	53

Source: Authors.

CV measurements reach to their lowest level in the SGWR model. Additionally, the spatial distribution of the residuals, measured by the Moran's *I*, is almost perfectly random, compared to those of the GWR and OLS model which are less randomly distributed (Table 4).

The estimates of the SGWR model show that the impact of two of the three EU-scale determinants are significant at the p-value < 0.05 level. The results show that higher values of *FAC1 Economic situation* and *FAC4 EU Cohesion Policy funding* are associated with lower share of population who has a negative image of EU, and such observation could be generalized across the all EU regions. The results indicate that no significant association between negative EU image and the level of *FAC3 Rurality and ageing population* could be drawn.

The impact of the two regional determinants of negative EU image, *FAC2 Migration and population growth* and *FAC5 Lower level of education*, is significant in less than half of the regions, 46% and 42% of the regions, at p-value < 0.05 level. Where the impact of these factors is significant, however, its magnitude is considerable. This is in contrary with the impact of two EU-scale determinants, *FAC1 Economic situation* and *Fac4 EU Cohesion Policy funding*, the effects of which could be generalized across all regions of EU, albeit their impact remains relatively modest in strength (Table 5).

TABLE 5 Estimates of SGWR model

	EU-scale determinants		Regional-scale determinants †				
	β	SE	% sig †	β mean ʸ	β min ʸ	β max ʸ	β SD ʸ
Intercept				0.140	−0.673	1.298	0.358
FAC1 Economic situation	−0.172*	0.071					
FAC2 Migration and population growth			46%	1.370	1.149	1.828	0.134
FAC3 Rurality and ageing population	−0.0511	0.082					
Fac4 EU Cohesion Policy funding	−0.196**	0.069					
FAC5 Lower level of education			42%	1.315	0.153	1.892	0.391
R-square	0.605						
Adjusted R-square	0.457						

β: standardized regression coefficient.

**p-value* < 0.05. ***p-value* < 0.01. †the regions in which the coefficient is significant at p-value = < 0.05 level.

ʸsummary statistics of the regions with significant coefficient at p-value = <0.05 level.
Source: Authors.

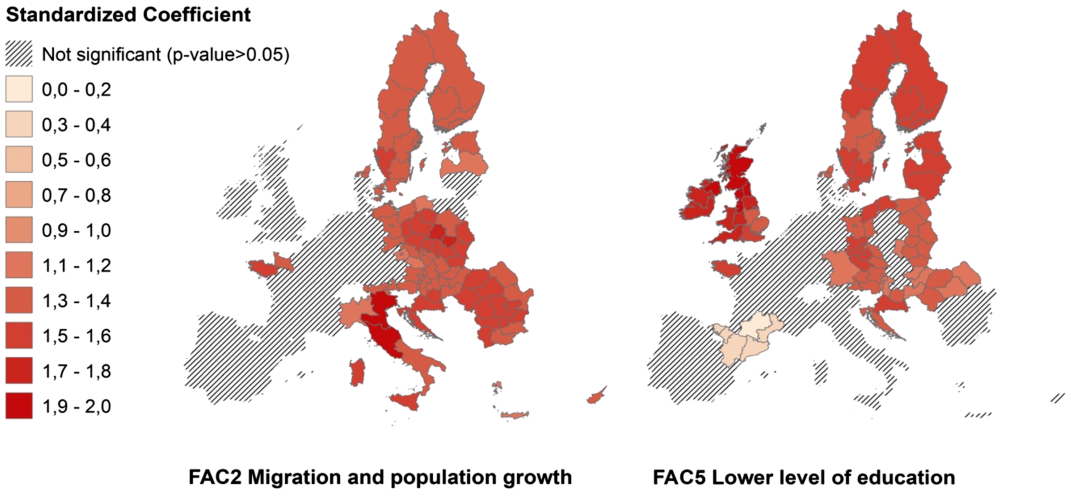

FIGURE 2 The regional variation of the association between EU scepticism and *FAC2 Migration and population growth* (left) and *FAC5 Lower level of education* (right)
Source: Authors.

The results show that, if significant, the estimated coefficients of the two regional-scale determinants are positively signed. In other words, in about the half of the regions *FAC2 Migration and population growth* and *FAC5 Lower level of education* are associated with boost of negative image of the EU. The spatial distribution of such regions shows that there are clear spatial patterns of the significant effect. *FAC2 Migration and population growth* has a significant impact on the EU scepticism in the regions that were gateways for the immigrants from the Middle East and North Africa, among them regions in Italy, Greece, Bulgariaand Hungary. The significant impact of the factor is also observed in the regions located at the Eastern boundaries of the EU, among them NUTS regions of Poland, Latvia and Estonia. The significant effect of *FAC2 Migration and population growth* is also observed in the Scandinavian regions of Finland and Sweden (Figure 2).

The spatial distribution of the regions significantly affected by *FAC5 Lower level of education* show that negative EU image in the United Kingdom and Ireland as well as in Sweden and Finland is strongly associated with the lower levels of education of citizens. The pattern is also significant in Northern and Eastern regions of Poland as well as some Slovakian, Hungarian and Romanian regions.

6 | DISCUSSION

Concerning the first and most important hypothesis of this study, about the positive relation between the amounts of funding as part of Cohesion Policy allocated to a region and more positive perceptions of the EU of that region's inhabitants (H1), our results confirm the hypothesis. Across all of the EU regions in our sample, larger allocation of ESIF was related with less negative image of the EU. That confirms, from a regional perspective, the findings from earlier studies indicating a positive relation between Cohesion Policy investment and support for the EU (Brinegar et al., 2004; Osterloh, 2011) and earlier research indicating that citizens of countries that benefit economically from European integration tend to be more positive about the EU (e.g., Anderson & Reichert, 1995). Further research, however, both through in-depth case studies and large-n statistical research, is necessary to understand better the relation between Cohesion Policy spending (and particularly the types of investment does Cohesion Policy predominantly support) and EU image.

The hypothesis according to which the citizens in economically struggling regions would be more inclined to have a negative EU image (H2), was also confirmed. Our analysis indicated that the citizens' EU image tended to be worse in regions with high unemployment, but also those where the economic situation worsened significantly as a result of the post-2008 economic crisis, with declining purchasing power of citizens and rising unemployment. This finding chimes with the insights from previous research on the surge of anti-EU sentiment in regions where economic situation worsens (thus not necessarily poor regions), where the citizens may be inclined to blame the EU for this negative turn of events and vote for anti-EU parties (Dijkstra et al., 2018), albeit our dependent variable was the negative image of the EU, rather than voting behaviour.

Hypothesis 3, according to which regions with lower education levels would display more negative EU image among the citizens was partly confirmed by our analysis. We found that low education levels are related to more negative EU image only in a part of European regions, however, the effect of this variable is strong. Again, this does resonate with previous research low educational educational attainment to Euroscepticism (e.g., Hakhverdian et al., 2013) or anti-EU voting (Dijkstra et al., 2018). However, the regional and spatial perspective that we adopted allowed for a more nuanced understanding of this relationship. We found that the education factor matters for negative EU image, but not always and not everywhere. Education was strongly related to EU image in three clusters of European regions. First, these are the Central, Eastern and South-Eastern regions, located in Eastern Germany, Austria, Poland, the Baltic States, Czech Republic, Slovakia, Hungary, Romania, but not in Bulgaria. The second cluster are the regions in Nordic countries, from Denmark, Sweden to Finland. Finally, low education was related to negative EU image also in the British and Irish regions as well as in Brittany in France. Only in those three clusters of regions low education of citizens appears to be related to the negative views on the EU that they hold, however, the reasons why this relationship occurs there and not in other regions (also within those clusters, e.g., low education does not seem to matter for negative EU image in some Polish or Czech regions) this seem complex and far from obvious, which calls for further investigation, ideally through case study research.

Another factor which mattered—the popular perception of which adds fuel to the anti-EU sentiment spreading across Europe—was migration. Our findings hence partly confirm the hypothesis (H4) that high net migration in a region would undermine positive EU image. Such as for education, the importance of the migration factor was only confirmed for some regions, which means that greater migration does not drive negative EU image in all regional contexts. This finding, however, contradicts those from previous research indicating that migration, in practice, mattered less for anti-EU attitudes (expressed at the ballot box) than the popular belief and the fierce xenophobic rhetoric of anti-EU parties would suggest (Dijkstra et al., 2018). Our findings indicate that while applying only to some regions, this relationship between migration and negative EU image, is strong. We notice that the migration factor relates to more negative EU image, in at least three clusters of regions. First of those is Scandinavia, where in the recent years we saw a rise of anti-immigrant rhetoric on the political stage. The second cluster of regions is in Central and Eastern Europe, where immigration tends to be a rare or a relatively recent (and often demonized) phenomenon, since these are regions from which typically people would emigrate to more prosperous places. One can distinguish, however, at least two distinct situations among this group of regions. First, there are places like the Polish regions, experiencing what one could call a "phantom pain" of migration, with a very small number of refugees incoming during Europe's recent migration crisis,[6] strong anti-migrant attitudes of the public, fired up by xenophobic rhetoric of the mainstream political parties (e.g., Krzyżanowski, 2018). Second, there are for instance Hungarian regions in that Central and Eastern European cluster, which also were exposed to the anti-immigrant populist rhetoric and actions (e.g., building of the border fence) by the central government, but have actually witnessed substantial refugee flows during the said migration crisis, even if most of the refugees transited only through these regions on the way to more welcoming and prosperous (e.g., German) regions. Finally, migration seemed to matter also in Greek[7] and Italian regions, being at the forefront of the refugee transit routes from Africa and Middle East.

[6]The massive inflow of Ukrainian migrants into Poland started from 2014, thus largely outside of our period of focus 2008–2015.

[7]One has to be cautious about interpreting the results for Greek regions given that we lacked data for most of them.

Finally, we tested the hypothesis that in peripheral and predominantly rural regions the citizens would tend to have more negative image of the EU =(H5). The hypothesis built on the findings from studies relating the surge in anti-EU populist voting to the frustration of inhabitants of peripheral and declining regions or "places that don't matter" (e.g., Rodríguez-Pose, 2018). While research on geographic determinants of anti-EU voting found that, somewhat surprisingly, citizens in peripheral and/or rural regions tended to vote predominantly for pro-EU parties, our results on the role of peripherality and rurality for negative EU image are inconclusive. There is no strong relationship between the variables relating to this factor (e.g., high old age dependency or low population density, as proxies for ageing population and low urbanity) and negative EU image. This issue thus requires further investigation and prompts question about whether the greater support for the EU in the periphery could be related to the fact that EU Cohesion Policy does support improvements in access to services and economic opportunities in such disadvantaged areas.

7 | CONCLUSION

The paper investigated the determinants of EU image across European regions, adding to the growing body of literature using a territorial lens to gain a better understanding of the (increasingly critical) attitudes towards the EU and the surge of populist voting (e.g., Becker, Fetzer, & Novy, 2017; Dijkstra et al., 2018; Rodríguez-Pose, 2018). In particular, the paper innovated by (i) exploring the extent to which EU Cohesion Policy support matters for shaping positive image of the EU across European regions, cross-checking for influence of regional characteristics, from economic situation, urbanity level and shrinkage, migration and population growth, to level of education; and (ii) by using spatial statistical methods for that purpose. Moreover, while previous research focused on regional level or a limited sample of selected European regions (Borz et al., 2018), our study covered all EU regions, painting a more complete picture.

Answering the research questions, we found that Cohesion Policy—the EU's central investment tool corresponding to one-third of the EU's budget, managed largely at the regional level and hence "close to the citizens", and supporting investment that should have a tangible impact on European cities and regions—does matter for EU image at the regional scale. Echoing the findings from previous studies stressing a positive influence of Cohesion Policy on the perceptions of the EU (Chalmers & Dellmuth, 2015; Osterloh, 2011), we found that greater amounts of ESIF *per capita* allocated to regions are inversely related to negative EU image among their citizens. Importantly, the size of the Cohesion Policy funding allocation mattered across our entire sample. Thus, perhaps EU money can't buy EU love, but at least it makes negative attitudes towards the EU less likely. By pointing to this relationship, we add to the growing body of research on the regional impacts of Cohesion Policy on the citizens' perceptions of the EU (Bauhr & Charron, 2019; Borz et al., 2018), confirming the potential of Cohesion Policy to create a less negative sentiment towards the EU.

Concerning the role of the other regional characteristics' influence on the EU image at the regional scale, our study highlighted the importance of the economic situation, particularly if that situation deteriorates. Thus, we found that the worsening economic situation during the crisis period, specifically the rising unemployment and decreasing purchasing power, fuelled negative EU image. This suggests that any cushioning effect that Cohesion Policy may have had on those crisis-stricken regions (see Wójtowicz & Olechnicka, 2016), did not counter the rising Euroscepticism. This, on the one hand, echoes the claims that the (declining) economic outlook has negative effects on the citizens' perceptions of the EU (Braun & Tausendpfund, 2014; Gomez, 2015). On the other hand, it indicates that there may be a problem with the effectiveness of communication of the results of Cohesion Policy interventions and points to the need to address that problem by European, national and regional policy-makers. Another implication for policy stemming from this finding is that Cohesion Policy could be used in a more flexible and targeted way to address the spatially uneven and region-specific negative consequences of future economic crises. The greater emphasis on flexibility in programming and on locally-led development strategies in the post-2020 Cohesion Policy framework may enable this.

By contrast, contrary to our expectations and previous literature (e.g., Dijkstra et al., 2018), we found that a low population density and ageing population, thus the hallmarks of shrinking and/or peripheral regional condition, did not play a significant role in shaping EU image. The results of the analysis concerning this factor were not conclusive. Future research could use different methods and data sets to investigate further with the still puzzling relation between shrinkage and peripherality and (negative) attitudes towards the EU, while shedding more light on the role of Cohesion Policy in this. In fact, it does seem to benefit such disadvantaged areas, leading to increasing territorial cohesion across Europe (see e.g., Mykhnenko & Wolff, 2019) and helping address the handicaps that shrinking and peripheral regions typically face (e.g., by providing funding for improvement of access to services of general interest, development of infrastructure, etc.).

Moreover, we found that two further factors mattered for negative EU image in regions: migration and low education of the population. In this case we found that the importance of these two factors was stronger than that of those that have an EU-wide influence on EU image, however, they played a role for the negative EU image in some regions only, while being insignificant in others. This finding adds to those from previous studies associating positive attitudes towards the EU and its Cohesion Policy with higher education levels (Chalmers & Dellmuth, 2015; Dijkstra et al., 2018; Osterloh, 2011); however, our results indicate that low education matters for negative EU image only in some clusters of European regions. More research is needed on this to elucidate why there is such a regional differentiation of the importance of this factor.

Concerning migration, previous research focusing on the EU and Brexit brought contradictory results, pointing that exposure to migration was a factor that drove "leave" vote in the 2016 British referendum on the EU (Goodwin & Milazzo, 2017) or, on the contrary, that it had little explanatory power (e.g., Becker et al., 2017) for the voting patterns in that referendum. By contrast, we adopted a pan-European perspective and, nuancing the insights from the study by Dijkstra et al. (2018), we found that migration was associated with negative EU image, at least in some European regions. Such as for the education factor, more research is needed to explain these regional patterns. That said, our findings on the regionally-relevant factors related with negative EU image highlight the advantage a spatial statistical approach that we adopted, offering a more fine-grained and nuanced perspective on the drivers of attitudes towards the EU. They also underscore the need for place-tailored policy support to tackle disadvantages stemming from low education levels and the burden of integration migrants in regions where these challenges are the most acute. The reformed Cohesion Policy for 2021–2027 does already include new measures in this direction,[8] thus future research could probe to what extent they deliver their promises and affect the ways in which citizens of the regions benefiting from them change their image of the EU.

Further studies could also study the relation between regional features, Cohesion Policy, and other EU policies. In fact, the perhaps less visible benefits of the Common Market (e.g., freedom of movement of labour) or, conversely, the very tangible direct payments to farmers as part of Common Agricultural Policy may also play an important role in shaping EU image. Future research could also go beyond the evaluative dimension of EU identification and consider its affective dimension, related to feelings of belonging to the European community, where different regional factors may come to the fore. Such research could also consider a longer temporal perspective as well as regionally weighted analysis to sharpen the analytical focus.

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[8]See summary of changes in Cohesion Policy post-2020 at: https://ec.europa.eu/regional_policy/en/2021_2027/ [Accessed 22 July 2019]

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Resumen. Con la inversión en el desarrollo de los territorios europeos, cabe esperar que la política de cohesión de la UE tenga un impacto positivo en las opiniones de los ciudadanos sobre la Unión Europea. Todavía no está claro si la política afecta realmente a lo que la gente piensa de la UE y cómo lo hace. Este artículo explora una serie de determinantes regionales de la imagen de la UE, desde los factores socioeconómicos hasta los territoriales y la intensidad de la financiación de la política de cohesión de la UE, a partir de los datos disponibles para el período 2008-2015. En él artículo se establece una relación positiva entre el tamaño de la asignación regional de los Fondos Estructurales y de Inversión de la UE y una imagen menos negativa de la UE, al tiempo que se destaca la forma en que una situación económica regional en declive alimenta más puntos de vista negativos sobre la UE. También revela que un menor nivel de educación y una mayor migración tienen una fuerte influencia en la imagen negativa de la UE, aunque sólo en algunas regiones europeas.

抄録: ヨーロッパの地域開発に出資することで、欧州連合（EU）の結束政策が、EU に対する市民の見解に良い影響を与えることが期待される。市民の EU 対する考え方に、政策が実際に影響を及ぼすのかどうか、またはどのように影響するのかは明らかにされていない。本稿では、2008～2015 年に得られたデータを基に、社会経済的な要素から地域的要素まで、地域における EU に対する印象の様々な決定因子、および結束政策の資金の集中度を調査する。結果から、欧州構造投資基金（European Structural and Investment Funds）のその地域の割当の規模と EU に対するネガティブな印象の少なさに正の関連性が認められたのと同時に、地域の経済状況の悪化が EU に対する見解をさらにネガティブにすることが顕著であることが強調された。また、教育レベルの低さと移住率の高さは、一部の地域に限られるものの、EU に対するネガティブな印象に強い影響を与えることが明らかになった。