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Political orientations, economic policies, and environmental quality: Multi-valued treatment effects analysis with spatial spillovers in country districts of Poland

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ABSTRACT

Many studies have found a positive association between liberal political views and support for environmental protection activities even though they require greater involvement of the state in market economies. However, such a conclusion is contradicted by empirical studies on pro-environmental activities with regard to the theory of planned behavior. On the one hand, subjective norms (including the expectations of public authorities) are usually found to be insignificant or very weak drivers of ecological behavior. On the other hand, self-efficacy (individual attitudes and beliefs in one's capabilities) is perceived as a leading factor. This inspired us to explore the long-term effects of localism on environmental quality in Poland. Because liberalism and conservatism exist in their 'pure' forms, Poland is very well suited to such a study. The aim of the article is to assess the long-term impact of local and liberal orientations (with conservatism as the reference), as reflected by electoral decisions on the quality of the environment. First, the current state of the environment is measured over four dimensions (air, water, soil, and biodiversity), and the effects of environmental policies (including spatial dependence) are estimated. Subsequently, the treatment effects on the environment when a particular political orientation is adopted are estimated using multi-valued treatment effect analyses. The study confirms that local orientation is conducive to long-term environmental care. Moreover, greater coordination of environmental policies at different levels is recommended, focusing on the negative spatial dependence of local environmental expenditure.

1. Introduction

Issues related to the individual determinants of citizens' pro-ecological behavior and the 'green vote' have been discussed by many researchers (Torgler and Garcia-Valinas, 2007; Schumacher, de Vries and Vis, 2013; Aklin et al., 2013; Ercolano et al., 2014). Notably, when considering the effectiveness of environmental policy, the relationship between the condition of the environment and the political orientation of voters was usually estimated (Eagle et al., 2017; Facchini et al., 2017). However, this is a complex problem, as individual environmental awareness and the behavior of citizens towards the environment are important. Moreover, political choices hand power to governments who might have certain agendas, causing the implementation of specific environmental policies (see Fig. 1).

Researchers are confronted with the problem of defining individual political orientations because liberal views can be interpreted in a

Abbreviations: A, attitude towards the behavior; AIPW, augmented inverse propensity weighting; ATE, average treatment effects; CAP, common agricultural policy; CC, civic coalition; CON, conservative orientation; CP, Civic Platform; CT, CRITIC-TOPSIS; ENVCAP, transnational policy expenditure; ENVLOC, municipality level environmental expenditure; EP, European Parliament; EQI, environmental quality index; HNVF, high nature value farming; IPW, inverse propensity weighting; LAJ, Law and Justice; LFA, less-favored areas; LIB, liberal orientation; LNSKEW0, Zero-skewness log transform; LOC, local committees; MO, moral obligations; PBC, perceived behavioral control; PDENS, population density; POM, potential output mean; PPP, Polish Peasant Party; PS, propensity score; PSM, propensity score matching; SBI, soil bonitation index; SDM, spatial Durbin model; SN, subjective norms; SPAT_ENVLOC, , spatial effect of local environmental policy; SPAT_EQI, spatial effect of pollution and biodiversity; TPB, theory of planned behavior.

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variety of different ways. For example, the American dichotomous division (Republicans vs Democrats) is particularly problematic. Generally, the former are characterized by a very liberal approach to the economy and the market, framed by a conservative view of tradition, religion, social roles and value hierarchies. By comparison, Democrats have a more conservative view of economic freedom, with increased economic control by the state. However, they are more open-minded with regard to cultural changes. Importantly, such a divergence in terms of economic perspectives and hierarchical values renders analysis difficult. For example, Fredrickson et al. (2018) revealed that the relationship between these concepts can vary according to which Republican president is in power, culminating in a lower budget for the Environmental Protection Agency. Lim and Bowen (2018) also discovered that in American cities dominated by democratic orientations, their local governments attracted more eco-efficiency grants in the field of energy supply. These findings suggest that Democrats are willing to accept deeper involvement of the government in the market economy for the sake of the environment, unlike Republicans. Other research conducted in the United States has also indicated that Republican orientations are less conducive to environmental care (McCright et al., 2014; Stoutenborough et al., 2014). Nevertheless, it remains unclear whether this can be attributed to issues around the free market and attitudes towards economic growth or to a conservative hierarchy of values, resulting in reduced environmental awareness and less inclination toward pro-ecological behavior. Further, some researchers have argued that the approach towards state participation in the economy is decisive. Uyeki and Holland (2000) noted that the impact of environmental policy is related to the involvement of the state and the imposition of restrictions in market functionality. According to the authors, this is why a liberal orientation places greater emphasis on the quality of the environment. However, such a conclusion is contradicted by the decomposition of individual behaviors when using the theory of planned behavior (TPB). According to this theory, behavior is guided by four factors (Menozzi, Fioravanzi and Donati, 2015; Fielding et al., 2008; Ajzen, 1991): i) attitudes (A) towards the behavior (i.e., favorable or unfavorable evaluation of the planned behavior); ii) moral obligations (MO); iii) perceived social pressures, termed subjective norms (SN); and iv) perceived ability to perform the behavior, termed perceived behavioral control (PBC). Interestingly, SN (which includes the expectations of public authorities and constraints imposed by environmental policy) is the only component of the TPB where the impact on behavioral intentions is statistically weak or insignificant, as highlighted in many studies (Adnan et al., 2018; Menozzi et al., 2015, Irfan et al., 2020). More importantly, PBC and A have the greatest significance when implementing sustainable schemes, as noted in the previously quoted research. For example, Irfan et al. (2020) investigated the impact of consumer intention factors on the willingness to pay for renewable energy in Pakistan. In addition, Martínez-García et al. (2013) studied improvements in grass-land management, Wauters et al. (2010) analyzed the adoption of soil erosion control practices, and Menozzi et al. (2015) devoted their research to participation in the 'Ecological focus area program'. These manifestations would suggest that the previously mentioned positive relationship between democratic perspectives and the quality of the environment is not a result of approaches to economic freedom. Rather, it emanates from the value system represented by attitudes and self-efficacy, which is also reflected by PBC (Bandura, 1997). It should be highlighted here that self-efficacy is part of the self-system encompassing one's attitudes, abilities, and cognitive skills (according to Bandura's concept). Herein, we focus on this aspect of behavioral decisions. However, it is difficult to link self-efficacy with a specific political orientation. This is why we assume it is more effectively reflected by 'localism', meaning a political orientation portrayed by choosing proven-in-management activists and their pragmatism.

To the best of our knowledge, the impact of 'localism' on long-term environmental quality has not been sufficiently researched. In addition, we test a thesis from the literature regarding the positive impact of liberal options on the environment and compare the extent of its impact with 'localism'. Poland is eminently suitable for this comparison because it encompasses European liberalism and conservatism in their pure forms. The liberal option in Poland assumes a free market approach and an open worldview on issues such as religion, family, social roles, and value systems. By comparison, the conservative option means consenting to state interference in the economy and a traditional hierarchy of values (Matuszczak et al., 2020).

The overall aim of this article is to assess the long-term impact of local and liberal orientations (using conservatism as the reference), as reflected by a holistic view of how electoral decisions can affect the quality of the environment. According to the literature (Laver and Garry, 2000; Facchini et al., 2017), a focus on electoral choices is justified because political parties are basic entities in the function of democracy. We also provide some methodological contributions, consisting of integrating spatial dependence with treatment effect analysis.

The remainder of the article is organized as follows. In the following section, we discuss the literature background to elicit the effects of political orientations (liberal, conservative – Section 2.1, and local – Section 2.2) on the environment and the political scene in Poland (Section 2.3). In the data and methodological section, we present the construction of EQI and the selection of other variables complete with descriptive statistics (Sections 3.1–3.4). We then advocate a propensity score (PS) as a tool for analyzing casual effects of political orientations (Section 3.5) and explain the modeling procedure, focusing on the model balance check (Section 3.6). Finally, we discuss the results (Section 4) and propose recommendations for researchers and policymakers (Section 5).

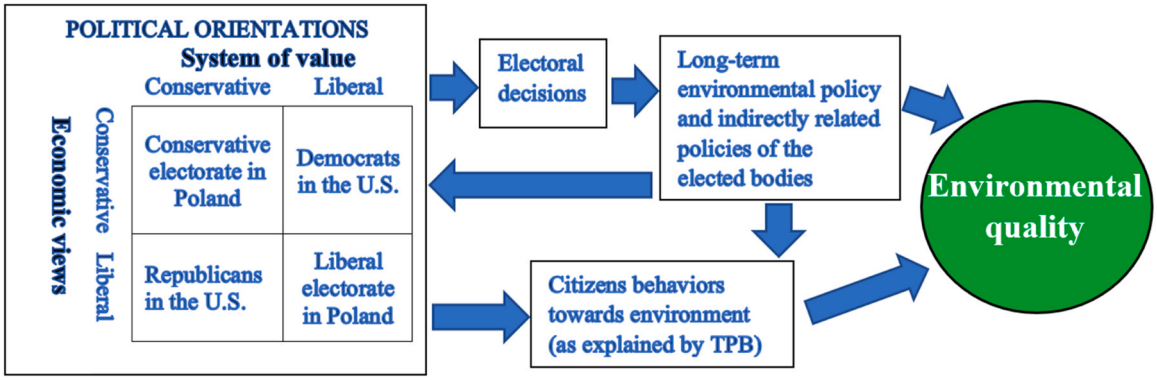

Fig. 1. Process of affecting environmental policy by political orientations based on the examples of Polish and American electorate divisions.

2. Literature background

2.1. Effects of liberal and conservative views on the environment

Political affiliation is the most widely discussed topic in the American literature on political ecology. A significant relationship has been revealed between the governance of a political party (Republican or Democrat) at both national and local levels and the ensuing implementation of environmental policies. When in power, Democrats tend to increase the pro-ecological budget, and local authorities are encouraged to follow pro-environmental policies (Wan, Shen, and Choi, 2017). The state should strive for social balance and justice, fight against poverty, and (above all) fiercely guard the protection of nature. Conservatives have a tendency to agree with governments that present pro-business and economy-friendly attitudes. However, they have less progressive attitudes and policies when addressing social concerns. This approach often prevents their governments from implementing any conservative policies that are directed towards the environment (Wan, Shen and Choi, 2017; Cheung et al., 2019; Hornsey et al., 2018). Moreover, they tend to compare the present with the past, while more liberal individuals compare the present with the future (Lammers and Baldwin, 2018). Conservatives primarily emphasize authority and stability (Jost et al., 2003; Antonio and Brulle, 2011), resulting in ignoring problems such as large-scale shifts in the climate that can threaten system functioning. They are less environmentally engaged, meaning they are less likely to take actions that are beneficial to the environment. This observation has been made by other researchers, who indicated a strong correlation between support for the environment and political ideology (Hamilton, 2011; Wolsko, 2017). Succinctly, parties towards the left of the political spectrum tend to support environmental protection, whereas those to the right often oppose these actions. Environmental issues are increasingly associated with exclusively liberal values in countries such as Canada and the United States. It is worth considering whether the reluctance of conservatives to protect the environment only applies to selected countries, or whether it is a universal phenomenon that is rooted in a country's history, development, and environmental quality (Nawrotzki, 2011).

2.2. Is localism conducive to environmental quality?

The literature on localism (Eagle, Jones, Greig, 2017; Chen and Szeto, 2015; Kaeding, 2017; Matuszczak et al., 2020) is diverse, complex, and constantly expanding. We can divide the literature into two groups. The first clarifies the decrease of state influence and limited spending at the central level, hampering effective environmental actions. This requires extended financial contributions and multi-level planning (Eagle et al., 2017). According to Hess (2008) the relationship between localism and environmental benefits remains variable and uncertain. The focal point of the second group is increasing environmental localism, with the aim of introducing a much broader ideology that challenges existing beliefs with regard to the economy. More importantly, this orients society toward collective progress, mitigating any threats to sustainable development. National governments are incapable of resolving issues such as climate change by themselves. Thus, to address these issues effectively, a wide range of state and non-state actions combined with individual behaviors should be considered when governing a country. As a result, legal entities in many Western countries have developed policies in tandem with non-state actors to approach complicated issues more comprehensively (Rhodes, 1997; Lowndes and Skelcher, 1998).

Environmental awareness is influenced by many factors, including socio-economic, environmental, and cultural factors. Further, the availability of ecosystem functions is inseparably related to land management decisions (Rounsevell et al., 2012). Thus, if we want to understand land systems (including local land management), especially in rural areas, we need to appreciate the interplay between citizens and the environment (Rega et al., 2019).

2.3. Political orientations in Poland

The collapse of the communist system in Poland created the prospect of political parties being formed. However, post 1989, it was not possible to direct public attention towards environmental protection issues, as there was no legislative initiative concerning ecology. This allowed the development of anti-environmental trends in agriculture, construction, energy, and industry. The party system in Poland has evolved over the past decades from being extremely fragmented to one that is relatively stable (Kimla, 2016; Gwiazda, 2019). Observation of realities would indicate that two parties have competed in Poland for 15 years. One of these is the Law and Justice Party (LAJ), which is a member of the European Conservatives and Reformers in the European Parliament (EP). With regard to socio-economic views, the LAJ promotes an egalitarian social program. The party's election manifesto emphasizes the active role of the state with regard to economic growth. Meanwhile, it stresses the meaning of far-reaching income redistribution within the country (LAJ, 2019). Consequently, the party has been associated with a conservative-leftist ideology (Matuszczak et al., 2020).

The Civic Platform (CP), which belongs to the European People's Party in the EP, also performs an important role in Poland's politic scene. In 2019, 51.34% of the party's supporters opted for a center-left/left-wing orientation (SoP, 2020). The party's manifesto relies on the concept of moderate, progressive promotion of economic freedom. When considering parties at a local level, the Polish Peasant Party (PPP) should be mentioned. Their manifasto is delineated as centrist and moderately conservative, emphasizing the role of Christian democrats. This party belongs to the European People's Party in the EP. Since 2015, both the CP and the LAJ have changed their approach to environmental policy dramatically (Tyrała, 2018). In 2015, the CP proposed investing in hard coal-based energy and started constructing a nuclear power plant. By contrast, the LAJ manifesto emphasized that 'excessive environmentalism' should be rejected and that wind energy should not threaten coal-fired power plants or have priority access to the distribution system. Moreover, by rejecting the draft 'climate resolution' in 2020, the LAJ led the fight against environmentalism and silenced the debate on how Polish institutions and society should prepare and participate in the fight against climate change.

Currently, the LAJ has suggested that at least 33% of energy should emanate from renewable sources by 2030. For example, this contradicts their view of wind energy, which until recently was perceived by politicians of the ruling party as expensive and harmful. Recent electoral manifestos of the leading political parties (the LAJ, Civic Coalition – CC incorporating Civic Platform, Modern Polish Initiative, and the Greens), SLD (New Left, Polish Socialist Party, Together, and Spring), the Polish Coalition (Polish People's Party and the European Union of Democrats and Conservatives), Confederation (National Movement, KORWiN, Union of Christian Families National League, and the Drivers Party) include environmental protection in their manifestos. However, this varies according to political groupings. The most ambitious environmental demands have been proposed by the CC, which aims to remove coal from household heating by 2030, district heating by 2035, and electricity generation by 2040. The CC's commitment to the refertilization of Polish rivers has caused great controversy around this topic, as it conflicts with the government's concept of making rivers available for large-scale freight transport. Important lines of action for the CC include reducing the use of plastic, expanding the geographical area of national parks, and investing up to €25 billion in thermal insulation programs. Further, the CC criticizes coal-based energy and promotes renewable energy sources (Kozek et al., 2019).

3. Data and methods

3.1. Proxies for environmental quality

Data for this stage of the analysis were collected at the municipal (gmina NUTS 5) and county (poviat NUTS 4) levels that have the status of country districts. The references for each type of environmental variable are provided in parentheses in Fig. 2. The environmental policy and election data are described in 3.2, 3.3, and 3.4. All the populations of country districts in Poland were considered. Several public statistical sources and institutions were engaged in this process (see Fig. 2 for the respective sources and subsections). In Poland, the administrative division comprises three levels: municipalities, counties, and regions (voivodships). The majority of environmental policy decisions are made by local authorities at municipal and county levels, which is discussed in detail later. There are 380 counties in the Polish administrative division. However, we ignored cities with over 100,000 inhabitants (i.e., those that possess county rights); accordingly, we omitted 67 cities with 'poviat' rights. We assumed that a biodiversity assessment serves no purpose in a city district. Moreover, the environmental quality evaluation in larger cities and rural communes would be incomparable. Hence, this work focuses on rural areas, including small cities.

The measures used to indicate total environmental quality are presented in Fig. 2, using the same approach as Czyżewski et al., 2020b. To synthesize the pollution and biodiversity issues, four composite indices were built at the county level (as mentioned in country districts), employing the CRITIC-TOPSIS (CT) method (Diakoulaki, Mavrotas, and Papayannakis, 1995; Deng, Yeh, and Willis, 2000). We aggregated these into the single composite measure EQI. The CT method assigns higher weights to features with relatively higher variability and lower correlation with other features (concurrently). Their selection was determined according to the diagonal values of the invertible correlation matrix. Next, the chosen variables were standardized by the zero unitarisation process, and de-stimulants were transformed into stimulants. Finally, the weights of environmental indicator variables were estimated according to the CT procedure, with the aim of avoiding errors due to subjective weighting. The final composite index was then derived using the Euclidean distances from the maximum and minimum weighted values (Czyżewski et al., 2020b; Matuszczak et al., 2020). Hence, the value of EQI_i (synthetic measure for i-th county) was determined according to the following formula:

$$EQI_i = \frac{\sqrt{\sum_{j=1}^{k}(u_{ij}^{*} - u_{ij}^{-})^2}}{\sqrt{\sum_{j=1}^{k}(u_{ij}^{*} - u_{ij}^{+})^2} + \sqrt{\sum_{j=1}^{k}(u_{ij}^{*} - u_{ij}^{-})^2}}, \quad (i = 1, 2, \ldots, n) \qquad (1)$$

where u is the maximum and minimum of zero-unitarised and weighted j-feature ($j = 1, 2, \ldots, k$):

$$u_j^{+} = \left(\max\left(u_{i1}^{*}\right), \max\left(u_{i2}^{*}\right), \ldots, \max\left(u_{ik}^{*}\right)\right) = \left(u_1^{+}, u_2^{+}, \ldots, u_k^{+}\right)$$

$$u_j^{-} = \left(\min\left(u_{i1}^{*}\right), \min\left(u_{i2}^{*}\right), \ldots, \min\left(u_{ik}^{*}\right)\right) = \left(u_1^{-}, u_2^{-}, \ldots, u_k^{-}\right)$$

The EQI represents a continuous variable (not truncated, please see Table 2) that has a distribution close to normal, although with a slight skew (Appendix, Fig. A1). Although it should not bias estimators, we adopted the 'Zero-skewness log transform' (LNSKEW0) for the dependent variable to ensure full formal model correctness. This is given by.

$$EQI^{*} = ln(-EQI - k) \qquad (2)$$

where EQI^{*} is a transformed variable and k is a transform parameter that ensures normal distribution of the EQI^{*} (StataCorp, 2017).

The transformation enabled full normality, as confirmed by the Shapiro-Wilk test (Appendix, Fig. A1). Hence, we also present the results of treatment effect estimation for the transformed variable EQI^{*}.

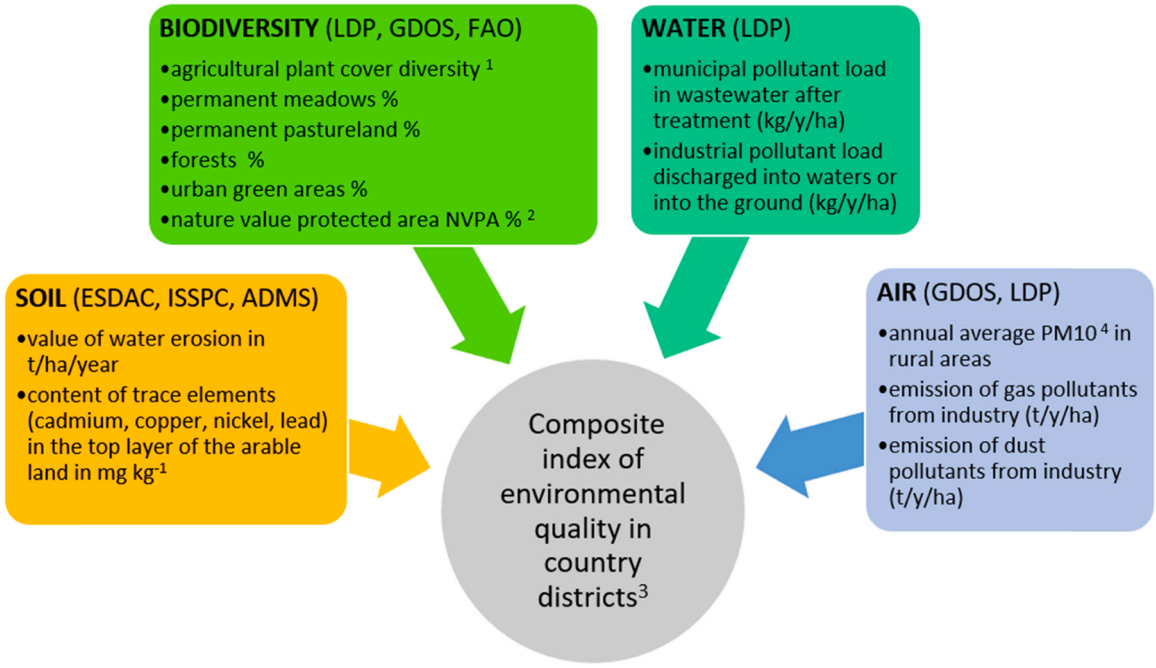

Fig. 2. The components of the composite environmental quality index (EQI) in the population of country districts in Poland (2017). Notes: [1]Using the GINI index (FAO 2020) [2]Total area covered by ecological areas, reserves, national parks, Natura 2000 bird areas, and Natura 2000 habitat areas as a percentage of county area [3]Synthetic measure based on zero unitarisation and the Euclidean distances from the pattern and the anti-pattern, with the CRITIC weighting applied (Deng et al., 2000) [4]PM10 – a mixture of airborne particles with a diameter of <10 μm.
Source: For the methodological details, please refer to the following: Czyżewski et al. (2020b); the Agricultural Drought Monitoring System in Poland (ADMS, 2020); the European Soil Data Center (ESDAC, 2020); the Food and Agriculture Organization (FAO, 2020); the General Directorate for Environmental Protection in Poland (GDOS, 2020); the Institute of Soil Science and Plant Cultivation (ISSPC, 2020); and the Statistics Poland Local Data Bank (LDP, 2020).

In Fig. 3, we depict EQI in comparison to population density. According to many studies, this is the main socio-economic driver of environmental quality (Adam and Tsarsitalidou, 2019). The following statement also has a strong foundation in our study: both EQI and population density have very similar quantile class distributions (Fig. 3). In Fig. 4, we visualize the ENVLOC and ENVCAP variables. While EVCAP spatial distribution refers to the distribution of EQI from Fig. 3 (therefore in the methodology section we consider the problem of potential endogeneity of ENVCAP), it is difficult to find any logical pattern in the distribution of ENVLOC. A clue may be the concentration of municipal environmental expenditures around several largest agglomerations characterized by high levels of industrial pollution. This would indicate an *ex post* policy of local authorities who address rising environmental costs and try to reduce the current social costs of environmental degradation.

3.2. Transnational environmental expenditures under CAP

The following environmental schemes of the CAP were used as a proxy of transnational environmental policy: payments for less-favored areas and for farming in mountain areas (LFAs); agri-environmental payments; afforestation of farm land; investment in forest area (including viability); agri-environment and climate schemes; organic agriculture; and payments for areas with natural-specific restrictions (ARMA, 2020). These expenditures were totaled and transformed into average yearly values over the period 2004–2017. We also coded them as ENVCAP variables, which are expressed in mln PLN.

3.3. National environmental expenditures by municipality

For national environmental policies at the municipal level (gmina), we considered the municipality budget. The following expenditures were added together (in PLN yearly per capita from 2002 to 2017) as the variable ENVLOC: municipal waste and city waste management; investment in green areas; protection of air and climate; management of sewage; and protection of water (LDP Statistics Poland, 2020).

3.4. National policy at the county level—the treatment variable

The county environmental policy in Poland is decisive, as it coordinates and passes judgment on key environmental programs and projects enacted at the municipal level. The main competencies of the county environmental department are as follows (BIP, 2020):

- issuing permits for waste collection, waste treatment, and waste production
- accepting applications from installations that may have a negative impact on the environment
- coordinating work on drawing up the district environmental protection program
- providing opinions on municipal environmental protection programs
- issuing permits for introducing gases or dust into the atmosphere
- issuing decisions allowing for temporary or permanent exclusion of protected land from agricultural production

These competencies are not negligible, although they are more evaluative and qualitative compared to the competencies of municipalities, which are largely dependent on spending for various environmental objectives. Therefore, it is difficult to measure the environmental policies of the district quantitatively. The policies effectiveness depends on two factors: the decisions of the officials and the environmental awareness of the inhabitants. These factors are difficult to measure directly through surveying the whole population of counties in Poland. The county council, elected in the general local government elections, is the constituting and controlling body of the county. Therefore, it can be assumed that the environmental awareness of the residents is determined by their electoral decisions. Moreover, the long-term rule of a certain political option has an impact on the quality of the environment in the district. The long-term results of local government elections to the county councils can be a proxy of both inhabitant awareness and decisions made by officials. In this study, it serves to identify the relationship between the dominant political orientation of the residents (as reflected in the elections to the district councils) and the rulings of a particular political option.

We used a three-value treatment variable to indicate which particular political option won in elections to the county council and ruled between 2002 and 2017 assuming that was the case at least twice. Hence, the particular party has ruled for at least eight years. The treatment options under question are as follows and depicted in Fig. 5:

- 'LIBERAL', LIB, including CP
- 'LOCAL', LOC (pragmatic), including local committees

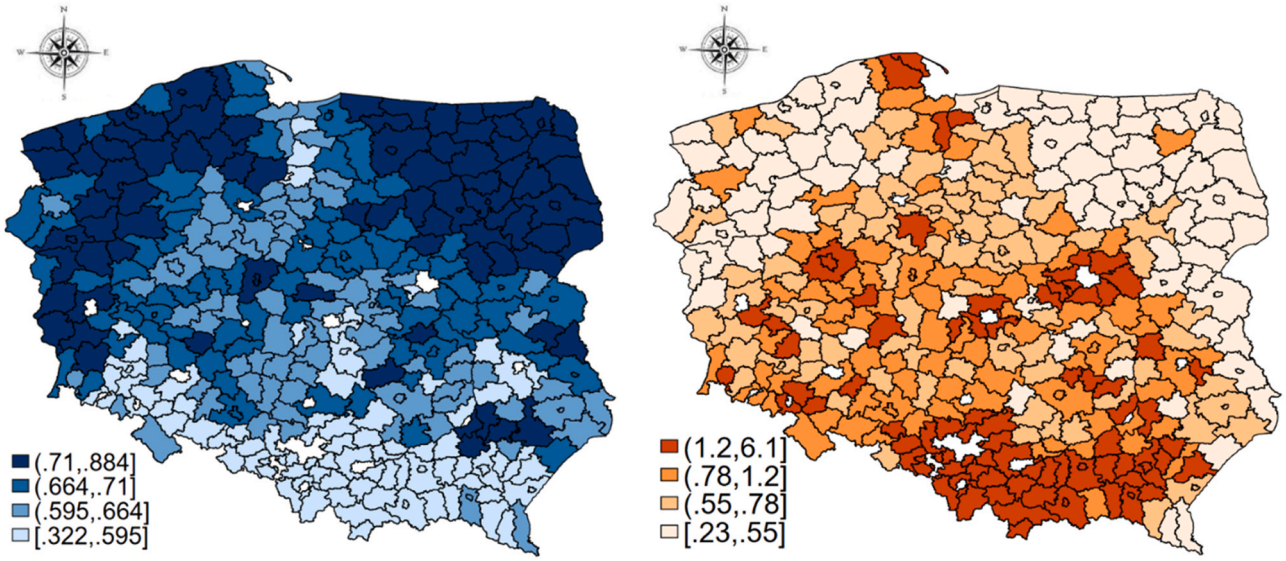

Fig. 3. The EQI in Poland on the left side and population density on the right side (in persons per ha, quantile method). Note: To compare with the official full-detailed administrative map of Poland, see https://stat.gov.pl/en/regional-statistics/classification-of-territorial-units/administrative-division-of-poland/ (Statistics Poland 2020).

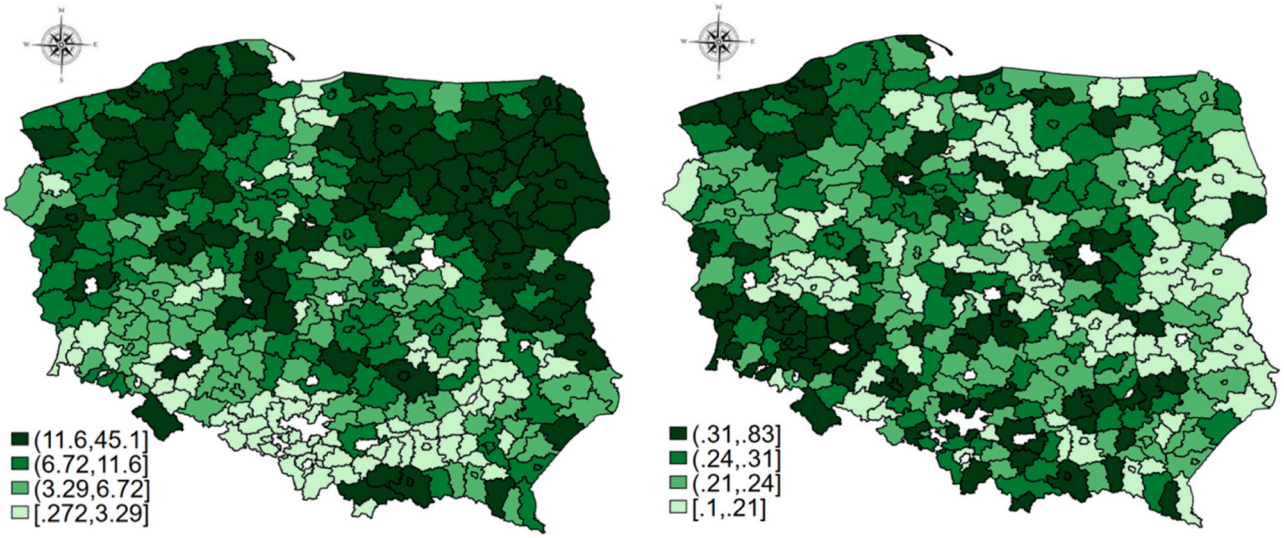

Fig. 4. Environmental CAP – 'ENVCAP' (in mln PLN annual av. 2004–2017) on the left side, and municipal environmental expenditures – 'ENVLOC' (th. PLN per capita annual av. 2002–2017) on the right side (quantile method). Note: To compare with the official full-detailed administrative map of Poland, see https://stat.gov.pl/en/regional-statistics/classification-of-territorial-units/administrative-division-of-poland/ (Statistics Poland 2020).

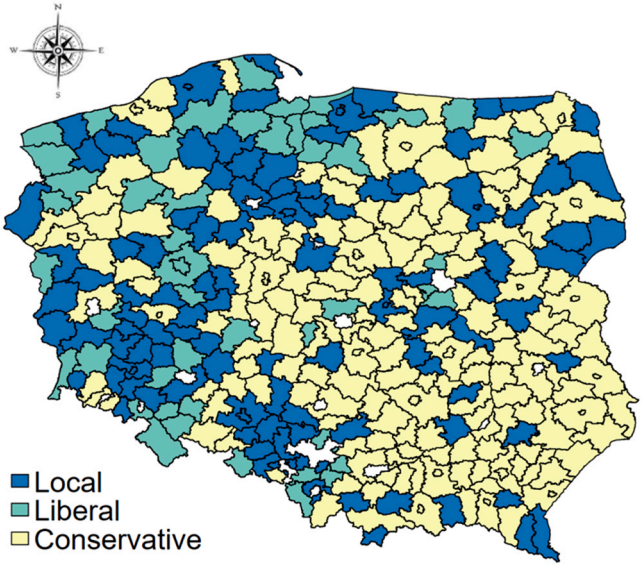

Fig. 5. Political options that have ruled in Polish counties for at least eight years between 2002 and 2017. Note: To compare with the official full-detailed administrative map of Poland, see https://stat.gov.pl/en/regional-statistics/classification-of-territorial-units/administrative-division-of-poland/ (Statistics Poland, 2020).

- 'CONSERVATIVE', CON, including LAJ, PPP and their altered ruling.

The local government elections were held in 2002, 2006, 2010, and 2014 and we gathered relevant data from the National Election Commission (2020). Hence, we assessed the environmental quality in country districts in 2017, providing they had been affected by long-term policies at the municipality level (ENVLOC), transnational policies (ENVCAP), and by the treatment of policy orientation at county levels (LIB/LOC/CON). In addition, other socio-economic factors were proxied by population density (PDENS) and the spatial spillovers of pollution, biodiversity (SPAT_EQI, please see Table 1 for definitions), and policy (SPAT_ENVLOC, please see Table 1 for definitions). The descriptive statistics of the variables involved are listed in Table 1.

Table 1
Descriptive statistics for the variables involved in the study.

Variable	Obs	Mean	Std. Dev.	Min	Max
Environmental quality indicator EQI	313	0.6545	0.0939	0.3216	0.8836
Conservative orientation CON (ruled min. 8 years 2002–2017)	313	51.44%	50.06%	0	1
Liberal orientation LIB (ruled min. 8 years 2002–2017)	313	15.02%	35.78%	0	1
Local orientation LOC (ruled min. 8 years 2002–2017)	313	33.55%	47.29%	0	1
Population density PDENS (pers. per ha, av. 2002–2017)	313	1.0042	0.7530	0.2317	6.1093
Municipal environmental expenditures ENVLOC (th. PLN per capita annual av. 2002–2017)	313	0.2623	0.0896	0.1001	0.8326
Spatial effect of environmental quality SPAT_EQI (EQI*W_1, where W_1 is a contiguity matrix that assumes counties only sharing a vertex are not neighbors; second-order neighbors were assigned non-zero values, and spectral normalization was used)	313	0.5863	0.1678	0.1128	1.0109
Environmental CAP ENVCAP (mln PLN annual av. 2004–2017)	313	8.1751	6.4379	0.2716	45.1328
Spatial effect of local environmental policy SPAT_ENVLOC (ENVLOC*W_1, where W_1 is defined the same as EQI)	313	0.2301	0.0615	0.0384	0.4049

Source: Original calculations using Stata 16.

3.5. Propensity score as a tool for analyzing the casual effect of political orientation

Propensity-based methods have been used frequently to estimate the effect of applied policy (Li et al., 2018; Xin and Qu, 2019; Zhou and

Shen, 2019; Li, Ding, and Yang, 2020; Ma et al., 2020; Zhang et al., 2020). In this subsection, we discuss the concept of applying propensity score (PS) to isolate the impact of policy treatments and their underlying political orientations. Here, PS is the conditional probability of receiving a treatment (i.e., a policy chosen in a local election), based on the subject's (i.e., a country district) characteristics that explain environmental quality. The main point is that the PS does not have to be accurate when predicting election results; it simply needs to include a well-fitted selection of explanatory variables (X) impacting the environment (Y) on a local scale.

Mathematically, it has been demonstrated that the control of probability P(X) works in the same way as controlling X directly, provided X explains a significant part of any variance in Y. We can say that PS is a type of function that converts X into a probability treatment. This poses the question of why use PS instead of exploring the long-term effects of elections on environmental quality directly. Counties that are 'treated' and 'non-treated' by a particular policy option are initially not comparable, because they differ systematically at the baseline. There are many reasons for this situation. For example, environmental quality is historically determined in Poland by Russian, Austrian, and Prussian partition borders from the 18th and 19th centuries. Further, although the eastern belt of the country is less developed and poorer, it has superior environmental conditions. Due to the lack of noticeable environmental burdens, people living there do not appear to care much about environmental postulates and are more likely to elect conservative parties that do not focus on ecological issues in their manifestos (Badanie, 2014; Kłos, 2015). However, if two counties from different samples (treated and non-treated) have the same probability of receiving the treatment, they are comparable. In other words, the overall concept of using PS is to find pairs of subjects that are very similar in terms of independent characteristics, which then explains our dependent variable (EQI). However, they differ solely in the long-term local election results. Hence, the effects of voters' political orientations and policies implemented by the elected committees are detached from other factors that affect the environment and can be precisely measured.

Rosenbaum and Rubin (1983) proved that treated and untreated objects with the same PS have identical distributions for all independent variables, which is very important for the undistorted casual effect of the treatment variable (Facure, 2021). However, a similar distribution of all independent variables is sometimes hard to achieve in regression models. This raises the question of why not insert a treatment dummy variable ($T = 0$ or $T = 1$) directly into the regression model for a particular policy option. When regressing the results of T and other explanatory variables, the coefficient of T is only a mean effect under several strict assumptions: The relationship between the response variable and the explanatory variable must be linear, and all regression lines and their position with respect to the X axis are the same at $T = 0$ and $T = 1$. This also applies to potential levels of the other explanatory variables that are probably subjected to grouping with regard to localization-specific environmental issues. It is very unlikely that this condition would be encountered in a complex system of environmental and policy interdependencies. Moreover, PS is a more reliable solution for revealing an average causal effect of T (the chosen policy option) without strong assumptions about how the outcome (EQI) is affected by explanatory variables. Nevertheless, we also calculated SDM with T dummies to present a complete picture. There are two main groups of estimators for PS models, which were both tested in this study: weighting and matching. In weighting, we fitted weighted averages of the response for $T = 0$ and $T = 1$ (Lunceford and Davidian, 2004). In PSM, we try to obtain a subgroup of untreated subjects whose PS values are close to those of the treated subjects (Rosenbaum, 2002).

In summation, there are two crucial conditions for effective PSM or IPW: well-fitted independent treatment variables with unquestionable bearing on the outcome and distributions of treated and untreated subjects that must overlap to ensure that both groups are well balanced. It is worth recalling that the predictive quality of the PS does not translate into its balancing properties. In fact, higher prediction power could damage the causal inference. If we include variables that predict treatment successfully and do not affect the outcome, this will increase the variance of the PS estimate. In the extreme case considered by Hernán and Robins (2020), infinite variance can also occur. For this reason, we do not include localization variables referring to the historic German, Austrian, and Russian territories of Poland from the 18th and 19th centuries in our model. However, it is well known that partition influence has caused inhabitants in western Poland to have more liberal views than those in eastern regions.

3.6. Modeling procedure

The unique methodology of our approach involves adopting multi-valued IPW and AIPW, as advocated by Cattaneo (2010) and Imai and Ratkovic (2014), to test for balance in the policy treatment effect analysis. This includes spatial (neighboring) effects on the IPW, AIPW, and PSM models and involves addressing the endogeneity of transnational policy in environmental quality regression. To the best of our knowledge, spatial spillovers of pollution and policy have not been introduced to treatment effect analyses, even though they are perceived as important determinants of environmental quality. However, this approach obliges us to insert a spatial regression model in the first stage. We performed the following modeling procedure (all calculations and maps were accomplished in Stata 16):

1) Fitting a spatial autoregressive model that includes independent treatment variables impacting EQI, with the objective of testing the explanatory power of the involved independent variables and computing spatial effects).

   It has been advocated in other studies that spatial spillovers of environmental issues (such as pollution and biodiversity) are prevalent in Poland (Czyzewski et al., 2020a). Gaseous and particulate pollutants are usually spread via wind and water, and species of fauna and flora migrate to the neighborhoods. Similarly, the positive and negative effects of environmental policy in a given county have an indirect impact on the environment in neighboring counties. However, these spatial spillovers are often neglected when modeling policy effects on the environment.

   In accordance with the procedure for spatial model choice by Lesage and Pace (2009) and Floch and Le Saout (2018), we proved the following SDM as the most appropriate. Here, the SDM is derived from the general Manski model, meaning $Y = \rho WY + X\beta + \mathrm{WX}\theta + \varepsilon$ and $\varepsilon = \lambda W\varepsilon + \xi$, assuming that the spatial autoregressive parameter $\lambda = 0$:

$$Y = \beta \bullet \mathrm{X}_1 + \gamma \bullet \mathrm{X}_2 + \delta \bullet \mathrm{X}_3 + \rho(\mathrm{W}_1 \bullet \mathrm{Y}) + \theta(\mathrm{W}_1 \bullet \mathrm{X}_1) + \varepsilon \quad (3)$$

   Here, Y is an $n \times 1$ vector of observations on the dependent variable EQI; W_1 is an $n \times n$ exogenous spatial contiguity matrix for EQI and ENVLOC (counties only sharing a vertex are not neighbors, second-order neighbors were assigned non-zero values, and spectral normalization was used); *X1* and *X2* are $n \times 1$ vectors of explanatory variables: municipal environmental policy (ENVLOC) and population density (PDENS), respectively; *X3* is a $n \times 1$ vector of the endogenous environmental CAP variable instrumented by the soil bonitation index (SBI) and by the high nature value farming index (HNVF); $\rho, \beta, \theta, \gamma, and \delta$ are vectors of regression coefficients, where ε is the vector of the error term.
2) Addressing endogeneity issues concerning transnational environmental policy

   When including environmental CAP in the regression of environmental quality, we must address the endogeneity issue. It is evident that agri-environmental schemes are more likely to be adopted by farms in areas that are rich in natural amenities (Kleijn and Sutherland, 2003). Hence, reverse causality may occur and EQI will

probably affect the ENVCAP. This is why the instrument variables (SBI and HNVF) are involved (European Commission, 2014, 2016, 2017). Both measures are composite indices and have no units. The SBI reflects the potential of agricultural productive capacity resulting from natural conditions. Its main component is the soil capacity (bonitation class), as they explain approximately 80% of the observed yield variability. In addition, the local agroclimate is considered with a weighting of approximately 12%, with both relief and water conditions at approximately 4%. The HNVF mainly comprises species-rich grassland, extensively managed arable land, traditional orchards, and landscape elements. These elements include hedges, field margins and banks with woody vegetation, natural stone walls, ruderal and herbaceous plots and fringes, sedge and reedbeds, wetland elements, pools, ponds and weirs, eutrophied oxbows, ditches, and waterways and springs (European Commission, 2014, 2016, 2017). We assume that the SBI is negatively and HNVF positively correlated with ENVCAP. The concept of the instruments is that they should be strongly correlated with the variable suffering from endogeneity. Importantly, this should not affect the dependent variable (Rahman and Mamun, 2017). Our instruments follow both these premises and were checked by rigorous econometric tests for instrument relevance and validity (Appendix, Table A1). For municipal expenditures, such endogeneity does not appear due to them being divided 'per capita'. Moreover, a positive coefficient (as in our model) cannot be subjected to this endogeneity, because a good quality environment would not necessitate authorities increasing expenditure in that area.

3) Estimating average treatment effects

The estimators applied in this study use IPW and AIPW with two-level logit and multinomial logit functions, as advocated by Cattaneo (2010). Further, the standard matching PSM method is employed (Stata, 2020). We ensured that the implemented treatment models balanced the covariates.

The average treatment effects (ATE) in the population and potential outcome means (POM) were estimated using multi- and two-level IPW and AIPW and two-level PSM. These were then compared with the output of the spatial autoregressive model, including the treatment as a dummy variable (Table 2). We started with a basic IPW ATE estimator of the following form (Glynn and Quinn, 2010):

$$\widehat{ATE}_{IPW} = \frac{1}{n}\sum_{i=1}^{n}\left\{\frac{X_i Y_i}{\widehat{\pi}(Z_i)} - \frac{(1-X_i)Y_i}{1-\widehat{\pi}(Z_i)}\right\}\Bigg\} \tag{4}$$

where Z_i is a set of observable control variables, Y_i is an outcome variable (0 or 1), X_i is a treatment variable, and $\widehat{\pi}(Z_i)$ is the estimated propensity score. However, the IPW estimator is known to have poor small sample properties when the PS approaches zero or one for some observations. Accordingly, the original IPW estimator has been improved by the AIPW as advocated by Glynn and Quinn (2010).

$$\begin{aligned}\widehat{ATE}_{AIPW} = \frac{1}{n}\sum_{i=1}^{n}\Bigg\{&\left[\frac{X_i Y_i}{\widehat{\pi}(Z_i)}\right. \\ &\left. - \frac{(1-X_i)Y_i}{1-\widehat{\pi}(Z_i)}\right] - \frac{(X_i-\widehat{\pi}(Z_i))}{\widehat{\pi}(Z_i)(1-\widehat{\pi}(Z_i))}[(1-\widehat{\pi}(Z_i))\widehat{\mathbb{E}}(Y_i|X_i \\ &= 1, Z_i) + \widehat{\pi}(Z_i)\widehat{\mathbb{E}}(Y_i|X_i = 0, Z_i)]\Bigg\}\end{aligned} \tag{5}$$

Although this formula does not require the same adjustment set

Table 2
ATEs of policy orientation on environmental quality and POs in multi-valued and two-level models, referring to the Spatial Durbin Model (SDM) output.

Estimator		Coef.	RobustStd. Err.	z	P > z	[95% Conf.Interval]	
IPW multi-valued							
ATE	(LIB vs CON)	0.0287	0.0088	3.26	0.0010	0.0114	0.0459
	(LOC vs CON)	0.0150	0.0070	2.16	0.0310	0.0014	0.0287
ATE* (LNSKEW0)	(LIB vs CON)	0.0284	–	–	0.0030	–	–
	(LOC vs CON)	0.0151	–	–	0.0370	–	–
POmean	(CON)	0.6452	0.0069	92.9900	0.0000	0.6316	0.6588
AIPW multi-valued							
ATE	(LIB vs CON)	0.0288	0.0085	3.4000	0.0010	0.0122	0.0453
	(LOC vs CON)	0.0133	0.0071	1.8600	0.0630	-0.0007	0.0273
ATE* (LNSKEW0)	(LIB vs CON)	0.0284	–	–	0.0010	–	–
	(LOC vs CON)	0.0133	–	–	0.0810	–	–
POmean	(CON)	0.6462	0.0068	95.0900	0.0000	0.6329	0.6595
AIPW two-level:LOCAL vs CONSERVATIVE							
ATE	(LOC vs CON)	0.0136	0.0070	1.9500	0.0504	-0.0001	0.0273
ATE* (LNSKEW0)	(LOC vs CON)	0.0139	–	–	0.0670	–	–
POmean	(CON)	0.6520	0.0068	95.9600	0.0000	0.6387	0.6653
AIPW two-level: LIBERAL vs CONSERVATIVE							
ATE	(LIB vs CON)	0.0253	0.0084	3.0200	0.0030	0.0089	0.0418
ATE* (LNSKEW0)	(LIB vs CON)	0.0250	–	–	0.0040	–	–
POmean	(CON)	0.6438	0.0074	87.1400	0.0000	0.6294	0.6583
IPW two-level:LOCAL vs CONSERVATIVE							
ATE	(LOC vs CON)	0.0149	0.0066	2.2600	0.0240	0.0020	0.0278
ATE* (LNSKEW0)	(LOC vs CON)	0.0154	–	–	0.0310	–	–
POmean	(CON)	0.6519	0.0067	96.7600	0.0000	0.6387	0.6651
IPW two-level: LIBERAL vs CONSERVATIVE							
ATE	(LIB vs CON)	0.0310	0.0117	2.6400	0.0080	0.0080	0.0540
ATE* (LNSKEW0)	(LIB vs CON)	0.0302	–	–	0.0110	–	–
POmean	(CON)	0.6389	0.0095	66.9900	0.0000	0.6202	0.6576
PSM two-level:LOCAL vs CONSERVATIVE							
ATE	(LOC vs CON)	0.0154	0.0075	2.0600	0.0390	0.0008	0.0301
ATE* (LNSKEW0)	(LOC vs CON)	0.0161	–	–	0.0480	–	–
PSM two-level: LIBERAL vs CONSERVATIVE							
ATE	(LIB vs CON)	0.0267	0.0090	2.9500	0.0030	0.0089	0.0444
ATE* (LNSKEW0)	(LIB vs CON)	0.0272	–	–	0.0050	–	–
Spatial Durbin Model (dummy variables)							
Maximum Likelihood (ML)	(LIB vs CON)	0.0304	0.0093	3.2900	0.0010	0.0123	0.0486
	(LOC vs CON)	0.0122	0.0070	1.7500	0.0800	-0.0015	0.0258

(Z_i) to be used in both the PS and outcome models, we retained this set to ensure that the results could be compared with other estimated models. Moreover, AIPW uses one model to predict treatment status and another to predict outcomes, leading to a double-robust property. It is worth noting that for consistency, only one of these two models must be correctly specified for the AIPW estimator (Stata, 2013). For the PSM, the following ATE estimator was applied:

$$\widehat{\tau}_N^* = \frac{1}{N}\sum_{i=1}^{N}(2W_i - 1)(Y_i - \frac{1}{M}\sum_{j\in J_M(i)} Y_j \quad (6)$$

where M is the number of matches per unit and W_i is an indicator variable. More specifically, W = 1 indicates exposure to the treatment, while W = 0 indicates a lack of exposure to the treatment. Term $J_M(i)$ indicates the set of matches, and the superscript on $\widehat{\tau}_N^*$ indicates that matching was performed on the true PS (Abadie and Imbens, 2016).

4) Checking model balance by the overidentification test and diagnostic procedure

Imai and Ratkovic (2014) developed a test for balance, treating the assumptions imposed by balance as 'overidentifying conditions'. These results are presented in the Appendix (Table A2). We have no grounds to reject H0 which says the covariates are balanced. In accordance with Rubin (2008) and Linden and Samuels (2013), we also compare the raw and weighted differences between the control and the treated groups. In the Appendix (Tables A3 and A4), we can observe that all weighted differences are far below the recommended maximum threshold of 0.1 and the variance ratio is within the recommended interval [0.5;2]. This means that the IPW and AIPW models balance the covariates sufficiently. For the PSM estimator, we performed an analogical diagnostic procedure (Appendix, Tables A5 and A6) and created a balance box plot, while recognizing that any econometric test in this case is not available (Fig. 6).

Finally, the overlap plots for multi-valued IPW illustrate the overlapping of PS values for liberal and local orientations versus the conservative orientation as the control group in almost entire range of PS (Fig. 7).

As usual, the limitations of our research manifest as assumptions. First, we assumed that 17 years is a sufficient period for the impact of environmental policies at county level and the effect of individual behavior of citizens resulting from political orientations (value system and economic views) on environmental quality to become apparent. Some might argue that this period is too short. Second, our underlying spatial model explains approximately 60% of the variation in EQI. With reference to spatial modeling practice, this is relatively high. However, omitted variable bias could be debated here.

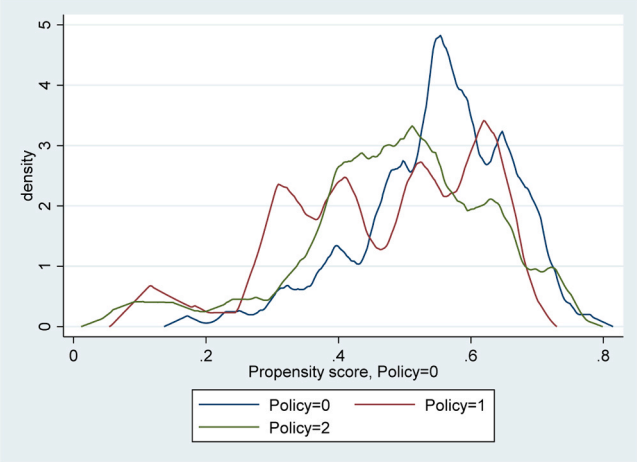

Fig. 7. Overlap plots for three-valued treatment effects. Notes: Policy1- = LIBERAL, Policy 2 = LOCAL, Policy 0 = CONSERVATIVE (ref.).

4. Results of estimating treatment effects and discussion

The spatial model explaining EQI is relatively well fitted (Pseudo R2 = 0.5911) and indicates two types of significant spatial (neighboring) effects: one for local policy and one for environmental spillovers (Appendix, Table A7). The positive spatial dependence of environmental quality was expected, indicating that a county's level of EQI covaries with the level of environmental quality among its geographical neighbors. For example, the model implies that a county's expected level of EQI might be 32.7 points lower if neighbors had an average environmental score at the minimum possible level compared to the neighbor average (Lin and Cheng, 2019).

Negative spatial dependence with regards to local policy is

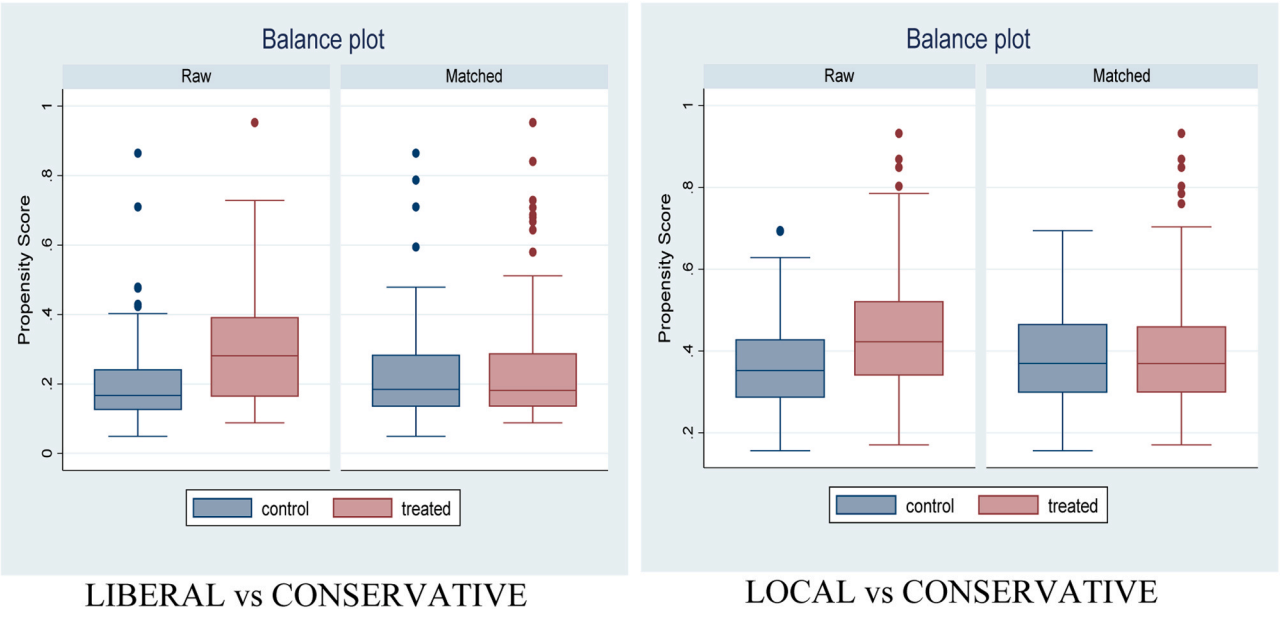

Fig. 6. Balancing properties of PSM for different policy option treatments.

particularly interesting. Such a negative spatial autocorrelation would probably occur when competition between regions for government funds outweighed cooperative factors (Saavedra, 2000; Boarnet and Glazer, 2002). There could also be a backwash effect, as discussed by Myrdal (1957). This implies that economic growth in one county can be harmful to growth in a neighboring county. This is because it may have attracted resources and skilled labor and reduced the potential to implement effective environmental protections while generating negative spillovers. Moreover, population density has a negative impact, while national and transnational policies have an expected positive influence. Therefore, this set of variables was used for estimating ATE.

The ATEs and potential outputs (POs) were estimated by different techniques, as presented in Table 2. The results are robust and very similar in each approach. Regardless the method, liberal orientation caused EQI was on average 0.028 points higher than with a conservative orientation. Further, the local orientation caused an average advantage of 0.015 points. These scores would equate to improved environmental quality measurement of 5% and 2.7%, respectively. Hence, our main finding is that localism should be considered when determining long-term environmental care, although slightly better results might refer to liberal orientations.

With regard to the liberal versus conservative options, this analysis confirms the findings of other empirical studies that revealed negative associations of conservative ideology with support for pro-environmental activities (e.g., Costa and Kahn, 2013; Hu et al., 2017; Hammar and Jagers, 2006; Unsworth and Fielding, 2014). As mentioned previously, political preferences coincide with the way people evaluate their attitudes towards environmental issues. Owen et al. (2010) argued that liberally-oriented voters consciously make sustainable decisions and consider themselves environmentalists. There is also evidence to suggest that improved environmental consciousness can persuade people to make pro-ecological choices (Kahn, 2007).

Pro-environmental intentions are crucial for explaining people's behavior, as they mediate the impacts of other factors (Bamberg and Moeser, 2007; Matuszczak et al., 2020). This is confirmed by our results, which provide an interesting insight into the TPB. The conclusion that local orientation matters infers that PBC has a greater influence on environmental awareness compared to SN imposed by authorities, which is likely to characterize conservative options. We might also consider the local orientation as a 'middle-of-the-road' option. In the studies of Mobley et al. (2010) and Cheung et al. (2019), political orientations were liberal/far left, moderate, and conservative/far right. The revealed a positive correlation between liberal and moderate orientations and pro-environmental behavior, where the liberal affiliation had a stronger explanatory power. This is also ratified quite successfully by our results (if the local orientation was categorized as a middle solution). Further, both studies suggest that people with these middle-of-the-road orientations possess a moderate level of environmental awareness. It is worth noting that this attitude was perceived as the main factor responsible for determining a positive overall effect on the environment. Leiserowitz (2005) underscored that conservatives judge the importance of the environment as lower when compared to liberals. This is particularly evident with the US Democrats. Schumacher et al. (2013) also proved that conservatives (US Republicans) are skeptical about the notion of environmental quality. Other researchers have demonstrated that a country is more committed to environmental protection if a more democratic party is in office (Neumayer, 2002; Obydenkova and Salahodjaev, 2016).

These premises also confirm our theory that liberal attitudes towards the market and an emphasis on economic growth do not necessarily contradict environmental commitment. When observing Fig. 8, it is clear that counties in Poland that are comparable in terms of their baseline features (similar PS values) and receive (or are likely to receive) local orientation treatment are scattered over all regions, regardless of geographical and historical determinants. An opposite observation concerns the liberal treatment, which is concentrated in regions that are historically determined by the Prussian partition (Fig. 9). This means that localism can be easier to promote than liberal views, even in regions dominated by a conservative system of virtues. Therefore, this can affect environmental awareness indirectly by strengthening self-efficacy, as reflected by PBC.

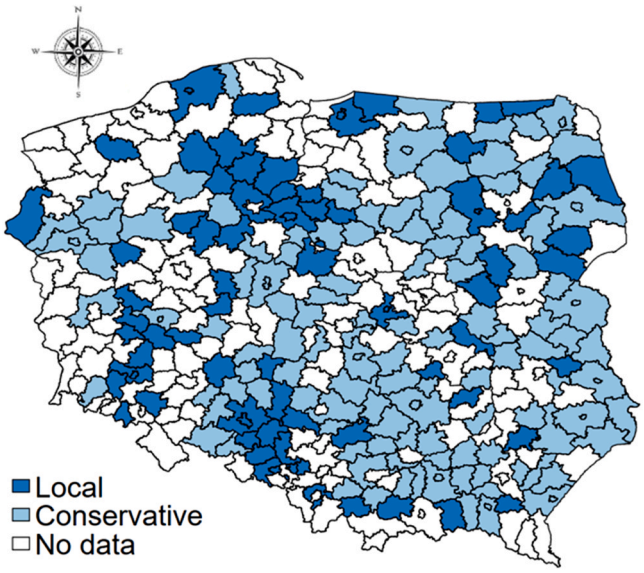

Fig. 8. Local vs conservative counties with similar PS values (mean +/- SD class, covering 68% of subjects, AIPW estimator).

5. Conclusions

In this study, we have discussed the long-term impact of political orientation (economic views and individual value systems) on environment quality, as defined from the multidimensional perspective. We also revealed the positive effects of localism and confirmed the theory concerning the positive influence of liberal orientations. Further, we have provided the methodological contribution of adopting policy treatment effect analysis, which allows the capture of spatial spillovers in environmental issues and policy and addresses the endogeneity problem that is usually linked to environmental policy.

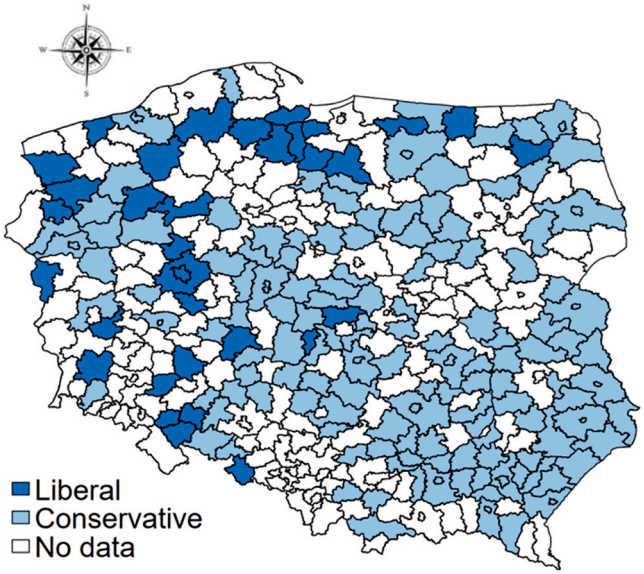

Fig. 9. Liberal vs conservative counties with similar PS values (mean +/- SD class covering 68% of subjects, AIPW estimator).

The proponents of the neoliberal model of administration and economics state that 'localism and successful devolution cannot occur without state government maintaining financial and structural support' (Eagle et al., 2017, p.13). However, according to our findings, the localism reflected by electoral preferences for local leaders (without reference to political orientations) has been beneficial to the environment over time in Poland. Meanwhile, conservative orientations (the acceptance of larger state interventionism) have resulted in a deterioration of environmental performance at the county level. Therefore, localism has greater meaning than financial and structural support of the state. Moreover, even if localism cannot exist without state support, it triggers an awareness of the need for pro-ecological change, reinforcing the self-efficacy of individuals. Poland is an excellent experimental background for assessing the impact of political orientation at the local level on environmental performance over time. This is because Polish liberalism and conservatism are represented in their purest forms, with no discrepancy between value systems and economic perspectives. Liberal voters in Poland are generally in favor of economic freedom and an open hierarchy of values. By contrast, conservative voters reflect an opposite mindset. Hence, our research suggests that another explanation should be sought to explain why the conservative option is not environmentally friendly (as stated by previous research). In all probability, the problem is not in the approach to economic freedom and state intervention. Rather, it is caused by moral obligations, attitudes, and PBC assumed by the TPB. Subjective norms generally become ineffective behavioral stimuli when considering pro-environmental attitudes, which is consistent with the results of this analysis. This creates an interesting and fruitful direction for further research and formulates general recommendations for policy makers: even in conservative surroundings, localism can enhance environmental management.

When considering detailed recommendations, once again we should refer to the process described in Fig. 1, which shows that environmental quality is shaped by two factors: citizen behavior and environmental policies. However, the latter is influenced by the political orientations of the citizens, especially in terms of their system of values (as concluded in our study). Hence, a loop is created for which there are two possible solutions: break the loop or focus on the broader institutions that build the system of values. To break the loop, the solution could involve the establishment of apolitical agencies dealing with environmental protection. In the current world of cataclysm, environmental protection is the duty of every person. Hence, it should not be influenced by the political option currently in power. However, such a solution requires the creation of a robust, fixed, and watertight legal framework by the ruling party. The second solution requires identifying the institutions that influence individual value systems. Although the debate could be protracted, three groups of institutional variables play a key role in Poland: religion (the Catholic Church), education, and international integration (influence of transnational environmental policies within the EU).

Spatial regression indicated that the impact of the transnational policy is relatively strong. Therefore, greater coordination of domestic and transnational environmental policies is recommended. For example, positive incentives triggered by agri-environmental CAP schemes could be reinforced by offering support for photovoltaic development with environmentally oriented farmers. The demand for coordination and deeper cooperation should also apply to the policies of individual counties, which were characterized by negative spatial dependence in our study. From this, we conclude that local committees (in particular) should cooperate more effectively with each other, instead of competing for environmental funding. This suggests a broader conclusion: environmental funds should be allocated on an egalitarian basis, not on competitive aspirations. The other two factors mentioned (church and education) are evident in many countries. They should never be directly related to politics. This also applies to Poland, where the Catholic Church and the conservative option support each other, producing governments that implement far-reaching reforms to the education system. This is why the voice of the supranational hierarchy of the Catholic Church (emanating from the Vatican) and preserving the maximum autonomy of higher education (universities) is so important. The Vatican took a tentative step in the right direction when pope Francis suggested adding a chapter on 'Ecological Sin' to the official Catechism of the Catholic Church (Connolly, 2019). The question then becomes to what extent conservative parties (who declare Christian and Catholic systems of values) take this voice into consideration within their manifestos.

CRediT authorship statement

Bazyli Czyżewski: Conceptualization, Investigation, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Visualization, Supervision. **Jan Polcyn:** Data curation, Writing – review & editing, Resources. **Agnieszka Brelik:** Writing – review & editing, Visualization, Resources.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.envsci.2021.11.001.

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