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Liberté, Égalité, Fraternité? The role of spatial inequalities in understanding the determinants of the populist vote in the 2022 French presidential election

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ABSTRACT

In April 2022, the French presidential election was held, where two candidates faced each other in the second round, one who embodied the Europeanist and pro-establishment option (Macron) and the other the populist option (Le Pen). This situation, combined with the high level of spatial disaggregation of socioeconomic information within the French statistical system, makes this case especially interesting for analysing how the persistence of spatial income inequalities at the local level, which 'leaves behind' certain areas from general socioeconomic progress, contributes to the increase in populism and antisystem political options. After applying a model controlling for the spatial dependence of the data and checking endogeneity issues, it is possible to verify that local spatial income truly matters in understanding the dynamics of political discontent. The relative income position of each locality within a group of neighbours is important in the sense that, after controlling for several place-specific characteristics, local areas that are poorer than their neighbours tend to have a higher antisystem vote share, and vice versa. Other relevant conclusions are obtained that confirm and expand conclusions from the 'geography of discontent' literature and remark on the importance of cohesion policies at the local level for reducing the populist vote.

KEYWORDS

Spatial income inequalities, left-behind places, geography of discontent, Euroscepticism and France

JEL R19, P25, C21

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1. INTRODUCTION

In the last decade, we have witnessed a wave of political discontent that has materialised in the forceful emergence of antisystem political options. In the case of Europe, these have sometimes had a markedly anti-European character. On many occasions, these parties have come to power, causing irreparable damage to social coexistence and economic stability. The case of the United Kingdom (UK) is the most dramatic: after seven decades of European Union (EU) construction focused on economic and social improvements, the citizens of the UK surprised the rest of the Union by voting for Brexit and opening the door to instability and setbacks that have been

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magnified over the last five years. The triumph of far-right options in Hungary and Italy has also resulted in populist heads of state and threatened the European project.

In this context, the tenth French presidential election held in April 2022, in which the extreme right-wing candidate Marine Le Pen presented herself with a marked anti-establishment discourse, was followed by clear concerns and attention from the rest of the EU. Marine Le Pen passed through to the second round of the elections, forcing French citizens to choose between the European and pro-establishment proposal represented by Emmanuel Macron and the populist alternative embodied by Marine Le Pen. Voters of other options, such as that represented by Jean-Luc Mélenchon, who obtained good results in the first round, had to decide between Macron or Le Pen in a second election. Although Le Pen gained great support throughout France, there was notable social rejection of Le Pen's proposals. There were numerous protests in many French cities in opposition to the radical ideological principles of the party led by Le Pen. Macron finally won 58.54% of the vote, bringing some relief to the rest of Europe.

From an academic standpoint, similar to Brexit or other European countries' consultations, this election has provided social science researchers with an extraordinary framework for understanding the dynamics of discontent reflected through the vote and for exploring the reasons behind the growth of anti-establishment political options. The French case is particularly interesting due to the quality of the statistical information available at a very spatially disaggregated level, enabling a highly precise geographical analysis of the relevance of France in European construction as well as of the social and political complexity of the country. Nevertheless, compared to the large number of works that have analysed Brexit from different angles, the number of works that have analysed the French case is still very limited (see, however, Bourdin & Torre, 2022, and Torre & Bourdin, 2022).

This paper analyses the results of the most recent French presidential election (April 2022) to understand the role that spatial income inequalities at a very local scale have played in establishing political discontent. Economic inequalities throughout the territory are expressed through multiple observable variables that report aspects related to income, the dynamism of the labour market, demographic trends and other social development indicators. This work will pay particular attention to spatial income distribution by employing data at the local disaggregation scale in which the research is framed. Additionally, different control variables, whose analysis and interpretation are likely equally relevant, will be considered.

Several commentators have put forward the idea that this election, with its unprecedented confrontation between populist values and an extreme centre, was an expression of the rising contestation and endangerment of the famous motto of the French Republic: '*Liberté, Egalité, Fraternité*' (Benmouffok et al., 2023).

This work will follow the rationale of the study conducted by Gutiérrez et al. (2021), which starts from the ideas proposed by McCann (2016) and Rodríguez-Pose (2018), among others, who explain the growth of antisystem political options as a reaction to the lack of opportunities and the persistence of income inequalities in some places (European Commission, 2015). Using the terminology proposed by Rodríguez-Pose (2018), we are facing a 'revenge of places that do not matter'. This sentence describes how deprived areas, as the main enclaves of support for populist political alternatives and the usual bearers of anti-European, anti-immigration or anti-globalisation sentiment, vote against institutions that are considered to have forgotten those areas' needs and failed to provide solutions to their concerns. McCann (2016) highlights the misconception that metropolitan elites are the only ones who have benefitted from the EU. As McCann (2016) notes, although many of these weaker regions have certainly seen the downside of internationalisation, belonging to the EU actually mitigates those perverse effects, although this reality does not reach the population, given the growing disparities. Both Rodríguez-Pose (2018) and McCann (2016) agree that territorial inequality is what matters; this is not to say

that interpersonal inequality is not important, but rather that the challenge to the system stems from this neglected source of inequality.

To test whether the hypothesis presented holds in the case of the French presidential election, we conduct a local-scale analysis of the populist vote in France to understand how the results were affected by the relative income of each place with respect to spatial context; in other words, we will test whether those municipalities that presented a worse income position relative to their closest municipalities cultivated a greater antisystem vote. Naturally, our aim is not intended to stigmatise economically deprived areas, nor to conclude that the anti-system vote is germinated exclusively in these places. On the contrary, what it desired is to verify that the existence of spatial income inequalities can lead to the rise of discontent among the population, which can translate into political discontent reflected in greater support for anti-system parties. Rather than blaming these areas for increasing the anti-system vote, what we want to highlight is that the existence of strong economic inequalities at the local level not only can generate important social and ethical implications, such as lack of individual opportunities, resources and in essence a lack of territorial and social cohesion, also it could be one of the seeds that fuel political instability in the national sphere according to the literature on the 'geography of discontent'. As will be justified, the focus is on seeing the role of spatial economic inequalities in the rise of anti-system parties in France, but we are aware that many other factors can be the breeding ground for these parties, for this reason, as previously underscored, many other sociodemographic factors will be considered as possible sources of radical support. This analysis contributes to the previous literature by analysing the similarities and differences between the socioeconomic determinants of voting patterns in France and the UK elections.

The paper is organised as follows. Section 2 briefly reviews the extensive literature on the geography of anti-European sentiment, focusing on previous analyses of the French case. This review helps identify the dimensions that we must consider in our analysis. Section 3 introduces the empirical setting of the study: the spatial unit used (municipalities), our response variable and the set of explanatory factors we intend to use to quantify the dimensions of the phenomenon, with special attention given to our measure of local inequality. Section 4 feeds all the information provided into the chosen spatial dependence specification. The results are presented and discussed in Section 5. The paper concludes with a final summary and policy recommendations in Section 6.

2. WHERE DID THE ANTISYSTEM VOTE TAKE ROOT? BREXIT LESSONS AND LINKS WITH THE FRENCH PRESIDENTIAL ELECTION OF 2022

Globalisation and free trade have profoundly changed national economies over the past several decades. Some regions, especially urban areas and metropolises, have greatly benefited, while others more exposed to trade shocks have not been as fortunate. In developed economies, regions dominated by industries vulnerable to overseas competition have experienced rising unemployment rates and declining incomes (Autor et al., 2016). This reality has been aggravated by the Great Recession that began in 2008, during which the EU responded with budget cuts and austerity measures, which were often followed by declining government revenues, worsening social instability and unrest (Ponticelli & Voth, 2020). Perceived competition for reduced public services and declining economic opportunities drove support for the anti-immigration and economic nationalism of far-right parties (Algan et al., 2017; Artelaris & Mavrommatis, 2021; Cremaschi et al., 2022; Steiner & Harms, 2021). This social downwards spiral left individuals in these 'left-behind places' to experience political distrust and discontent, especially if they were also educationally, economically, technologically and occupationally disadvantaged (Abreu & Jones, 2021; Abreu & Öner, 2022; Alabrese et al., 2019; Curtice, 2017; Lenzi & Perucca, 2021; Luukkonen et al., 2022 and, among others, Stein et al., 2022).

In this sense, as noted by Goodwin and Heath (2016), the geography of deprivation and prosperity both interact with and overlay each of the individual-specific explanatory variables. Rodríguez-Pose (2018) pitches a stirring idea, namely, the 'revenge of places that do not matter', whereby those areas specialised in declining activities and located on the periphery voted down a system that they perceived to have quelled their potential; instead, they went down a road in which the future offers no opportunities, no jobs and no hope (see also Dijkstra et al., 2020). In line with this idea, Los et al. (2017) highlighted that people in less prosperous regions who sensed they had suffered under modern globalisation were much more likely to vote to leave the EU.

With these ideas in mind, Gutiérrez et al. (2021) proposed an analysis of the proleave vote in the case of the UK that uses information at a local level (local authorities), confirming that the behaviours identified in the literature at a regional scale are verified more clearly when local data are used. In addition, the authors introduce a new relative spatial income inequality indicator that is significant in their study. According to the analysis by Gutiérrez et al. (2021), the income position of a place relative to its closest neighbours (that is, the differences with the closest spatial context – intraregional or metropolitan) is equally or even more relevant than the spatial inequality between regions or the overall level of income. This conclusion reinforces the idea put forwards by McCann (2018) regarding the 'revenge' of 'left-behind places' but on a local scale.

The problem is to find examples of similar predicaments, where voters have to decide between two clearly differentiated positions of maintaining the *status quo* versus an antisystem proposal and populism. From the point of view of academic analysis, it is difficult to use ordinary electoral processes to test the idea of the 'geography of discontent', since such elections normally involve voting for complex options, including several close alternatives in the political spectrum, i.e., leaders with different charismas and the influence that local leaders can exert. However, the French presidential election system, being a two-round process in which no candidate reaches a majority in the first round, 'incidentally' caused a situation very similar to that of Brexit. In the April 2022 presidential election, the two candidates running for the seat in the second round represented two totally opposite positions: on the one hand, the far-right candidate from the *Rassemblement National* (RN) party, Marine Le Pen, presented herself with a marked anti-establishment platform and on the other hand, Emmanuel Macron from the centre-right party, *La République En Marche* (LREM), embodied pro-European and prosystem political values. Given the diametral confrontation between the candidates, we can analyse this second round using the same logic as that used in the approach proposed by Gutiérrez et al. (2021).

Populism is defined above all as a systematic appeal to the people to oppose the 'elites'. 'People' are described as a single body dispossessed of its sovereignty by an oligarchic and distant political elite. Populists claim a monopoly on the representation of 'authentic' people, making themselves spokespersons of the 'forgotten' ones or the 'silent majority' against the alleged abuses of the 'system' or 'establishment'. The second central idea of populism is that it refers to a plurality of underlying ideologies ranging from national populism to social populism. In Europe, populism is mainly represented by radical right-wing parties, such as Marine Le Pen's *Rassemblement National* in France, Giorgia Meloni's *Fratelli d'Italia* in Italy and Geert Wilders' *Freedom Party* in the Netherlands (Stavrakakis et al., 2017); however, according to several authors, populism can also be found on the left of the political spectrum, in new radical left-wing parties such as Jean-Luc Mélenchon's *La France Insoumise* in France, Pablo Iglesias Turrión's *Podemos* in Spain, and Aléxis Tsípras's *Syriza* in Greece (Mudde & Rovira Kaltwasser, 2013). As in many Western democracies, the rise of populist forces in France is intimately linked to the deterioration of living standards of the middle and working classes. The 2008 financial crisis accentuated the effect of this deterioration (Cox, 2017). In France, the fact that the RN has partly supplanted the *Parti Communiste Français* (PCF) among the working-class electorate is symptomatic; the political force that industrialised society conferred on the working classes has disappeared (Ivaldi,

2019). In addition, two major events affected French society and led to significant changes, with significant spatial consequences. The first is the regional reform, which was carried out in 2015 and led to the merger of several regions into larger entities. Literature confirms that individuals' well-being is highly connected to the geographical space in which they live (Ala-Mantila et al., 2018). In this sense, in the French context, empirical evidence has shown that the mergers of territories derived from the reform resulted in a significant improvement in the economic development of those areas that acquired a larger geographical size, for instance, they presented rapid decreases in unemployment rates (Wilner, 2023), which translates into greater well-being of individuals. The second is the revolt of the yellow vests, which occurred in 2017 during Emmanuel Macron's first presidency. This revolt began in response to the government's plan to limit the speed on motorways and impose taxes on fuel. It took the form of numerous violent demonstrations and occupations of roundabouts by protesters from medium-sized cities, suburbs and peripheral areas. They expressed their remoteness from centre areas and the need to use their vehicles for work or personal journeys. Their sensitivity to the spatial dimension and geographical isolation are very important in this situation (Bourdin & Torre, 2022).

Related to these events, Emmanuel Macron's surprising victory in the 2017 presidential election shook up a multitude of benchmarks in electoral analysis. Maps published in the aftermath of presidential elections with the electoral results, which were enough to identify the most significant political cleavages, seemed to have disappeared. The traditional left and right parties collapsed in electoral scores in favour of centrist votes embodied by Emmanuel Macron on the one hand and extreme votes on the other hand (Bourdin & Torre, 2022). The electoral France that took shape on 23 April 2017 was clearly more complex than it had been in the past, confirming the emergence of new cleavages. As a result, the logic of class voting was profoundly transformed. The geographical fractures of socioeconomic poverty widened, and the optimism–pessimism divide emerged as a new reading grid (Bourdin & Tai, 2022; Evans, 2018). Clearly, the results of this recent presidential election and the 2022 legislative elections that followed further accentuated that trend. Today, there are three major forces in France, namely, the LREM, the centrist party of Emmanuel Macron (approximately 28% of the votes cast), the RN of Marine Le Pen, and the *La France Insoumise* of Jean-Luc Mélenchon (approximately 22–23% each).

Moreover, geographical divisions and opposition are particularly important. As in the UK, opinions and political feelings are clearly distributed according to the locations of the populations (Bourdin & Torre, 2022). Large cities' inhabitants often appear privileged because of their proximity and easy access to services, especially public services. In contrast, people living in the suburbs – especially those in even more rural areas – are facing a decline in public services (hospitals, maternity hospitals, schools, post offices, perceptions, etc.), meaning they have to make important journeys to carry out their daily activities. These individuals feel a significant loss of well-being and a strong resentment against the elites, who have seemingly deprived them of these services for their own benefit. Finally, the inhabitants of certain areas (especially in the north and east of the country) were impacted by the strong deindustrialisation movement that affected France in the 2000s (Wicke et al., 2018). Essentially, workers and employees, often either unemployed, reduced to very temporary jobs or who confront these issues in their family, tend to engage in extreme and antisystem forms of voting, especially in favour of far-right parties.

3. EMPIRICAL SETTING: SPATIAL UNIT OF ANALYSIS, VARIABLES AND DATASET

3.1. Spatial unit of analysis: local administrative units (LAUs)

The 'geography of discontent' is the strand of literature in the field of regional science that explores the link between support for antisystem political narratives and different socioeconomic and demographic factors observed across the territory. This is how the concept of 'left-behind

places' has arisen, i.e., as stagnant territories, without prosperity and/or opportunities. Although early works, such as that of Rodríguez-Pose (2018), referred to regions or areas of a certain dimension, the tendency has shifted towards 'places', referring to local areas. In this sense, one of the main challenges of this study is obtaining statistical information at a disaggregated scale to capture territorial economic inequalities at this narrow spatial level.

Fortunately, the French statistical system provides a wide variety of relevant economic, social, demographic and political information at a large scale of disaggregation. Some databases offer information at an inframunicipal scale (see, for example, the IRIS: *Ilots Regroup´es pour l'Information Statistique*); however, when we descend to this level of spatial disaggregation, it is difficult to obtain crucial information to develop this analysis, such as data on electoral results. The municipality is the smallest administrative subdivision for which there is common data for all variables considered in the analysis. This level of spatial aggregation matches the so-called local administrative unit (LAU) established in the Nomenclature of Territorial Units for Statistics (NUTS), which is the official system for dividing the EU economic territory. LAUs represent a subdivision of NUTS3 regions, being the most disaggregated administrative units with harmonised statistical information for EU member states. Currently, France has 34,966 LAUs. However, due to some limitations on data availability for many LAUs, in this analysis, we work with a subsample of 31,015 of these LAUs. Statistical information restrictions are mainly related to economic variables, as we will detail later, as the principal reason for missing data is statistical secrecy.

3.2. Dependent variable: the decision between Macron vs. Le Pen and the role of Mélenchon

As stated previously, the two-round French presidential election system gives us an opportunity to study the 'geography of discontent' in a similar framework to that of Brexit and what it entailed for the UK. After the first round, in which runners from all parties competed against each other, the most voted for candidates who progressed to the second round were Emmanuel Macron and Marine Le Pen. Each represented a completely opposite vision. Le Pen embodied the populist, far-right model. In contrast, Macron represented a prosystem and pro-European Union political option. In this sense, this second round could be interpreted as a legitimacy test of the *status quo*. Therefore, in this analysis, we will use the votes in favour of Macron and those in favour of Le Pen as the independent variables of our models, where we will compare how different socioeconomic and demographic factors are linked with the support received by the two voting options.

Although we are mainly interested in the second round, it is interesting to compare the 'radical' choice in the second round with the results of the first round, where the two candidates mentioned earlier competed with others who represented different positions between the pro-establishment or anti-establishment options. The votes that Mélenchon received in the first round are particularly interesting, as his results were very close to those of Le Pen (23.15% for Le Pen, 21.95% for Mélenchon). The decision made by Mélenchon's supporters – discontented citizens who channelled their opposition to traditional policies into a left-wing option – could have tipped the balance and driven Macron to victory. For this reason, we include an analysis of the first round to cross-compare the relationships between the socioeconomic characteristics in the model estimated for each of the three main candidates in the election. We also aim to understand possible second-round effects derived from the interaction between the two main options and this third player, or, in other words, to determine whether the presence or absence of candidates can radicalise the vote. Additionally, the socioeconomic determinants of abstentionism are studied in such a polarised context, which, in line with Bourdin and Tai (2022), could also represent individuals' discontent.

Figures 1 and 2 show the geographical distribution of the votes for Le Pen and Macron in the second round (Figure 1) and those for the two candidates plus Mélenchon in the first round (Figure 2). Figure 1 shows how support towards Macron dominates in the wealthiest regions

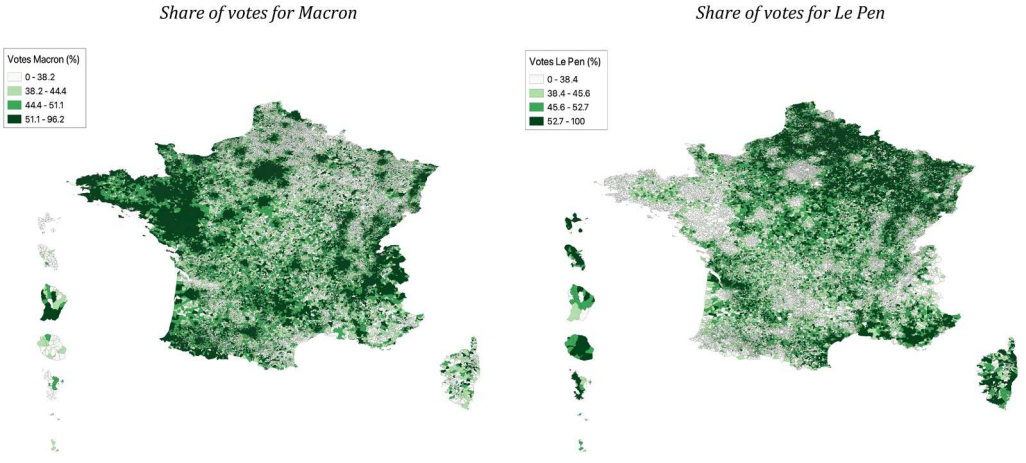

Figure 1. Second round of presidential elections, April 2022: share of votes for Macron and Le Pen by municipality (LAU).
Source: own elaboration using data from the French Ministry of the Interior.

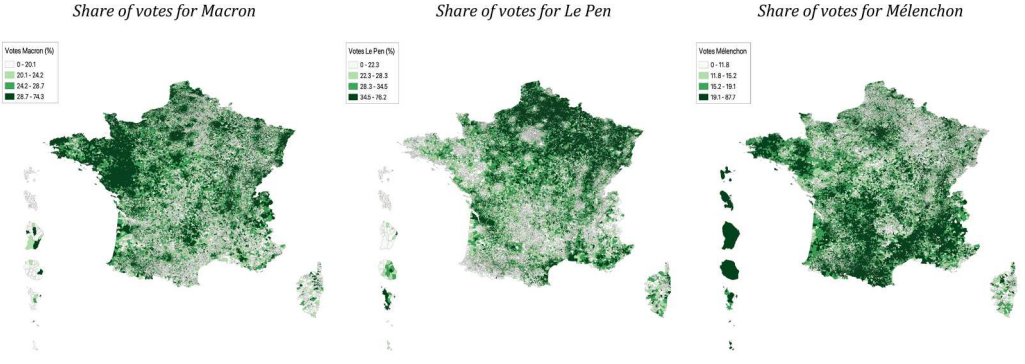

Figure 2. First round of presidential elections, April 2022: share of votes for Macron, Le Pen and Mélenchon by municipality (LAU).
Source: own elaboration using data from the French Ministry of the Interior.

and the most populated urban areas (among which Paris stands out), while Le Pen leads in the most disadvantaged or peripheral municipalities. In Figure 2, the geographical pattern observed for the two main candidates is less marked, with Mélenchon showing some ability to capture the disaffected vote of the peripheral industrial areas of Paris and other large urban areas of the country.

The spatial content of these votes is particularly striking. At first sight., Macron's voters are mainly located in the west of the country and in cities, i.e., in territories marked by regular development in the twenty-first century and by very easy access to public services. For example, motorways are free of charge in Brittany, which is an exception in the French landscape, and the density of towns and villages is very high in this region. On the other hand, with a few exceptions, Le Pen voters are mainly located in northern and eastern France. These old industrial zones were the most prosperous and richest in the twentieth century and were recently affected by massive deindustrialisation. The countryside is deserted by public services, and cities are characterised by

numerous shops and services. It should be noted that the latest censuses show an internal migration from these areas to the benefit of the southern and western regions, which present themselves as the most dynamic in economic and demographic terms (INSEE, 2023). The votes for Mélenchon are more urban than those for the other two competitors and remain an important characteristic in the southwest, which has been a traditional land where the left has had a footing, especially of radical and socialist parties, for more than a hundred years.

3.3. Our main explanatory variable: a measure of relative local spatial income inequality

The main objective of this paper is to explore and analyse how the discontent associated with spatial income inequalities at a local scale affects the populist vote. In practical terms, this translates into looking for the relationship between a vote for Le Pen, as the main representative of the populist vote in the second round of the French presidential election in April 2022, and spatial inequalities in terms of per capita income at the local level. As mentioned before, a fundamental requirement for this analysis is to have statistical information available at the local level, especially reliable income data at a high level of spatial disaggregation, to capture the 'geography of discontent'.

The median income per capita at the LAU level is employed to calculate a relative measure of economic spatial inequality. This particular variable is selected because it is the only proxy related to individuals' income for which there is information for a substantial number of observations at the most detailed geographical level, LAUs. For this purpose, median income per capita statistical data are obtained from the French National Institute of Statistics and Economic Studies (INSEE). This information exists for a total of 31,015 LAUs. Income-related data are not available for a total of 3951 LAUs (small municipalities with fewer than 50 households and fewer than one hundred inhabitants, subject to statistical confidentiality). Even considering this limitation, we gather information for almost 90% of French municipalities, which allows us to measure the territorial income imbalances associated with the phenomenon of voting for antisystem political parties, linked to the discontent potentially created by spatial inequalities. Figure 3 represents the median income per capita (€) in each LAU in 2018 (the last year available). It is clearly observed that income is not distributed evenly throughout the national territory. In general, the most dynamic municipalities, such as Paris, Marseille and Lyon, are surrounded by LAUs with high incomes. However, if we look in more detail, low-income levels are not only found far from the metropolises; within the developed areas, there are also large spatial inequalities in terms of income at the local level. For instance, the case of the Paris metropolitan area is particularly relevant.

As mentioned, median income per capita statistical information is mainly obtained for assessing spatial economic inequality. As in Gutiérrez et al. (2021), we construct an indicator representing the relative average difference in the local median income between a municipality and its hundred nearest neighbours. The definition of this measure, which intrinsically considers the spatial dimension, allows us to analyse the link between the spatial pattern of the vote share of the candidates (Figures 1 and 2) and the relative income differences that may exist within a vicinity.

This indicator ($Diff_i$) is defined as follows:

$$Diff_i = 1/n \sum_{i,k}^{n} \left(\frac{Minc_i - Minc_k}{Minc_i} \right) \qquad i \neq k \,;\, n = 100 \tag{1}$$

where $Minc_i$ is the median income per capita in spatial unit i, and $Minc_k$ is the median income per capita in spatial unit k. The absolute value of this index shows how close or far a spatial unit is with respect to its n closer neighbours (one hundred, in our case) in terms of median income per

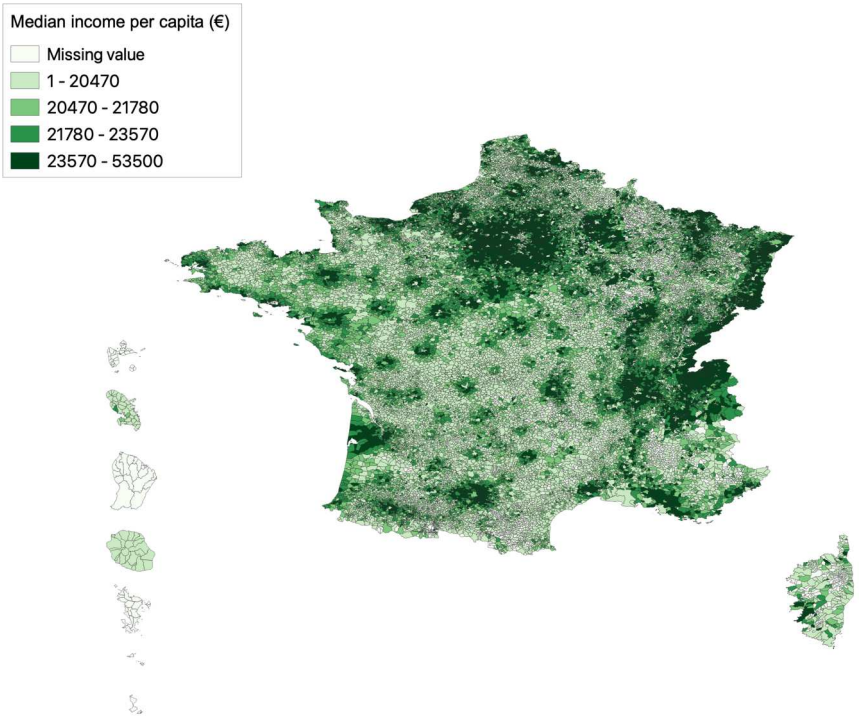

Figure 3. Median income per capita (€) by municipality or LAU (2018).
Source: own elaboration using data from the INSEE.

capita, which is positive if the region is above the average within its defined vicinity and negative if it is below. The duality of the index (positive/negative) makes it a very strong tool despite its simplicity, as it differentiates two types of inequalities, namely, a better or a worse situation relative to that of the neighbouring localities.

Although there is no objective way to determine the optimal neighbourhood size (n), a high number of neighbours, one hundred, is used for two reasons. First, when dealing with numerous small spatial units, considering a larger number of neighbours is essential to account for potential spatial dependencies. Second, a cluster analysis of the dependent variables was conducted to observe possible underlying spatial patterns. This analysis identified vote clusters for the various candidates, each encompassing a great number of municipalities. Carrying out this cluster analysis made it possible to rule out the use of contiguity neighbourhood matrices or those that consider a reduced number of neighbours.

The French case is especially interesting because spatial inequalities in terms of income at the local scale, as shown in Figure 3 and measured through the variable $Diff_i$, are signals of the economic deprivation of certain municipalities compared with their surroundings. We consider that this economic territorial imbalance could be a source of discontent and, therefore, one of the reasons why certain segments of the population voted against the system. These claims align with the economic studies of Los et al. (2017) and Rodríguez-Pose (2018), who show how individuals unhappy with their disadvantaged economic situation take 'revenge' on so-called metropolitan elites during political elections. In this vein, we expect a negative and significant relationship between antisystem vote shares and the spatial relative inequality indicator ($Diff_i$) introduced in this analysis; i.e., the lower the value of the indicator (meaning more negative and, thus, a worse economic performance of the area relative to its neighbours), the greater the share of antisystem votes.

3.4. Sources and definitions of the control variables

To build our models, we include a set of other variables that have been identified in the literature as relevant for properly explaining the vote. In line with the studies reviewed in Section 2, previous papers consider the economic, demographic, educational and cultural scenario, along with labour market conditions and the ideological position regarding international economic integration (e.g., Euroscepticism), as drivers of the vote results (Arnorsson & Zoega, 2016; Becker et al., 2017; Clarke et al., 2017; Crescenzi et al., 2017, among others).

Following the trend established in previous empirical exercises, this analysis includes as many reviewed drivers as possible to explain voting decisions at the local level across French territory. Table 1 summarises all available variables at the local level. Table 2 presents the main descriptive statistics of each variable included in Table 1.

4. EMPIRICAL MODEL SPECIFICATION AND ECONOMETRIC STRATEGY

In our approach, we are working with highly disaggregated spatial data (local scale); in addition, as shown in Figures 1, 2 and 3, the geographical distribution of the variables of interest appears to be far from random. Both the distinct spatial pattern of the vote data and our research interest in the neighbourhood effect linking relative inequality to vote results lead us to adopt a spatial econometric approach.

As expected, Table 3 shows that the vote results for each candidate in both rounds are affected by a process of spatial autocorrelation; i.e., both Global Moran´s I and Geary C statistics, which are tests typically used for determining whether there is spatial autocorrelation, are positive and significant, indicating spatial autocorrelation in the voting pattern for each candidate. This confirms that the vote results in each municipality are positively related to those of its closest spatial units.

Figure 4 presents a standard exploratory spatial data analysis[1] (ESDA) (Anselin, 1999) for the case of the votes for Le Pen in the second round. This examination allows us not only to graphically observe the confirmed global spatial autocorrelation process through the Moran scatterplot but also to analyse the process of spatial autocorrelation from a local perspective through the local indicator of spatial association (LISA) cluster map or local Moran´s I cluster map.

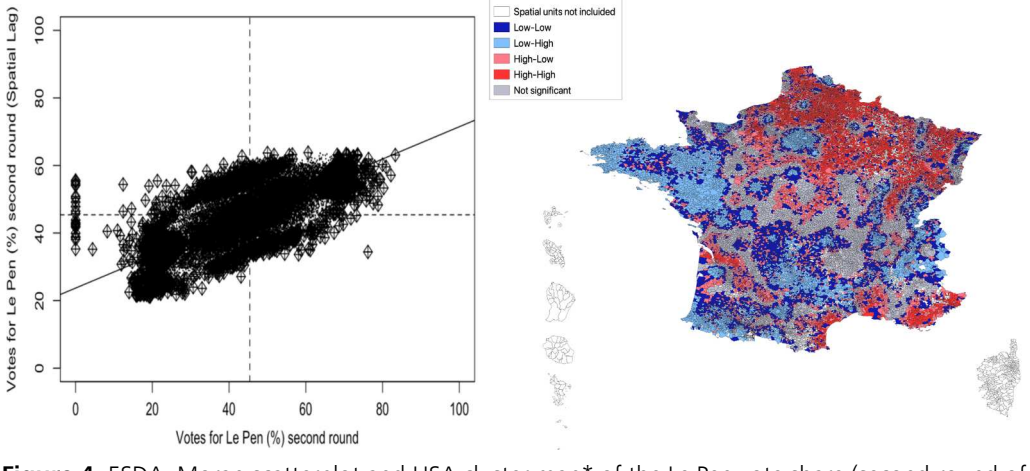

Figure 4. ESDA: Moran scatterplot and LISA cluster map* of the Le Pen vote share (second round of the presidential elections of April 2022). *Only those clusters that are significant at the maximum of 10% are presented in the figure on the right. Source: own elaboration.

Table 1. Variable definitions and sources.

Variable	Definition	Source
Dependent variables (Cand)		
Votes for Macron	% votes for Macron over the total votes of each municipality in the first or second round	French Ministry of the Interior
Votes for Le Pen	% votes for Le Pen over the total votes of each municipality in the first or second round	
Votes for Mélenchon	% votes for Mélenchon over the total votes of each municipality in the first round	
Independent variables		
Difference income neighbour's indicator (*Diff*)	Relative difference in local median income with respect to the hundred nearest neighbours	French National Institute of Statistics and Economic Studies (INSEE)
Unemployment rate (*Unem*)	% of unemployed people over the total active population in each municipality	
Agriculture (*Agri*)	% of active population working in agriculture, aged 15–64 years, over the total active population in each municipality	
Artisans, merchants and entrepreneurs (*Creat*)	% of active artisans, merchants and entrepreneurs, aged 15–64 years, over the total active population in each municipality	
Highly skilled occupations (*Skill*)	% of highly skilled active population, aged 15–64, over the total active population in each municipality	
No qualifications (*Nonq*)	% of the out-of-school population aged 15 or over, without a diploma or no more than primary education	
Highly qualified (*Highq*)	% of the out-of-school population aged 15 or over, with education equal to or higher than a bachelor's degree or professional certificate	
French population (*French*)	% of the population of each municipality that was born in France	
Immigrants in 2008 *(Immig)*	% of the population of each municipality in 2008 that was immigrant	
People under 30 (*Young*)	% of the population of each municipality under 30 years old	
People over 60 (*Old*)	% of the population of each municipality over 60 years old	
Reform (*Reform*)	Dichotomous variable that reflects those municipalities affected by the reform relating to the merger of territories since 2015	

Source: own elaboration.

Table 2. Main descriptive statistics.

Variable	Mean	St. Dev.	Min.	Max.
Dependent variables (Cand)				
Votes for Macron 1st round (%)	24.87	6.23	0	55.24
Votes for Macron 2nd round (%)	45.07	9.47	0	79.68
Votes for Le Pen 1st round (%)	16.04	6.21	0	68.49
Votes for Le Pen 2nd round (%)	45.39	10.14	0	83.33
Votes for Mélenchon 1st round (%)	16.05	6.21	0	68.49
Independent variables				
Diff income neighbours	−0.01	0.09	−0.87	0.57
Unemployment rate (%)	10.58	4.83	0	100
Agriculture (%)	10.53	14.61	0	100
Artisans, merchants and entrepreneurs (%)	16.23	11.96	0	100
High skill occupations (%)	21.05	13.21	0	100
No qualifications (%)	21.67	6.87	3.16	60.86
Highly qualified (%)	42.73	9.41	13.24	86.75
French population (%)	95.74	4.25	41.41	100
Immigrants in 2008 (%)	3.91	3.87	0	52.28
People under 30 (%)	31.21	5.70	4.35	59.52
People over 60 (%)	29.01	8.04	5.11	71.32
Reform			0	1
Observations				31,015

Source: own elaboration.

Table 3. Global autocorrelation tests. Global Moran´s I and Geary´s C tests.

Dependent variables (*Cand*)	Global Moran´s I		Geary´s C	
	Statistic	p value	Statistic	p value
Votes for Macron 1st round (%)	0.348	0.000	0.648	0.000
Votes for Macron 2nd round (%)	0.447	0.000	0.552	0.000
Votes for Le Pen 1st round (%)	0.512	0.000	0.484	0.000
Votes for Le Pen 2nd round (%)	0.477	0.000	0.519	0.000
Votes for Mélenchon 1st round (%)	0.390	0.000	0.604	0.000

Source: own elaboration.

First, the Moran scatterplot on the left of Figure 4 shows a clear positive relationship between the percentage of votes for Le Pen in a municipality and that of its hundred nearest neighbours. The local process of vote clustering can be seen on the map on the right. This analysis confirms that although, on average (see Global Moran´s I in Table 3), there is a positive spatial correlation, there are different kinds of spatial processes at the local level.

As expected, clusters of high–high support for Le Pen in the second round were observed mostly in the northern and eastern parts of France, revealing there were LAUs with high support for Le Pen surrounded by municipalities that also preferred that candidate. This is consistent with our expectations and with the fact that there is a strong presence of discontented voters

concentrated in places experiencing the same feeling of abandonment and processes of deindustrialisation. Clusters of low–low support represent those municipalities that gave low support to Le Pen and that are also surrounded by LAUs with the same preference. Light red and light blue colours highlight groups of LAUs with contrasting voting patterns. The case of the metropolitan area of Paris is remarkable, as it forms a cluster of low–high support for Le Pen, meaning that municipalities in that area did not support Le Pen but were surrounded by municipalities that strongly supported that candidate. This difference totally covers the reality of the situation, in which the very urban and gentrified municipalities of central Paris voted for Macron (or Mélenchon in the first turn), while the more peri-urban, rural and peripheral municipalities of the region, remote and in need of public services, voted for Le Pen. The pattern shown in Figure 4 consistently follows the spatial distribution outlined in Figure 1, indicating that our choice of neighbourhood appropriately comprises the spatial relationship of the analysis.

As shown in Figure 4, significant processes of spatial autocorrelation are identified for each of the candidates considered in each round. The case of Macron in the second round, which is reflected in the right part of Figure A4. in Appendix A in the online supplemental data, deserves to be particularly highlighted. In contrast to the case mentioned for Le Pen in Figure 4, a large positive autocorrelation is identified in the western part of the Paris metropolitan area, which translates into a cluster of high–high support for Macron related to the highly gentrified character of the places and voters. In summary, the significant process of spatial autocorrelation identified through the ESDA analysis allows us to reach two important conclusions. First, the vote carried out in each municipality was not independent of the vote in the other municipalities. Rather, it broke with the necessary assumption of independence between the observations, which is key in most common econometric models such as ordinary least squares (OLS). Second, in all cases, the results confirm the importance of considering the spatial dimension in our estimation strategy.

Geographical patterns in the vote outcomes justifies the use of a spatial approach; however, to further the methodological discussion, whether income differences played a role in the election results can also be analysed. Figure 5, which represents the correlation between municipal

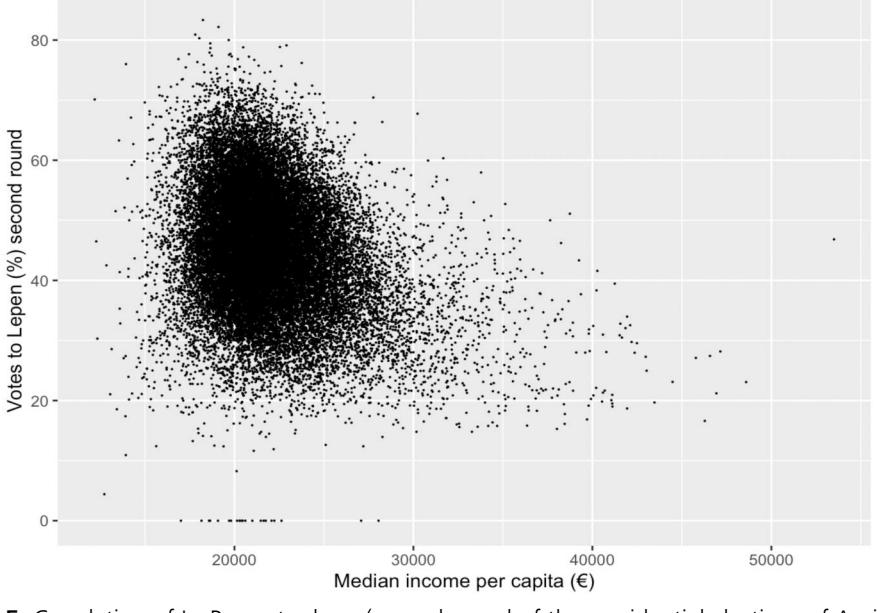

Figure 5. Correlation of Le Pen vote share (second round of the presidential elections of April 2022) and median income per capita (€) of each municipality. Source: own elaboration using data from the INSEE and the French Ministry of the Interior.

votes for Le Pen in the second round of the presidential election and median income per capita, provides convincing first evidence on the matter. There is no clear negative correlation between the abovementioned variables. The observations presented here support the idea that some localities that were not necessarily the poorest in the country backed the antisystem position and that this support might be linked to regional inequality, as argued by Rodríguez-Pose (2018).

Additionally, Figure 5 shows that municipalities with practically the same level of income could have very different voting patterns. This behaviour is in line with the premises of the 'geography of discontent', i.e., municipalities' perceptions of dissatisfaction can be different. A worse perception of the circumstances of a territory with respect to its closest neighbours could motivate a vote for antisystem political parties many times, despite the area's absolute income level. In this sense, each municipality's position in space matters, making the spatial perspective crucial in determining the relationship between antisystem voting and socioeconomic and demographic factors.

In this vein, in the first part of this study, we check the potential role played by spatial spillovers, as shown by the clustering of local areas with high and low shares of antisystem votes. As the Global Moran's I and Geary C tests (Table 3) confirm the spatial autocorrelation for each dependent variable, the specification chosen is a spatial Durbin model (SDM)[2], as expressed in the following equation:

$$\begin{aligned} Pct\_Cand_i = \alpha + \rho WPct\_Cand_i + \ \theta Diff_i \\ + \ \sum_{j=1}^{12} \beta_j X_{ij} + \sum_{j=1}^{12} \gamma_j WX_{ij} + \varepsilon_i \\ i = 1, \ \ldots, \ 31015 \\ j = 1, \ \ldots, \ 12 \end{aligned} \tag{2}$$

To assess the influence of neighbouring localities from a global perspective, we rely on a definition of a neighbourhood as the one hundred nearest LAUs (the same as those used in the construction of the relative income difference indicator) contained in matrix W, using each municipality's centroid as a reference point. The parameter ρ measures the intensity of the spatial dependence between the spatial units that have been established as neighbours under our selected criteria. In other words, ρ allows us to observe whether the closer municipalities tend to have more similar voting patterns, and, therefore, to contrast whether there is a spatial component that has a weight when determining the voting pattern of the municipalities or what is the same; we will determine if the vote carried out by the municipalities is not independent of the position they occupy in space. Specifically, ρ takes a positive value if there is a positive spatial dependence. In our context, this means that greater support for the antisystem political parties of neighbouring territories increases the number of votes against the system in the considered municipality. In contrast, ρ takes a negative value if there is a negative spatial dependence, meaning that greater support for the antisystem political parties of neighbouring territories would diminish the votes against the establishment in the considered municipality. Finally, ρ takes a value equal to zero if there is no spatial dependence.

Parameter θ accompanies the main explanatory factor (*Diff*) and the control variables β_j (see Table 1). γ_j represents the coefficients of the spatially lagged controls, which measure how changes in the socioeconomic and demographic characteristics of the surrounding municipalities increase or decrease support for each political option in each area. All variables included in the analysis characterise each of the 31,015 spatial units considered in this study, and the model presented in the previous equation is estimated through maximum likelihood.

5. MAIN RESULTS

5.1. Selection of the estimation approach

In this section, we present the obtained results after developing the estimation strategy proposed in the previous section, adapted to the specific data and characteristics of the French case, and adding the variables summarised in the third section.

First, an estimation using a standard ordinary least squares (OLS) specification is made. The results show that spatial econometric analysis is essential: the global Moran´s I test for each of the OLS regression residuals clearly reveals significant spatial autocorrelation. In this sense, all spatial regressions consistently show significant spatial dependence, which means that municipalities' voting patterns are not independent of each other (see Tables in Appendices B and C in the online supplemental data).

Consequently, a spatial autoregressive model (SAR), a spatial error model (SEM), and a spatial Durbin model (SDM) are estimated. The ρ parameter estimated in the SAR and SDM models, which, as explained, captures the parameter associated with the spatial lag of the dependent variable, reflects a positive spatial dependence, meaning that municipalities' voting pattern is positively related to that of neighbouring territories. Additionally, the λ parameter estimated in the SEMs, which captures the spatial dependence component associated with the error term, is also positive and significant in each of the estimates, again suggesting the need to control for the role of space in identifying the determinants of voting patterns.

In addition, it was considered a possible endogeneity problem related with the central variable of our analysis: *Diff*. In order to test if this potential endogeneity could affect the robustness of our results additional estimates of the spatial Durbin model with instrumental variables (IV SDM) have been carried out. The choice of a strong instrument to adequately explain the endogenous variable is a fundamental aspect in the development and estimation of an IV model. In this work, a Bartik instrument has been created, which, in the literature, is widely considered optimal to treat circumstances in which, as in our case, the endogenous variable captures the unequal distribution of resources across the geography, or in other words, a variable that captures territories economic inequality. Following Boustan et al. (2013) an instrument has been created that allows us to approximate the income distribution of municipalities free of influences from local specific factors, which allows us to address the potential problem of endogeneity in our previous estimates. What is done in this Bartik-like instrument is about projecting past local income levels to recent periods considering the growth rates of the national income distribution in the selected time span. This allows the obtaining of an instrument that models the income distribution of the municipalities absent of endogeneity since it eliminates local dynamics.

The Bartik instrument has been created in the manner explained below. First, we obtained data related to the income level of the municipalities for more than a decade ago to the period that we had as reference, 2018. Specifically, the median income data of the municipalities of France in 2006 were obtained and correctly homogenised with our database considering the mergers of municipalities that occurred after the mentioned reform of 2015. Second, once this 2006 income data was obtained, it was projected to 2018 for each municipality by using the income growth rate observed in the national distribution at each percentile. To project municipal income from 2006 to 2018, municipalities were classified by income deciles in 2006 and the observed national growth rate between 2006 and 2018 of that specific decile is applied to each of the municipalities of each specific decile. The only problem that we consider using this Bartik-like instrument is that when using income data from 2006 the sample size is reduced by more than 2000 municipalities due to missing values in this variable.

Additionally, various diagnostic tests were typically used after carrying out IV estimates were performed. We highlight that the weak instrument test, in all carried out estimates, obtains a very

reduced *p*-value of less than one percent, which allows us to reject its null hypothesis related to the weakness of the instrument; in essence, the selected instrument can be considered adequate to explain the endogenous variable *Diff*. The Wu Hausman test, in almost all estimates, is significant and has a very low *p*-value of less than one percent, which permits us to reject its null hypothesis of non-endogeneity and conclude that it is appropriate to use an IV model. However, in the estimate of Le Pen in the second round of the presidential elections, which is practically the one taken as a reference in our analysis, this test is reported as non-significant, indicating that the OLS estimate is consistent with the IV estimate in that case.

Results regarding OLS and spatial econometric estimates can be found in Appendices B (first round) and C (second round) in the online supplemental data. The results under the different approaches are consistent: the estimated parameters regarding the independent variables show similar behaviour in the SAR, SEM, SDM and IV SDM regressions. However, SDM is our preferred specification due to its greater capacity to model the potential spatial dependence process that can alter the analysis by considering that it can affect both dependent and independent variables. The results obtained in the IV SDM estimates are practically equivalent to those of the traditional spatial models (SAR, SEM and SDM), not providing different conclusions to those of the analysis that will be presented below. Thus, we will focus on explaining the SDM's marginal impacts (LeSage, 2008), while the results from the rest of the models can be found in Appendices B and C.

5.2. Marginal effects and brief discussion of the first-round results

Table 4 contains the marginal effects (direct, indirect and total impacts) of the SDM estimation of the vote shares in the first round of the French presidential election in April 2022 for the three candidates that obtained the most support: Macron, Le Pen and Mélenchon. As usual in spatial models, the direct impact measures the average effect of a change in an explanatory variable in a specific spatial unit on the dependent variable of the same spatial unit. Then, the indirect impact measures the average effect that a change in an explanatory variable of neighbouring spatial units (k) generates on the dependent variable of each spatial unit (i) considered in the analysis (LeSage, 2008). Finally, the total impact results from the sum of the direct and indirect impacts. In our context, through these impacts, we can observe whether changes in a certain municipality's socioeconomic or demographic circumstances could promote the antisystem vote in the municipality itself or its closest neighbours (spillover effect).

According to the results presented in Table 4, a significant link is observed between the antisystem vote, represented by Le Pen, and the 'left-behind places' in the first round. In other words, a 'geography of discontent' related to the income differences between localities in the voting pattern in the first round is identified; and the direct and indirect impacts of relative inequality (*Diff*) are negative and significant for support for Le Pen, suggesting that spatial economic inequalities support her at this stage. However, in the case of Macron, it is significant and positive, meaning that the greater the advantage of a municipality with respect to its neighbours, the stronger its support for their positions. As a result, spatial relationships comparable to those obtained in the case of Brexit for the UK can be clearly observed in this first round of the French presidential election of April 2022.

However, the vote for Mélenchon also shows a negative and significant association with the *Diff* variable, and the magnitude of the impact in that case is greater than that observed for Le Pen. As a consequence, we draw a particularly relevant conclusion: Mélenchon, with a left populist discourse, managed to capture an important part of the economic discontent in France, stopping Le Pen from capitalizing on that advantage. Relatedly, it seems that elections with only two options, such as the second round of the French presidential election, the presidential election in the United States or Brexit referendums, pose socially and politically riskier situations. The results suggest that presenting a worse economic situation in relative terms is

Table 4. Marginal effects (direct, indirect and total) for the votes in favour of Macron, Le Pen and Mélenchon in the first round of the French presidential elections of April 2022.

Dependent variable: votes for Macron (%)						
	Direct	Std. Err.	Indirect	Std. Err.	Total	Std. Err.
Diff income neighbours	18.354***	0.409	134.834***	9.275	153.188***	9.487
Unemployment rate (%)	−0.024***	0.006	−0.178***	0.047	−0.202***	0.054
Agriculture (%)	0.006***	0.002	0.046***	0.015	0.052***	0.017
Artisans, merchants and entrepreneurs (%)	0.007***	0.002	0.053***	0.018	0.060***	0.020
High skill occupations (%)	0.021***	0.003	0.157***	0.022	0.179***	0.025
No qualifications (%)	0.099***	0.010	0.728***	0.099	0.828***	0.109
Highly qualified (%)	0.168***	0.008	1.235***	0.113	1.403***	0.119
French population (%)	−0.124***	0.018	−0.911***	0.113	−1.035***	0.130
Immigrants in 2008 (%)	−0.047***	0.018	−0.344***	0.125	−0.391***	0.143
People under 30 (%)	0.143***	0.010	1.047***	0.092	1.190***	0.099
People over 60 (%)	0.273***	0.008	2.006***	0.129	2.279***	0.132
Reform	0.782***	0.161	5.743***	1.209	6.525***	1.364
Dependent variable: votes for Le Pen (%)						
	Direct	Std. Err.	Indirect	Std. Err.	Total	Std. Err.
Diff income neighbours	−1.591***	0.556	−12.576***	4.394	−14.167***	4.944
Unemployment rate (%)	−0.084***	0.008	−0.666***	0.072	−0.750***	0.079
Agriculture (%)	−0.013***	0.002	−0.103***	0.020	−0.116***	0.022
Artisans, merchants and entrepreneurs (%)	0.005**	0.002	0.042**	0.018	0.048**	0.021
High skill occupations (%)	−0.028***	0.003	−0.219***	0.025	−0.247***	0.027
No qualifications (%)	−0.109***	0.010	−0.858***	0.090	−0.967***	0.099
Highly qualified (%)	−0.479***	0.008	−3.784***	0.203	−4.263***	0.205
French population (%)	0.289***	0.013	2.284***	0.151	2.573***	0.160
Immigrants in 2008 (%)	0.027**	0.012	0.211**	0.095	0.238**	0.107
People under 30 (%)	0.075***	0.011	0.596***	0.097	0.672***	0.108
People over 60 (%)	−0.232***	0.009	−1.837***	0.119	−2.069***	0.125
Reform	−0.834***	0.192	−6.592***	1.553	−7.426***	1.741
Dependent variable: votes for Mélenchon (%)						
	Direct	Std. Err.	Indirect	Std. Err.	Total	Std. Err.
Diff income neighbours	−19.787***	0.408	−172.343***	9.965	−192.129***	10.108
Unemployment rate (%)	0.147***	0.007	1.277***	0.098	1.423***	0.103
Agriculture (%)	−0.047***	0.002	−0.412***	0.030	−0.460***	0.031

(*Continued*)

Table 4. Continued.

Dependent variable: votes for Mélenchon (%)						
	Direct	**Std. Err.**	**Indirect**	**Std. Err.**	**Total**	**Std. Err.**
Artisans, merchants and entrepreneurs (%)	−0.022***	0.003	−0.187***	0.025	−0.209***	0.028
High skill occupations (%)	0.004	0.003	0.034	0.028	0.038	0.031
No qualifications (%)	0.004***	0.002	0.039***	0.015	0.043***	0.017
Highly qualified (%)	0.168***	0.005	1.460***	0.089	1.628***	0.091
French population (%)	−0.196***	0.017	−1.704***	0.158	−1.900***	0.172
Immigrants in 2008 (%)	0.108***	0.019	0.941***	0.187	1.049***	0.205
People under 30 (%)	−0.109***	0.011	−0.946***	0.107	−1.055***	0.117
People over 60 (%)	−0.101***	0.008	−0.876***	0.083	−0.977***	0.090
Reform	0.240*	0.128	2.088*	1.121	2.328*	1.249

Source: own elaboration.

directly associated with greater support for extreme political options; therefore, there is a greater probability that discontented individuals and places can be dragged by the most radical parties, even though they are not necessarily antisystem voters or places characterised by a radical or extreme ideology.

5.3. Marginal effects and discussion of the second-round results: the role of spatial inequalities at the local level

Table 5 presents the marginal effects (direct, indirect and total impacts) of the SDM estimation for the results of the second round of the French presidential election of April 2022 and for the two candidates that advanced to the final round: Macron and Le Pen.

As stated, the second round of the French presidential election represents a scenario closer to that of the Brexit referendum in the UK, with only two options: Emmanuel Macron, who represented the prosystem status quo, and Marine Le Pen, who attracted the anti-establishment vote. After eliminating other candidates who could disperse the votes, this second round allows us to observe whether the expected assumptions of the literature on the 'geography of discontent' are fulfilled.

The results regarding the effect of the socioeconomic explanatory variables for the case of Le Pen in the second round (see Table 5) are akin to those that operated in the UK for voters or places that supported leaving the EU (Gutiérrez et al., 2021). For example, in places where there was a greater proportion of highly qualified occupations, support for Macron was greater. However, in places where the average population was less qualified, there was greater support for Le Pen. In addition, it is verified that those municipalities that in the past were exposed to higher levels of immigration currently show greater support for Le Pen, suggesting the vote for antisystem political parties in France could be motivated by a cultivated rejection of immigration. Although, as Hangartner et al. (2019) observed, sudden increases in immigration can cause a significant increase in the antisystem vote, it is clearly observed in the case of France that the rejection of immigration has been progressively taking shape and is reflected in the current voting patterns. In general, the behaviour of these sociodemographic variables in the second round is very similar to what was identified for similar variables in the case of Brexit (Goodwin &

Table 5. Marginal effects (direct, indirect and total) for the votes for Macron and Le Pen in the second round of the French presidential elections of April 2022.

Dependent variable: votes for Macron (%)						
	Direct	**Std. Err.**	**Indirect**	**Std. Err.**	**Total**	**Std. Err.**
Diff income neighbours	12.109***	0.512	97.315***	6.250	109.425***	6.619
Unemployment rate (%)	0.043***	0.009	0.349***	0.075	0.393***	0.083
Agriculture (%)	0.000**	0.000	0.003**	0.001	0.003**	0.001
Artisans, merchants and entrepreneurs (%)	−0.006***	0.002	−0.045***	0.015	−0.051***	0.017
High skill occupations (%)	0.039***	0.003	0.312***	0.028	0.350***	0.031
No qualifications (%)	0.182***	0.010	1.463***	0.107	1.645***	0.115
Highly qualified (%)	0.478***	0.008	3.838***	0.189	4.315***	0.192
French population (%)	−0.381***	0.017	−3.059***	0.190	−3.439***	0.202
Immigrants in 2008 (%)	−0.046***	0.016	−0.366***	0.130	−0.411***	0.146
People under 30 (%)	0.114***	0.012	0.914***	0.098	1.028***	0.109
People over 60 (%)	0.354***	0.009	2.847***	0.144	3.201***	0.148
Reform	1.350***	0.223	10.849***	1.838	12.199***	2.053
Dependent variable: votes for Le Pen (%)						
	Direct	**Std.Err.**	**Indirect**	**Std. Err.**	**Total**	**Std. Err.**
Diff income neighbours	−6.958***	0.504	−57.989***	5.031	−64.946***	5.472
Unemployment rate (%)	−0.069***	0.009	−0.572***	0.082	−0.640***	0.090
Agriculture (%)	0.004***	0.001	0.031***	0.010	0.035***	0.011
Artisans, merchants and entrepreneurs (%)	0.013***	0.002	0.105***	0.020	0.117***	0.022
High skill occupations (%)	−0.038***	0.003	−0.315***	0.029	−0.353***	0.032
No qualifications (%)	−0.151***	0.010	−1.255***	0.099	−1.405***	0.108
Highly qualified (%)	−0.546***	0.008	−4.553***	0.216	−5.099***	0.220
French population (%)	0.368***	0.021	3.069***	0.210	3.438***	0.226
Immigrants in 2008 (%)	0.049**	0.022	0.407**	0.180	0.456**	0.202
People under 30 (%)	−0.006**	0.002	−0.047**	0.018	−0.053**	0.020
People over 60 (%)	−0.325***	0.006	−2.710***	0.130	−3.035***	0.133
Reform	−1.052***	0.219	−8.771***	1.839	−9.823***	2.054

Note: *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.
Source: own elaboration.

Milazzo, 2017; Gutiérrez et al., 2021). Additionally, the results are in line with what other authors have found at other spatial disaggregation scales, such as votes in favour of Trump in the United States presidential election (see Crescenzi et al. (2017), Arnorsson and Zoega (2016), Clarke et al. (2016), Harris and Charlton (2017) and Manley et al. (2017), among others).

The variable that now stands out in a special way is the indicator of spatial inequalities at the local scale, the variable *Diff*, which is not only significant but also has the greatest weight in explaining municipality voting behaviour for both candidates. The *Diff* indicator is highly positive for Macron and highly negative for Le Pen. This means that a municipality whose median per capita income is worse than that of municipalities in its local environment will support Le Pen much more intensely. In contrast, when a municipality is above the average of the neighbouring municipalities, the number of votes for Macron increases. The *Diff* variable confirms the hypothesis formulated by Rodríguez-Pose (2018) of the 'revenge of places that do not matter', but on a local scale. In other words, the idea of McCann (2016) is verified as a reaction against the municipalities that seem to have benefited the most from globalisation and belonging to the EU, normally the large cities and wealthier metropolitan areas. In line with the aforementioned results, it has also been observed that as municipalities become larger, their association with voting for radical parties decreases. As highlighted previously, the literature justifies that the territories that merged with others and acquired a larger size presented significant improvements in their economic conditions (Wilner, 2023). This improvement in the relative situation of these territories can potentially influence individuals' political preferences (Rodríguez-Pose, 2018). However, in the French case the general opinion on this reform has been quite negative (see Torre & Bourdin, 2022). All this justifies an interest in observing how the increase in the administrative size of a territory affects voting patterns. This has been verified through the *Reform* variable. This is a dummy variable that takes a value of 1 in those municipalities that have been affected by the reforms that, since 2015, have caused mergers of municipalities; it takes a value of 0 otherwise. This variable shows a significant and negative impact on the vote for Le Pen, while it shows a positive and significant impact on the vote for Macron (see Table 5), indicating that larger municipalities in a better situation in relative terms seem to have a weaker association with the antisystem vote.

In light of the importance of large cities, we were interested in determining whether the relevance of the income spatial inequalities identified in our analysis through the *Diff* variable is influenced by the effect exerted by Paris and its area of influence (Île-de-France region). To check whether the conclusions drawn in this study are applicable to France without the influence of Paris and its surroundings, an estimation was carried out on a subsample from which the spatial units of Île-de-France were extracted (1252 LAUs). Logically, the distance matrices had to be recalculated, and the estimation model was adjusted to the subsample (of 29,763 LAUs). In general, the results are maintained both in the sign and significance of the control variables and in the effect of the *Diff* variable. It is true that the coefficient is smaller, but it always maintains significance and the same sign. This indicates that the conclusions obtained in this work are not due to the Paris effect, although this is the case where they are most intensely observed. This pattern is repeated throughout France.

It should be noted that spatial economic inequalities in a specific municipality not only promote the rise of antisystem voting in that territory (direct impact). Such inequalities in particular places, in the so-called 'left-behind places', also boosts support for antisystem options in the surroundings. In other words, there is a vast spillover effect (indirect impact) from territories in which economic inequalities are greater (b) than those established as their closest neighbours (*a*), suggesting that, in some areas in which there are no relevant economic inequalities in relative terms, there is outstanding support given to antisystem political options. For instance, an increase in economic inequality in the surroundings of Paris (*b*) could promote greater support for antisystem political parties in the mentioned municipality (*a*). In conclusion, the discontent linked to income inequalities in certain municipalities could increase the number of antisystem votes in neighbouring territories (total impact) (see Darvas, 2016). Importantly, we consider that the 'geography of discontent' could be extended beyond the limits of the 'left-behind places' due to the observed great spillover effect.

An additional reflection can be extracted by studying the behaviour of the abstentionist vote. We estimated two models in which the dependent variable is the percentage of abstention, calculated as the proportion of individuals who abstained over the total number of individuals registered in the census in each municipality in each electoral round; the initial specification presented in Equation (1) regarding the explanatory variables is maintained. The results obtained by estimating the mentioned models are not included for reasons of space, but in general, it is observed that the variables that best explain the most anti-system vote (pro-Le Pen vote) explain the abstentionism in both electoral rounds. Thus, in line with the work of Bourdin and Tai (2022), we find evidence that indicates individuals' economic discontent is manifested not only through voting for populist options but also through abstaining from voting.

Finally, it is interesting to compare the results for the second round of the French presidential election with those obtained by Gutiérrez et al. (2021) for the case of the Brexit referendum in the UK. The conclusions of both studies are essentially the same, although the effect of the indicator that measures local spatial inequalities (*Diff*) is stronger in the French case. This clearer result obtained for France may be due to a combination of three elements. First, from a technical point of view, there is much better information in France, and we have many spatial units, leading to more robust and clearer results. Second, municipalities (LAUs) in France are much smaller than those in other countries; therefore, the study is much more spatially disaggregated. In this way, it is possible to more clearly capture the effect of spatial inequalities at a highly local scale. Third, in the French case, discontent is also concentrated in the metropolitan peripheries, especially in the case of the surroundings of the Paris metropolitan area (see Figure 4). However, as we have seen, the conclusions hold even if the data are extracted from the Paris region. In any case, the conclusion obtained is clear and reinforces the conclusion reached for the UK; i.e., spatial inequalities at the local scale is a key element for understanding the growth of populist and antisystem political processes. To stop this trend that can harm European democracies and the European project itself, spatial inequalities in general, including those that operate at the local scale, should be reduced. In this sense, economic and social cohesion policy, which has been a key element of European construction in the past, should be interpreted not only as a regional development policy but also as a fundamental element to ensure the stable development of the European integration model and developed in a more territorially detailed level. In the same way, this policy should not only be focused on reducing regional inequalities; intrametropolitan actions and local cohesion projects are equally fundamental.

6. CONCLUSIONS AND POLICY IMPLICATIONS

There are many factors behind the growth of populist and anti-establishment political options. In the field of regional science, the importance of spatial inequalities has been explored. More specifically, the idea of the 'revenge of places that do not matter' (Rodríguez-Pose, 2018) or of the political consequences of the accumulated political dissatisfaction in the 'left-behind places' (Goodwin & Heath, 2016) has been tested in multiple works identifying a clear 'geography of discontent' (McCann, 2016). However, most of these works have been applied to regions or large areas; very few have been carried out at a local disaggregated level. We hypothesise that the spatial processes of discontent operate on a local scale as much, or even more clearly, than on a regional scale. Using Gutiérrez et al. (2021), we verified how local economic inequalities played a relevant role in generating social discontent that ended up forging the success of Brexit in those places.

The French presidential election has provided an extraordinary case study for analysing this hypothesis. In the second round of the elections, Emmanuel Macron and Marine Le Pen faced each other, forcing a situation in which French citizens had to choose between the European and pro-establishment proposal, represented by Emmanuel Macron, and the populist alternative, which Marine Le Pen embodied. Voters who had previously chosen

other options, such as those who favoured Jean-Luc Mélenchon and who obtained good results in the first round, had to finally decide between Macron or Le Pen. This situation is very similar to that generated by Brexit, where two radically opposed options were on the table. In addition, France has highly spatially disaggregated statistics providing socioeconomic indicators at the local level for 31,015 local areas (LAUs). The abundance of local data makes it possible to study the importance of local inequalities in voting decisions with high empirical precision. A variable has been proposed that measures the relative position of each local unit with respect to its environment, which has been returned against the votes in favour of Macron and Le Pen by applying a model with spatial dependence with multiple socioeconomic indicators incorporated as control variables. This model has also been applied to the first round of the elections to see how the results changed from a context of multiple political options, especially the one represented by Mélenchon, to a context with only two clearly opposed options in the second round.

The obtained results confirm many of the conclusions raised in previous papers about the relevance of the persistence of spatial inequalities in the increase in populist voting but, in this work, it is employed with a local perspective. The number of votes for Macron increased in large cities and more favoured areas, and there was a significant increase in support for Le Pen in more depressed places, urban peripheries or rural areas. In the localities with the most qualified professionals, support for Macron significantly increased, while in areas dominated by no highly qualified workers, support for Le Pen was also significantly greater. In addition, our work on the French case has allowed us to provide additional evidence to the literature on the 'geography of discontent'. For example, by comparing the two rounds of voting, we have been able to see how populism takes better advantage of contexts in which alternatives are reduced. In the first round, part of the discontent was channelled through political options integrated into the system. When the options are reduced, which is a common issue in any referendum, it is more likely that the anti-establishment option will be able to attract 'left-behind places' based on their political disaffection.

The main hypothesis of our approach has been confirmed. After applying spatial model analysis at the local level and controlling for different socioeconomic and demographic variables, it was verified that spatial economic inequalities in local environments significantly boost antisystem support. Although many factors promote anti-system voting, it has been proven that interterritorial economic disparities significantly promote the rise of these anti-system parties. Municipalities that were below the median income level tended to vote more for Le Pen, while those that were above the average voted more for Macron. These results are consistent with what had been obtained in a similar analysis carried out for the case of Brexit in the UK (Gutiérrez et al., 2021), confirming that local inequalities significantly influence the creation of political discontent, leading to the growth of populist options. Territories matter. We emphasise that our results do not suggest that all economically disadvantaged areas are anti-system, nor do we ensure that the vote in these places is the only breeding ground for the radical vote although it is a very relevant factor according to our estimates.

Results demonstrate that the changes in the territorial divisions and the administrative delimitation of the territories significantly affected voting patterns; merged territories due to 2015 reform showed a significant and negative relationship with the vote for Le Pen, the anti-system option. Once again, these results reinforce the previous conclusion that improvements in people's living standards are associated with a lower support for radical political parties. The economic policy decisions in relation to the territorial sphere strongly determine the geographical scenario of income and well-being distribution and the configuration of spatial patterns of economic inequality (Ala-Mantila et al., 2018; Wilner, 2023). As a result, territorial policy should be considered as a crucial agent to slow down or stop the growth of the anti-system political support.

'Left-behind places' should not be regarded as the culprits of the rise of anti-system parties: the absence of territorial cohesion should be considered one of the primary causes. Our analysis

ratifies the importance of implementing territorial cohesion policies in Europe, not only from the perspective of spatially balanced growth but also from the perspective of minimizing the political dissatisfaction that endangers the development of the European project. In addition, our results highlight the relevance of developing these cohesion policies not only by addressing inequalities between regions but also by trying to minimize inequalities in local contexts and by taking the territorial dimension into account. Balanced urban development policies and attention to the most disadvantaged areas of large cities or metropolitan areas can stop or at least reduce the development of populist options observed throughout Europe. Perhaps we must return to the values of the French Revolution and pay attention once again to equality and fraternity; however, we must do so not only between people but also between territories.

But above all, it seems essential to implement real income policies in the most peripheral regions of European countries. Through cohesion policies or the Common Agrarian Policy (CAP), the EU has made great effort to install new infrastructures, support certain sector categories or develop local communities and their networking in peripheral areas, whether new entrants, rural areas or islands and mountainous areas. Our analysis shows that one must also look at a very important economic factor, income inequality. These inequalities are destructive at the local level, and lead to the birth and development of the votes of discontent. In addition, our approach shows that it is also important to look at the case of peri-urban areas, which also present characteristics of peripherality and spatial income inequalities with their neighbouring urban areas. Unfortunately, populist and antisystem parties are spreading and growing throughout the European territory. The new successes of these political options have been registered in other key countries of the Union, such as Italy. The importance of local inequality, revealed by studies of the UK and France, encourages us to continue applying this approach in these new populist success stories that risk the European project itself.

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NOTES

[1] Similar ESDA analysis for the votes for Le Pen, Macron and Mélenchon in the first round, and of Macron in the second round, are presented in Appendix A in the online supplemental data.

[2] Following the standard procedure in spatial econometrics, we estimate the analogous spatial autoregressive model (SAR) and the spatial error model (SEM); however, their statistical performance is worse in terms of the Akaike information criterion. Anyway, SAR and SEM estimates are presented in Appendices B and C in the online supplemental data.

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