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Political Reactions to Changes in Local Economic Policies

By

Makoto Fukumoto

A dissertation submitted in partial satisfaction of the

requirements for the degree of

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in

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in the

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University of California. Berkeley

Committee in Charge:

Professor Paul Pierson, Co-Chair
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Spring 2021

Abstract

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by

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Doctor in Philosophy in Political Science

University of California, Berkeley

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Against the backdrop of accelerating economic divergence across different regions in advanced economies, political scientists are increasingly interested in its implication on political behavior and public opinion. This dissertation presents three papers that show how local-level implementation of policies and local economic circumstances affect voters' behavior. The first paper, titled "Biting the Hands that Feed Them? Place-Based Policies and Decline of Local Support", analyzed if place-based policies such as infrastructure projects and business support can garner political support in the area, using the EU funding data in the UK. Contrary to conventional wisdom, the findings suggest that relatively educated, well-off voters who pay attention to local affairs turn against the government that provides such programs and become more interested in the budgeting process. Visible and high-profile projects appear to be particularly counterproductive. This goes against the positive findings in the literature about cash transfer or disaster relief, but it is important to remind that very few cases of such place-based intervention have been successful in the context of deflationary spirals in the declining regions. Despite questionable track record in terms of economic impact, such measures are often used to "appease" the voters in economically declining areas; this paper questions its political value of such a project.

The second paper, titled "Gone with the Dirty Air? Closure of Polluting Plants, Fracking Sites, and Changes in Local Public Opinion", deal with the impact of the factory closure and fracking ban on the political behavior of the residents in the affected areas in the UK. It turned out that such events are not associated with a strong emotional response against environmentalism, but they evaluated the government according to their economic interest. Homeowners and blue-collar workers in oil-producing areas disapproved of the government after the fracking ban, while homeowners and self-employed people in industrial areas temporarily evaluate the government highly after the shut down of factories, presumably because of the immediate governmental support for the community following the economic malaise. This chapter disputes the prevalent view that unemployment in formerly industrialized areas is creating political backlash and populism

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surge. It appears that voters' evaluation of the government is economically rational, and there is no indication of emotional backlash or misattribution of responsibilities.

The third paper, "Paper 3: Choosing Voters? Partisan Sorting of Voters following Close Municipal Elections in France." deals with the geographic sorting of voters in France, and the findings suggest that people do change their locations in response to local-level politics and policies. While the paper's main focus is sorting according to mayors' partisanship, the fact that people appear to be responsive to tax rates differentials may make policy-induced migration more effective. As economists generally support migration from declining areas to prospering areas, the political factor to hinder or accelerate such domestic migration would be an essential topic, and this paper suggests the electoral motivation of the subnational leaders to influence the migration flow.

The crucial common ground of the three papers, in addition to the topic, is that the findings are not in line with the conventional wisdom in the relevant academic fields. Place-based policies are often assumed to garner support in the area, factory closure is associated with anger and political populism, and policy-induced sorting was thought to be insignificant. With rigorous empirical design and careful treatment of the data, this dissertation claims that the literature in political science and urban economics has not found an answer to the critical geographic question today. It calls for further research in how changing economic geography interacts with the political landscape today.

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Chapter 1

Introduction

Economic globalization and technological change have had a spatially uneven impact. As the IMF World Economic Outlook 2019 pointed out, within-country regional differences in economic performance are widening ever further in most advanced economies. They resulted in the divergence of various measures of well-being, from job prospects and earnings to health and educational outcomes. While such regional divergence has been a serious concern for policymakers since the 1980s, its accelerating pace and seeming relationship with political discontent made this topic particularly urgent.

Political Scientists have worried in particular about the well-documented association between the economically left-behind areas and anti-establishment, populist sentiments. Many political phenomena, ranging from the rise of far-right parties to the yellow vest movement in France, are often associated with industrial or non-metropolitan regions experiencing economic stagnation. Some mainstream political parties, such as the Conservative party in the United Kingdom, actively target post-industrial regions as the regional loyalty to the union movements fades away. Indeed, in addition to suburbs, such post-industrial regions are political frontline, unlike successful cities and rural areas. As the middle ground, voters in the declining regions may yield substantial political influence in the years to come.

Given the economic and political changes many areas in advanced economies are experiencing today, it is essential to consider how voters react to local-level industrial changes and policy measures, particularly in relatively lagging regions. It is worth asking how local public opinion changes in the phase of industrial decline, how voters react to place-based policies, and how voters migrate in relation to local level policies to understand better the interaction of economic geography and today's political landscape.

Based on the core questions, this dissertation focuses on the intersection of political economy and political geography, with particular attention to the geographic mobility of voters and designs of place-based policies. The three papers in this dissertation investigate these topics.

Paper 1: Biting the Hands that Feed Them? Place-Based Policies and Decline of Local Support.

While place-based policies, such as regional development programs, are widely used as compensatory measures for those adversely affected by economic globalization or technological changes, the empirical research on their political impact is limited. This paper investigates whether implementing place-based policies increases the support for the entity providing them.

When studying the political impact of place-based policies, selection bias and omitted variables pose a considerable challenge. Such programs are often allocated implicitly or explicitly based on electoral concerns. Moreover, the regions targeted by place-based policies are generally lagging areas, with many socioeconomic peculiarities and other disadvantages potentially affecting the area's political inclinations.

The EU Structural and Investment Funds in the United Kingdom before the Brexit referendum provide a fitting opportunity to address these concerns. The assessment mechanism of the EU fund eligibility was formulaic and discontinuous. Local, national, or the EU-level politicians of the UK were not able to strategically target particular regions or manipulate the formula. Through a Geographic Regression Discontinuity design, I can compare voters in neighboring regions with different levels of exposure to the EU funding for place-based policies.

Using the geocoded data of the British Election Studies, I find that, on average, the voters in the well-funded areas became less supportive of the EU and became more interested in topics such as the EU's spending or bureaucracy. Moreover, the negative effect is more pronounced among voters with high educational attainment, high socioeconomic status, and those who gather information from local newspapers and radio. There was no discontinuity concerning their attitudes toward immigration, the support for the EU before the funding period, and their support for local or national governments. Given that well-informed, well-off groups react negatively to the EU-funded projects, I claim that either anti-pork barrel attitude or welfare-chauvinistic attitude among relatively well-off residents affects the observed results, rather than miss-attribution or miss-information. I present suggestive evidence to support the anti-pork theory.

I compliment the results with matching analysis using the locations of actual beneficiaries, not funding eligibility. With a Genetic Matching algorithm, I find that if the area had infrastructure projects and business development funded by the EU, residents become less likely to approve of the EU. Research-related projects and projects managed by the universities did not cause any reaction. The results suggest that people are reacting more negatively toward visible large-scale projects.

This paper suggests that visible place-based policies can negatively impact political support, particularly among well-off voters who pay close attention to local affairs. The findings call the conventional wisdom of pork-barreling into question. Unlike cash transfers or providing public sector jobs, the impact of place-based policies may be more apparent to well-informed, well-educated voters, who may critically scrutinize the programs, and unaffected by marginal benefits of the projects.

This would question the political effectiveness of such policies in the declining areas to "appease" the voters. In most declining areas, infrastructure is not overused or in short

supply, and the marginal benefit may be limited. It appears that voters do not appreciate the government's effort and punish the incompetence and inefficiency associated with the projects.

Paper 2: Gone with the Dirty Air? Closure of Polluting Plants, Fracking Sites, and Changes in Local Public Opinion.

Researchers have paid significant attention to politicians, parties, unions, and employers trying to defend polluting or dying industries despite the political, economic, and social pressure to move away. However, it is not straightforward to expect what happens after they lose such industries. They may embrace the transition to green industries once they lose the polluting ones, but they could feel aggrieved and embolden their opposition to the change. How they react to the government in charge is not clear either. This paper asks if the residents change the attitude toward climate change policies or the government after they lose polluting industry in the area.

These are essential questions, as many governments in advanced democracies face challenging political choices regarding what to do with industrial jobs and threatened industries. Letting these jobs go may cost them votes, or it may cause a backlash against the transition. It is not clear if they can appease the angry voters with the promise of safety nets or incoming green jobs.

Using original geocoded datasets and the British Election Studies (BES) panel data, I check how voters in different places in the UK reacted to four types of industrial transitions in their localities; closures of industrial plants, a government ban on fracking, and government-backed introduction of clean energy power plants. I applied standard regression models with individual and time fixed effects, as well as difference-in-differences design and event study model.

The results suggest that the support for the government fell in the areas affected by the fracking ban but temporarily improved in the areas with factory closures. Subset analysis and results from other questions reveal that people adversely affected by the government's decisions to ban fracking disapprove of the government, but people who would have benefited from the safety net measures the government provided to the community did have a favorable response to the government, albeit temporarily.

On the other hand, the locals' attitudes toward environmental protection were not different from unaffected areas. Indeed, as the average BES respondents became more pro-environment over multiple waves, the residents in deindustrialized areas did not defy the national trend and had a corresponding shift in their attitudes. It is worth noting that areas with factories and oilfields did show the initial tendency to have skeptical attitudes toward environmentalism; therefore, the gap in attitudes may remain over time. In the case of green jobs, the effects are inconclusive for both measures.

The findings indicate that the government may pay a political price in de-industrialization, but losing jobs may not result in the backlash against environmentalism. The affected areas seem to have a similar pace of accepting industrial changes, albeit from different starting points. As for the government approval, it appears that the residents do not blame the government severely for the loss of private-sector jobs, and it could make policymakers more hopeful in that adequate support may make the transition phase po-

litically peaceful.

Paper 3: Choosing Voters? Partisan Sorting of Voters following Close Municipal Elections in France.

Most economists support migration from declining regions to prospering areas. However, local and national policies and politics often hinder such a process. Whereas domestic migration and local politics have attracted attention from various branches of social sciences, the relevant papers are overwhelmingly theoretical, and there have been markedly few empirical investigations on this topic.

In 2018, the French statistics agency made available the micro-level mobility census data of domestic migration in 2015, which contains more than 19 million individuals as a representative sample of the French population. I merged it with an original dataset of the municipal elections in 2008 and 2014 and the local tax rates in 2008, 2014, and 2018. I also used micro-level housing census data in 2016 and 2013. When combined, these datasets enable an unprecedented level of analysis of domestic migration and local politics. I investigate if people move into or out of specific local jurisdictions in response to the partisanship of the local governments, using a regression discontinuity design based on close municipal elections.

The results suggest that the groups that predominantly supported the Right in the municipal elections - the retired - did move to the Right-controlled municipalities. The effect was particularly significant for early retirees when the election in the recipient municipality was close. Self-employed people, another supporting block of the Right, also showed a moderate tendency to move into the Right-controlled cities. The other politically neutral groups do not display any indication of sorting. Placebo comparing the 2013 and 2016 housing census shows that there was no prior trend.

I also found that the narrowly elected mayors of the Left and the Right show a significant divergence in policy decisions in terms of how they increase or decrease local property tax, which can be an indicator of various other policy stances. The results hint that there could be strategic calculations of electorally vulnerable mayors to take hardline policies to attract their supporters.

As opposed to place-based policies, migration is usually a more preferred channel by economists to deal with the regional economic divergence. They do not have to defy the industrial lifecycle or locational advantages that inevitably raise regional inequality. However, this paper suggests that policy-induced migration would be possible, political motivation may interfere in that process, making an efficient spatial allocation of workers difficult.

These three papers all deal with the important political economy dilemma in that people demand political solutions, even though policies are unlikely to overturn the trend or economic divergence. By analyzing different economic circumstances and policy options, I attempt to present a more nuanced understanding of the relationships between the state of the local economy and the political behavior of the residents.

Chapter 2

Paper 1: Biting the Hands that Feed Them?
Place-Based Policies and Decline of Local Support.

Abstract

Conventional wisdom presumes that place-based policies, such as regional development programs, increase political support in the benefiting areas. However, empirical evidence is limited, and economics literature is doubtful of the local economic benefit of such policies. Exploiting formulaic eligibility criteria for EU funding schemes in the UK, I analyze the support for the EU among the areas with different levels of EU funding availability for place-based policies. Using a Geographic Regression Discontinuity design, I find that residents in the well-funded areas become less likely to approve the EU, particularly if they have high socioeconomic status, high educational attainment, and local newspaper subscription. I geocoded different types of EU-funded projects in England and found that residents in the area with visible, large-scale EU projects tend to show particularly lower support for the EU. This paper suggests the anti-pork attitudes among well-off and well-informed voters, which challenges the viability of pork-barrel politics.

Introduction

It is well established that individually targeted benefits, such as welfare payment or disaster relief, increase the recipients' political support for the incumbents (Manacorda, Miguel and Vigorito 2011, Golden and Min 2013, Bechtel and Hainmueller 2011). A wide range of studies also uncovered how politicians and political organizations strategically allocate goods and services in geographic space (Mayhew 1974; Ferejohn 1974; Shepsle and Weingast 1981; Bates 1981; Stein and Bickers 1995). Thus, it appears natural to assume that politicians can gain electoral support in certain areas by providing place-based policies, such as infrastructure projects, locational subsidies, and special economic zones.

On the other hand, in the literature on urban economics and economic geography, the empirical record of place-based policies have been disappointing, and its theoretical justification is thin (Glaeser and Gottlieb 2009; Neumark and Simpson 2015; Kline and Moretti 2015). If the place-based policies' electoral impact depends on the economic benefits to the community, it is not clear why local voters should support the incumbents for policies with such a mediocre track record, from which they may not gain direct monetary benefit.

This paper investigates whether implementing place-based policies increase the support for the entity providing them. Place-based policies in this paper refer to "government efforts to enhance the economic performance of an area within its jurisdiction, typically in the form of more job opportunities and higher wages" (Neumark and Simpson 2015, p1198). It is typically targeted to economically underperforming areas and can be contrasted with people-based policies such as welfare programs and tax credits.

When studying the political impact of place-based policies, selection bias and omitted variables pose a considerable challenge. Such programs are often allocated implicitly or explicitly based on electoral concerns (Knight 2004). While the literature revealed that politicians mostly target their core supporters rather than swing or median voters, there is evidence that they sometimes target the areas where they foresee an electoral struggle (Evans 2011). Moreover, the regions targeted by place-based policies are generally lagging areas, with many socioeconomic peculiarities and other disadvantages potentially affecting the area's political inclinations.

The EU Structural and Investment Funds in the United Kingdom before the Brexit referendum provides a fitting opportunity to address these concerns. The assessment mechanism of the EU fund eligibility was formulaic and discontinuous. Local, national, or the EU-level politicians of the UK were not able to strategically target particular regions or manipulate the formula. Through a Geographic Regression Discontinuity design, I can compare voters in neighboring regions with different levels of exposure to the EU funding for place-based policies.

Using the geocoded data of the British Election Studies, I find that, on average, the voters in the well-funded areas became less supportive of the EU and became more interested in topics such as the EU's spending or bureaucracy. Moreover, the negative effect is more pronounced among voters with high educational attainment, high socioeconomic status, and those who gather information from local newspapers and radio. There was no discontinuity concerning their attitudes toward immigration, the support for the EU be-

fore the funding period, and their support for local or national governments. Given that well-informed, well-off groups react negatively to the EU funded projects, I claim that either anti-pork barrel attitude or welfare-chauvinistic attitude among relatively well-off residents affects the observed results, rather than miss-attribution or miss-information. I present suggestive evidence to support the anti-pork theory.

I compliment the results with matching analysis using the locations of actual beneficiaries, not funding eligibility. With a Genetic Matching algorithm, I find that if the area had infrastructure projects and business development funded by the EU, residents become less likely to approve of the EU. Research-related projects and projects managed by the universities did not cause any reaction. The results suggest that people are reacting more negatively toward visible large-scale projects.

This paper suggests that visible place-based policies can negatively impact political support, particularly among well-off voters who pay close attention to local affairs. The findings call conventional wisdom of pork-barreling into question. Major works in clientelism or vote-buying suggest that such practices are effective in gaining support among low-income voters. However, unlike cash transfers or providing public sector jobs, the impact of place-based policies may be more apparent to well-informed, well-educated voters, who may critically scrutinize the programs, and unaffected by marginal benefits of the projects, if any. Given the relatively poor records of place-based policies in redeveloping lagging areas, expecting simple and straightforward gratitude from the locals could be naive. While place-based policies are widely used as compensatory measures for those adversely affected by economic globalization or technological changes, this study also casts doubt on their effectiveness in alleviating the discontent.

Literature review and Theory

This paper spots a theoretical disconnect in the relevant literature. Many political science works assume that voters may react positively to place-based policy interventions, presumably because their regions benefit from them. Economics literature claims that such place-based policies do not always benefit the locals, and they often turn out to be ineffective.

Following the classic arguments of Mayhew (1974) and Bates (1981), political scientists have produced numerous works on the mechanisms and incentives of politicians to target the supporters, constituencies, or "selectorates" spatially (Ferejohn 1974; Shepsle and Weingast 1981; Stein and Bickers 1995, Harris and Posner 2019). However, studies on the voters' reactions to such place-based policies have been scarce compared to politicians' actions. A few researchers working on American congressional earmarks found mixed evidence for the electoral return (Rocca and Gordon 2013). Still, it is also known that the majority party tends to allocate such funding to electorally vulnerable areas (Knight 2004; Evans 2011), which would bias the findings based on the election outcomes. The studies on the EU cohesion fund are also contested (Accetturo et al., 2014; Borin et al., 2018), but they compare large regions with significant economic and social differences. Even if the place-based policies are allocated based on the formula, the rules are often susceptive to the incumbents' political incentives. Due to the selection bias and omitted variable problems, it is challenging to examine place-based policies rigorously.

On the electoral reward to individually targeted policies, such as welfare programs and disaster reliefs, there are a couple of prominent papers that convincingly demonstrated positive political gains for the incumbents (Bechtel and Hainmueller 2011; Manacorda, Miguel, and Vigorito 2011). Coupled with the abundant evidence on how clientelism works with cash transfers and public sector jobs (e.g., Hicken 2011), one may easily assume that place-based policies would be similarly effective.

Meanwhile, economists have long been skeptical of place-based policies in general, and the economic effect of place-based policies on residents is known to be mixed, heterogeneous, and not always positive. Such policies tend to result in mere displacements of jobs and enterprises, and the relocated activities could find themselves in inefficient locations while they could crowd out more locally suited ones. Moreover, place-based policies often fail to benefit the intended beneficiaries in the area with price and rent fluctuation (Glaeser and Gottlieb 2009, Kline and Moretti 2015). The empirical record of place-based policies, ranging from large-scale infrastructure programs to investment aid, are mixed at best and often ineffective (Neumark and Simpson 2015). There is no shortage of prominent failures, delays, cost overruns, unfinished projects, and suspected corruption (Acemoglu and Robinson 2008; Accetturo et al., 2014). Its theoretical justification is thin, as it is seen as a worse substitute for cash transfer due to the difficulty in targeting the right beneficiaries and its distortions to economic activities (Kline and Morretti 2015).

Certainly, there are arguments in favor of place-based policies, but they may not please all the local voters. Some economists support place-specific job training and educational programs in deprived regions (Austin et al., 2018), but newly trained workers are notably mobile and tend to relocate, limiting the targeted regions' benefit (Duranton and Venables 2018). Even if such programs ameliorate certain people's well-being, they may not generate lasting benefits among broad segments of residents.

Therefore, place-based policies' positive impact on the local economy is far from guaranteed, and if there is a tangible benefit, it may affect residents differently. If such policies are as ineffective as its record suggests, they cannot be political equivalents to cash transfers or disaster relief. Besides, while voters would like to have particularized benefits, if they find those projects socially inefficient, they may have little reason to support the incumbent (cf. Coate and Morris 1995).

Economic ineffectiveness may not directly mean political ineffectiveness. Jensen and Malesky (2018) demonstrate that elected mayors are more likely to provide locational investment incentives than appointed mayors, even though those mayors seem to know the drawbacks of such policies. Nonetheless, they claim that politicians could identify themselves with the success of private investments only if investment incentive schemes are in place, thereby creating the credit claiming opportunities that economically efficient policies may not provide. Importantly, Jensen and Malesky also suggest that voters may not be aware of the policies' trade-offs. If similar mechanisms are in place, voters may react differently depending on the level of information access.

Different socioeconomic groups may react divergently regarding potentially inefficient place-based policies. In the context of patronage politics in Columbia, Weitz-Shapiro (2012) found that non-poor voters are critical of clientelistic policies targeted toward poor voters, thereby incentivizing some politicians to refrain from such practice. Indeed,

most works on vote-buying measures focus on the poor as they are cheaper to buy. However, the less targeted nature of place-based policies may trigger reactions from the rich as well, and it is far from certain that they would appreciate such policy measures. Dellmuth and Chalmers (2018) also claim that the fit between the local demand and place-based policies may alter the policies' impact, which could suggest that different types of policies affect different demographic or socioeconomic groups divergently.

Therefore, concerning place-based policies, the electoral return on investment could be ambiguous and heterogeneous. Furthermore, I claim that, on certain occasions, this effect could be negative. Indeed, there is anecdotal evidence to suggest a potentially adverse electoral return. For example, it is well known that the voters in the net-beneficiary states of federal transfer in the US, such as Alaska, are hostile to the federal government's involvement and preferred a smaller federal budget. In the countries whose growth was widely attributed to the EU cohesion funds and single market access, such as Poland and Hungary, voters are increasingly hostile to the EU.

I outline five different possible mechanisms - dislike for inefficient pork-barrel politics, welfare chauvinism, misinformation, misattribution, information bias - that could lead to negative electoral return. The first and second hypotheses imply that well-informed, well-off people are likely to dislike the entity providing the support. The third and fourth are the opposite, and the fifth depends on the information source's bias.

The first potential mechanism is a dislike for inefficient pork-barrel politics and poor management. Besides the mediocre track record, infrastructure projects and other re-development programs are often associated with a cost overrun, delayed schedule, and suspicion of corruption (Accetturo et al., 2014; Duranton and Venables 2018). Some people who watch closely may question the competence and contribution of the governments or parties responsible to their community. This may make people dislike the institution that spends a significant amount of money on what they deem unsuccessful, useless, or wasteful.

The second possibility is a variant of welfare chauvinism. Regional development programs, especially those targeted at the backward regions, are often aimed at benefiting relatively worse-off or unskilled people in the area. Some relatively better-off people may perceive that some people are "undeservingly" getting subsidized jobs (cf. Weitz-Shapiro 2012). In the case of anti-pork attitude or welfare chauvinism, people with high socioeconomic status people would dislike the entity. The marginal gain in local employment or salary that such projects bring is unlikely to affect the better-off.

Thirdly, it could be possible that some people are misinformed about the benefit and costs of those projects (Mettler 2011). Even if the national or federal entities fund or subsidize the local projects, the residents may believe that the locals are paying for something that the national or federal government decided to do in their areas, which may trigger negative feelings. Similarly, they may not notice the potential benefit they receive while they are concerned about the cost.

Alternatively, people may misattribute any local hardship to the national or federal entity instead of the local authorities (Hobolt and Tilley. 2014). The place-based policies and billboards may stand out as if they are in charge, and it would be easy to associate anything negative in the region with those who claim credit for interventions. If misinformation or misattribution is driving the negative feeling against the providers, I expect

that the effects are more prominent among less-informed groups.

The last possibility is information bias. People may have been affected by certain discourse about the entity providing the place-based policies and see projects in the local area in a different light. For example, those exposed to anti-EU rhetoric may dismiss a local EU project as a symbol of waste and bureaucracy, while those who use pro-EU sources may regard the same project as an emblem of the European ideal. In this scenario, people using different information sources will react differently.

One important factor that underlies the five mechanisms and distinguishes place-based policies or pork-barrel politics with other forms of "vote buying" methods is that it is tough not to expose the projects to non-beneficiaries. While cash transfers or public sector job allocations could be invisible to the non-beneficiaries except for the costs, virtually everyone in the area sees the infrastructure projects. In addition, while most place-based policies try to benefit relatively worse-off residents, the benefits are often indirect compared to cash transfers or guaranteed jobs, if any.

In summary, most works on place-based policies assume a positive political return for the entities that provide them, but its theoretical justification is shaky as such policies do not always bring tangible benefits. Relying on the well-established positive return on the cash transfers could be misleading, but political gains on geographically targeted policies are understudied. Rather than expecting everyone in the targeted areas to react positively, I anticipate that the aggregate political return may well be null or negative. The heterogeneity may depend on the information sources, education, or socioeconomic status.

ESI Funding Schemes and their Eligibility Criteria

The EU funding scheme in the United Kingdom before the Brexit referendum provides an excellent test case for this topic because of its design. European Regional Development Fund (ERDF) and European Social Fund (ESF) are the primary tools the EU uses to foster regional development in relatively advanced member states, which together are referred to as European Structural and Investment Funds (ESIF). ERDF covers most of the conventional regional development policies, such as support for SMEs and infrastructure upgrades, while ESF support training and employment. Appendix A has the detailed descriptions. Applications to the funding are project-based. As shown in Table 2.1, various public and private actors can apply for the funding as long as their projects are located in a designated area and following classified objectives.

Table 2.1: Percentage of the ESIF recipient types (UK; 2014/1-2020/7; N=1305)

City councils and Borough councils	County councils and Combined authorities	National-level public institutions	Private firms and Chambers of Commerce	Public-Private Partnerships	Charities and Trusts	Universities and Research Institutes
17.16	18.86	11.11	11.19	11.57	7.203	22.53

ERDF and ESF provided a large amount of funding for regional development policies in the UK. In the period 2014-2020, the ERDF available for the UK was 3.6 billion Euros (2.6 billion Pounds) and ESF 3.5 billion Euros (2.53 billion Pounds). This is significant

compared to nationally-funded programs, particularly after the UK government abolished earmarking and scaled down its own regional development programs in 2012 (see Online Appendix A for the details).

To inform relevant parties and residents of the EU's contribution, the EU promotes and advertises its projects, much like typical pork-barrel politics. Indeed, the EU regional policies have an explicit political goal to promote social and political cohesion in the lagging areas in Europe. The beneficiaries bear the legal obligation to demonstrate to the public and relevant parties the EU's contribution via billboards, placards, posters, brochures, websites, and emails.[1] Given the scale of the funding and the PR effort, it is reasonable to assume that those in the benefiting areas are likely to be aware of the EU's contribution.

Geography and formula determine the eligibility criteria of the ESI funds, and how funding is distributed is imperative to the research design.[2] The ESI had three funding categories, which differed in what kind of projects are eligible, the amount of EU funding available per project, and the earmarked amount of the funding for the region. The UK is divided into 40 statistical regions called *NUTS 2 regions*, and their regional GDP per capita in 2011 decided the eligibility of each region.[3] Most *NUTS 2 regions* do not correspond to regional or county governments in the UK. According to the formula, the 40 *NUTS 2 regions* in the UK are divided into the following three categories.

- **Less developed regions** refers to the poorest regions with GDP per capita below 75% of the EU average. The fundings are available for a broad range of projects. The level of matching funds by local, national, or private actors can be less than 25%. Only two rural regions of West Wales and Cornwall fall into this group.

- **Transition regions** include those regions whose GDP per capita is between 75% and 90% of the EU average. The level of matching funds should be at 40%. Although the proposals need to be "more targeted" compared to *Less Developed Regions*, there are few formal constraints, and a wide range of projects are approved. Ten of the UK NUTS 2 regions belong to this category.

- **More developed regions** are comprised of regions where GDP per head is equal to or higher than 90% of the EU average. This category includes West London, the wealthiest region in the EU. The required level of matching fund under this category is 50%, but crucially, funded activities in these areas need to fit the specified shortlist of priorities, such as research and innovation or institutional capacity building. Therefore, typical regional development policies, such as the generic aid for employment and investment aid for private enterprises, are severely restricted.

These different categorizations resulted in diverging availability of the funding, both quantitatively and qualitatively. In per capita terms, the average *Transition region* had

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[1]   The details are set in Annex XII of CPR 1303/2013
[2]   The beneficiaries need to be located in the designated areas, and the recipient firms that relocated elsewhere within five years have to repay the funding. The same applies to cession or substantial change of operation, and change of ownership giving undue advantage.
[3]   "NUTS" is the acronym for *Nomenclature des Unités Territoriales Statistiques*

the funding package 59% larger than the average *More developed regions*. People in *Transition region* get 31% more from the EU than the neighboring *More developed regions* whose GDP per capita are less than 100% of the EU average. Crucially, however, *Transition regions* were able to use the funding for conventional place-based policies while applicants from *More developed regions* were obliged to focus on specific activities. Indeed, a substantial portion of the EU fundings to *More developed regions* go to universities and affiliated institutions, and not to regional development programs. Therefore, for most of the UK, whether the region had the GDP per capita higher than 90% of the EU average in 2011 made a significant difference in terms of EU funding eligibility for conventional regional policies. Moreover, unlike other place-based policy interventions, this difference in eligibility criteria corresponds to the clearly defined geographic border.

The introduction of *Transition regions* in 2013 was due to the EU-wide policy changes and had little to do with any manipulation by the UK's representatives. There were only two eligibility categories in the previous 2007-2013 ESI budget cycle, and 75% of the EU average was the threshold. The UK had only three "Convergence" areas - equivalent of *Less developed regions* - during this period: West Wales, Cornwall, and Scottish Highlands. However, the accession of Romania, Bulgaria, and Croatia to the EU during this budget cycle significantly lowered the average GDP per capita of the EU used for the 2014-2020 cycle. Consequently, the traditional ESIF beneficiaries in western Europe, such as Eastern Germany, Southern Spain, and Southern Belgium, were about to be pushed out from the "Convergence" categories. In response to this development, *Transition regions* were created to keep these regions eligible for ESI funding schemes (Downes 2019). Thanks to this development, nine regions in the UK that did not receive the preferential treatment in the previous ESI budget cycle suddenly found themselves in the categories with a higher possibility of using ESI fundings. There was little indication of any active manipulation of the formula by the British representatives.[4]

This setting provides a fruitful opportunity to test the political implication of place-based policies. As the EU provided a significant amount of money and claimed credit, different eligibility classifications inevitably lead to divergent exposure of the residents to EU funding, with clear geographic demarcation and no sign of major manipulation.

Brexit referendum and the micro-level data

The UK in this period provides fitting dependent variables for this study as well. On June 23, 2016, British electorates voted in the United Kingdom European Union membership referendum (Brexit referendum), and opinion polls asked various questions regarding how citizens viewed and evaluated the EU during the campaign period. Comparing the support for the EU in well-funded regions and more developed regions can enable us to see the effect of place-based policies on political support toward the granting authority.

The dependent variables come from the British Election Study (BES). I mainly used Wave 7, 8, and 9 from the *Combined Waves 1-19 Internet Panel Studies* (Fieldhouse et al., 2020). These three waves just before and after the referendum included detailed

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[4]   Possible exception is Merseyside, which had GDHI per capita above the cut-off threshold. In the robustness checks, the results without Merseyside are presented.

questions about the respondents' opinions regarding the EU and Brexit. Wave 7 took place between April 14 and May 4, 2016. Wave 8 was between May 6 and June 22, just before the Brexit referendum on June 23. Wave 9 was between June 24 and July 4, 2016. Respectively, 30,895, 33,502, and 30,036 respondents took Waves 7, 8, and 9. Out of Wave 7 participants, 23,402 took Wave 9 as well, with a retention rate of 75.9%.

Additionally, Wave 2 included a question on the respondents' approval of the EU. Wave 2 took place between May 22 and June 25, 2014. Whereas the first dispensation of the European Social Fund started in January 2014, the first for the European Regional Development Fund was April 2015, and a limited amount of the ESIF had been spent by May 2014. Therefore, Wave 2 in May 2014 can serve as a quasi-pre-treatment period, as it is reasonable to assume that residents had less exposure to the EU-funded programs by then. Residents may have been informed of what to come, but most visible schemes such as infrastructure projects had not started. Wave 2 had 33,219 respondents, and 15,956 of them also took Wave 9 in 2016, with a retention rate of 52.7%.

The main questions regarding the EU's evaluation are the following: "Do you approve or disapprove of the job that the EU is doing?". This is asked in Waves 2, 7, and 9, and respondents chose from 5 levels. I also used the multi-level-answer question in Wave 7 and 8; "How much do you agree or disagree that the EU has made Britain more prosperous?".

As the exposure to the EU funding depends on the NUTS 2 regions they live in, the respondents' locational information is critical for this study. For most respondents, BES recorded their local authority and education authority, with which I locate the respondents on the map.[5]

Various demographic and socioeconomic variables are available in the BES dataset. Some self-reported variables are not available for subsets of respondents, and adding a full set of covariates reduces the sample size. In the robustness checks, I present the results without covariates, with core covariates (age, sex, ethnicity, socioeconomic status, education) and the full set of demographic covariates. Appendix C lists full demographic covariates.

As geographic covariates other than ESI funding eligibility, local authority level data are drawn from the Office of National Statistics (ONS). I collected the statistics for the GDHI per capita and the unemployment rate of the local authority level, as well as their growth rate. I also used the population density and the linear distance to London as controlling variables. Online Appendix J has a separate discussion with deindustrialization indicators (Colantone, and Stanig 2018).

Geographic Regression Discontinuity Design

Just using well-funded regions as treatment areas and more developed regions as control may raise the concern that some place-specific unobservable variables, such as political culture, could affect the support for the EU. As the ESI funding eligibility is strictly based on the applicants' locations, the scheme perfectly fits the regression discontinuity design in the spatial data (Keele and Titiunik 2014).

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[5]   I used the centroid of local authority areas when available. If not, I relied on their parliamentary constituency to locate the individual respondents.

The regression discontinuity design (RDD) exploits the discontinuity in the treatment assignment to solve omitted variable problems. Geographic Regression Discontinuity is used when treatment assignment is geographic. I use the distance from the border between well-funded regions (*Transition regions* or *Less Developed regions*) and *More developed regions* as forcing variable, and being in the well-funded regions is the treatment. It is assumed that other relevant variables that affect the support for the EU are at least continuous, if not random, around the geographic border. However, the marginal distances would result in different ESI funding availability levels and the residents' exposure to the EU-funded projects. Figure 2.1 shows the borders between well-funded regions and more developed regions in red, and the wards within 50 kilometers of that border as dots.[6] Black dots are in *Transition regions* or *Less Developed regions*, and white dots are in *More developed regions*. I assessed whether there is a discontinuity in the support for the EU between the well-funded regions and more developed regions at the margins.
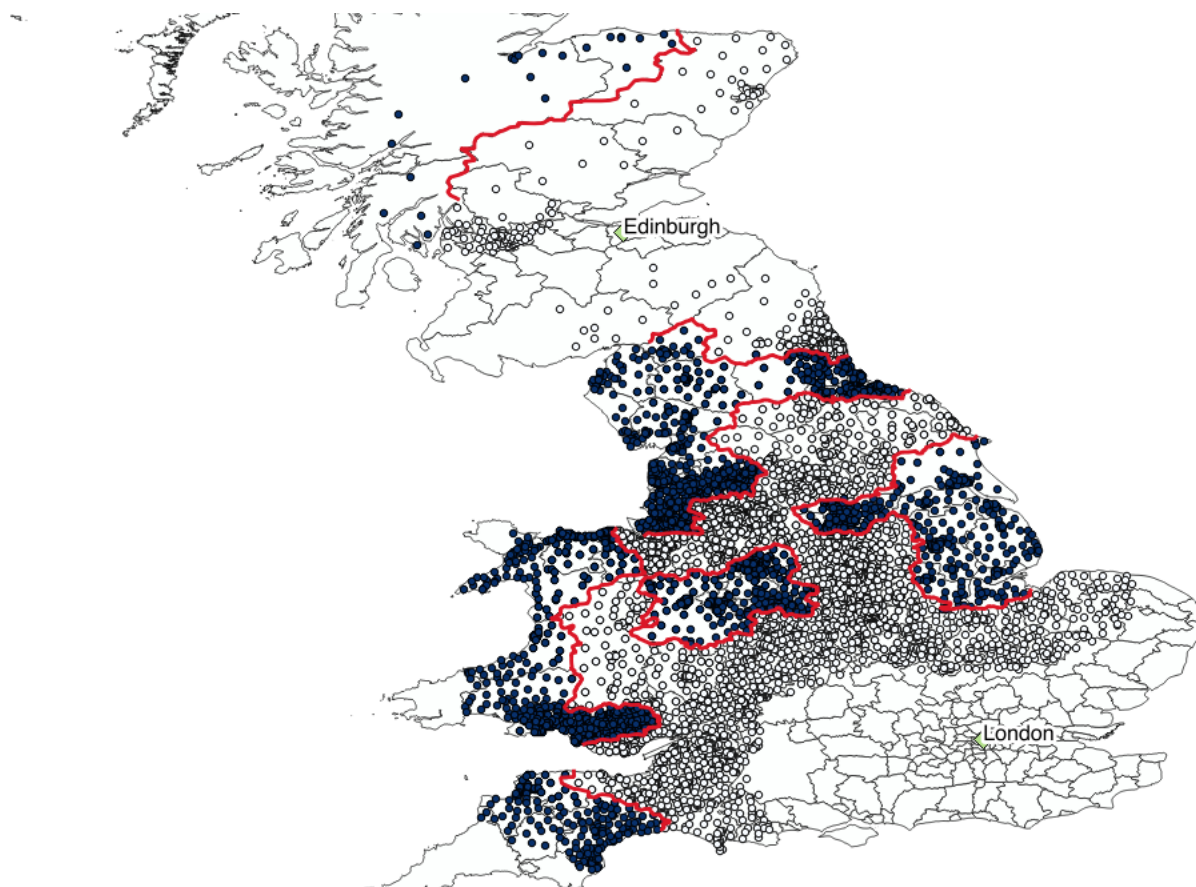
Figure 2.1: Borders between well-funded regions and more developed regions, with a 50km band: Well-funded regions in black

The framework of RDD is simple. Local linear regressions combine choosing a suitable bandwidth with a linear control function and are the primary method in this paper. Local quadratic regression is used for bias-correction. The bandwidths for the main results are

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[6] The density of wards is a proxy for the population density.

drawn from the *CCT bandwidth*, and the results are reported with robust bias-corrected confidence intervals (Calonico, Cattaneo, and Titiunik 2014). The results with arbitrary bandwidth (20/30/40/50km) are presented in Online appendix. The primary dependent variable of interest is the individual-level support for Brexit and the EU. I apply the following local linear regression to both sides of the cut-off line within the bandwidth;

$$P[SupportEU]_{i,c} = \alpha + \beta I(\textit{Well-funded\_Region}_c) + f(\text{Distance\_from\_the\_border}_c) +$$
$$\gamma_1 \text{Closest\_Border}_c + \gamma_2 \text{Demographic\_Covariates}_i + \gamma_3 \text{Geographic\_Covariates}_c + \epsilon_{i,c}$$
$$s.t. \quad \text{Distance\_from\_the\_border}_c \in (-\hat{h}, \hat{h})$$

where $[SupportEU]_{i,c}$ is the propensity of an individual i in local area c to support or oppose the EU. This variable denotes the answer to the BES questions and changes depending on the answer structures. $I(\textit{Well-funded\_Region}_c)$ is the dummy variable, which takes 1 if the local area c is in *Transition regions* or *Less developed regions* , 0 in *More developed regions*. $\hat{h}$ is a neighborhood around the border between well-funded regions and *More developed regions*. *Distance_from_the_border*$_c$ is the linear distance to the closest border between two funding regions, and f() is some continuous function for covariates and unobservables. All results will include the fixed effects of the border to which the local area is closest. Alternative results with different covariates and clustering are also presented.

In this design, the spatial discontinuity could be considered as fuzzy due to spillovers of policy effects beyond borders, but the borders between *More developed regions* and well-funded regions do feature sharp changes. *More developed regions* are eligible for some ESI funding as well, but as noted above, the programs are catered to those that benefit narrow sections of the population (e.g., research and innovation). It is certainly possible that workers in *More developed regions* adjacent to well-funded regions may commute to the benefiting firms, thereby reap the benefit from the EU-funded projects. Nonetheless, the level of exposure to various funded projects, including local infrastructure, would be different across the border. The prohibition of the beneficiaries to relocate elsewhere may also confine the spillover effect.

For this RD design to be viable, it is important to demonstrate no discontinuity in geographic or demographic indicators across the eligibility borders. Figures 2.2A and B show no discontinuity in the local authority area's census results or demographic indicators of BES Wave 9 respondents. Appendix B has discussions on the McCrary density test for the BES survey in Wave 9.

Given the literature and conventional wisdom surrounding populism and Brexit, I also analyzed the BES questions regarding the respondents' attitude toward immigration, social change, gender roles, populism, patriotism, cultural traditionalism, and their perception of their finance and general state of the economy. To those outcome variables, I applied the same RDD framework and present them as balance tests in the following section.

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Figure 2.2: RD results of geographic indicators (2011 census) and demographic attributes (BES Wave 9), with border fixed effects
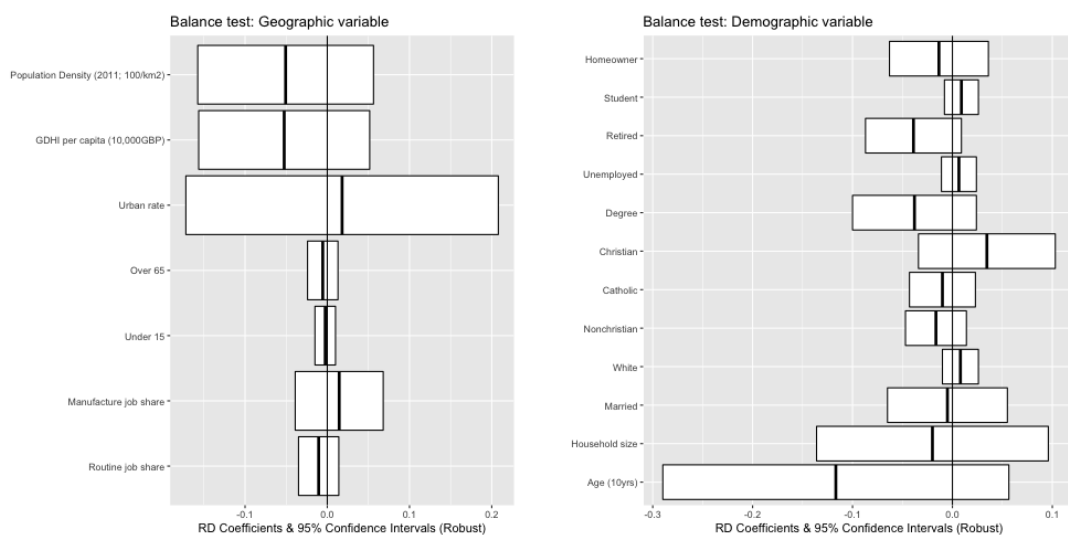
Main results (Geographic RD)

This section presents the RD results with the CCT bandwidth. All the results include the "border" fixed effects so that geographically proximate units are compared across the border between the well-funded regions and more developed regions. The 95% confidence intervals are reported in the robust and bias-corrected version, while the coefficients and standard errors rely on the conventional method (Calonico, Cattaneo, and Titiunik 2014). Local authority areas are the unit for cluster-robust variance estimation. For all the models, the treatment is being in well-funded regions, and the rows in tables represent different dependent variables.

Overall, the results show that residents in well-funded regions are more likely to disapprove of the EU after the ESIF dispensation. Moreover, the support for national or local authorities does not show the corresponding discontinuity, and there was no regional gap regarding the attitude toward immigration or sovereignty. These findings are contrary to the conventional view that regional development policies and place-based policies would improve the political fortune of those who provide it. However, it is in line with my theory that people may not necessarily support the funds' providers given the ambiguous economic benefit and mediocre track record of place-based policies.

Columns 1 and 2 in Table 2.2 show that the people in well-funded regions are less likely to approve the EU than less-funded neighbors by 0.16 to 0.19 points on a 5-point scale. The results are robust when adding demographic and geographic controls to the RD, and the robust and bias-corrected confidence intervals at the bottom of the table suggest a larger magnitude than conventional ones. Similar effects are shown in Columns 7 and 8 regarding a different question in Wave 7.

This gap did not exist before the introduction of the ESIF scheme to the areas. Columns 3 and 4 of Table 2 show no observed effect of being in well-funded regions in Wave 2 in May 2014. Among those who took both waves of surveys, Columns 5 and 6

Table 2.2: Main Results (Geographic RD: CCT bandwidth)

Treatment variable:	Being in well-funded regions							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:								
Approve EU: Wave 9 (2016) (1 Strongly disapprove - 5 Strongly approve)	-0.166*** (0.026)	-0.187*** (0.031)						
Approve EU: Wave 2 (2014) (1 Strongly disapprove - 5 Strongly approve)			-0.013 (0.008)	0.017 (0.012)				
Approve EU: Wave 9 - Wave 2 (Simple deduction)					-0.255*** (0.031)	-0.212*** (0.042)		
EU has made Britain more prosperous: W7 (1 Strongly disagree - 5 Strongly agree)							-0.094*** (0.022)	-0.129*** (0.023)
Border Fixed Effects	X	X	X	X	X	X	X	X
Geographic Covariates		X		X		X		X
Full Demographic Covariates		X		X		X		X
Robust Confidence Interval (Upper bound)	-0.140	-0.117	0.036	0.051	-0.209	-0.133	-0.066	-0.103
Robust Confidence Interval (Lower bound)	-0.267	-0.288	-0.005	-0.018	-0.373	-0.351	-0.184	-0.206
Bandwidth (Estimate)	16.5km	19.0km	31.1km	21.1km	21.5km	20.7km	20.3km	19.5 km
Bandwidth (Bias Correction)	31.4km	28.1km	53.6km	32.7km	34.0km	32.8km	33.8km	48.8km
Effective N. Controll	4447	2630	4527	1612	1892	1223	5060	2562
Effective N. Treatment	6340	1958	3425	1243	1464	989	3710	1927
Note:								*p<0.05; **p<0.01; ***p<0.001

show that people in well-funded regions became more displeased with the EU than those in less-funded regions between Waves 2 and 9.

If people are dissatisfied with the status quo in their regions, it is possible that they also blame national and local governments as much as the EU. Only Wave 7 asked if they approve of the local, national, and EU authorities at the same time. Columns 1-3 in Table 2.3 apply the same geographic RD framework to those questions. It appears that the areas that received a significant amount of the EU funding do not necessarily show lower support for the local or national government, as opposed to the EU. Similarly, Columns 9 and 10 in Table 2.3 demonstrate that people in well-funded areas are dissatisfied with the democracy at the EU level at Wave 9, but not at the national level.

It is worth clarifying what criteria they use to evaluate the EU. In Wave 7, the BES asked what people cared the most when deciding how to vote in the EU referendum. Columns 4-8 in Table 2.3 reports the geographic RD results for what topic the respondents chose. Interestingly, people in well-funded regions were more likely to select niche topics such as "Bureaucracy" and "Spending" by about three percentage points, respectively, than their counterparts in more developed regions do. More mainstream issues such as immigration, economy, and sovereignty did not show such regional gaps.

If bureaucracy and spending are critical factors, people may perceive that the EU unfairly treats them or imposes a high financial burden. Table 2.4 looks at various questions regarding the perceptions of the EU and Brexit. Those in well-funded regions are no more likely to expect a significant change in their financial situation, crime, or immigration when the UK leaves the EU than those in more developed areas. They are no less likely to believe that Britain gets a fair share of the EU budget, either.

Table 2.3: RD: Related questions

Treatment variable:				Being in well-funded regions						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Do you approve or disapprove of the job that each of the following are doing? (Wave 7: 5 levels)										
EU	-0.080***									
	(0.021)									
National Government		-0.029								
		(0.020)								
Local Authority			-0.007							
			(0.020)							
What matters most to you when deciding how to vote in the EU referendum? (Wave 7: Single option)										
Sovereignty				-0.000						
				(0.007)						
Immigration					0.004					
					(0.007)					
Economy						-0.009				
						(0.007)				
Spending							0.026***			
							(0.004)			
Bureaucracy								0.030**		
								(0.008)		
On the whole, how satisfied or dissatisfied are you with the way that democracy works in the following? (Wave 9: 4 levels)										
EU									-0.083***	
									(0.018)	
UK										0.010
										(0.018)
Border Fixed Effects	X	X	X	X	X	X	X	X	X	X
Robust Cl (Upper)	-0.050	0.031	0.052	0.016	0.035	0.012	0.042	0.052	-0.059	0.090
Robust CI (Lower)	-0.159	-0.066	-0.048	-0.023	-0.006	-0.027	0.020	0.007	-0.148	-0.002
BW (Estimate)	20.5km	18.4km	17.7km	21.9km	22.3km	28.8km	25.7km	20.3km	18.5km	18.6km
BW(Bias Correction)	33.5km	37.4km	31.6km	36.1km	37.7km	54.5km	36.5 km	33.4km	32.6km	32.3km
Effective N. Controll	5285	4824	4695	4371	4108	4482	5177	4045	4420	4608
Effective N. Treatment	3944	3799	3490	3066	3016	3169	3478	2954	3504	3668
Note:								*p<0.05; **p<0.01; ***p<0.001		

Table 2.4: RD: Perception of the EU

Treatment variable:				Being in well-funded regions				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Do you think the following would be better if the UK leaves the European Union? (Wave 7: 5 levels)								
My personal financial situation	0.022							
	(0.013)							
The general economic situation in the UK		0.046*						
		(0.020)						
Do you think the following would be higher if the UK leaves the European Union? (Wave 7: 5 levels)								
Immigration to the UK			0.009					
			(0.021)					
Unemployment				-0.076***				
				(0.016)				
The risk of terrorism					0.000			
					(0.013)			
How much do you agree or disagree that ... (Wave 8: 5 levels)								
Britain gets its fair share of EU spending						-0.031		
						(0.022)		
EU made Britain more prosperous							-0.093***	
							(0.023)	
EU created more red tape for business								0.287***
								(0.031)
Border Fixed Effects	X	X	X	X	X	X	X	X
Robust CI (Upper bound)	0.053	0.119	0.069	-0.042	0.021	0.021	-0.038	0.404
Robust CI (Lower bound)	-0.017	0.009	-0.029	-0.130	-0.047	-0.094	-0.162	0.269
Bandwidth(Estimate)	25.6km	19.4km	15.5km	23.9km	24.5km	18.2km	19.7km	10.1km
Bandwidth (Bias Correction)	43.8km	31.5km	31.4km	38.3km	41.1km	30.3km	30.9km	27.8km
Effective N. Controll	6265	4853	4363	5896	6449	4041	5352	2501
Effective N. Treatment	4202	3654	3074	4200	4358	3126	4132	2225

Note: *p<0.05; **p<0.01; ***p<0.001

However, they appear to believe that the EU created significant red tapes, made the UK less prosperous, and leaving the EU may improve employment in the UK. Given these findings, it is unlikely that people are protesting out of parsimony or fiscal concerns.

Immigration and identity were unarguably the decisive topic in the EU referendum and the reason for many voters to support the *Leave* position. However, Table 2.5 demonstrates that the well-funded regions do not show any disparities in their preferences for immigration policies or their attitudes toward immigrants. The questions regarding ethnic minorities or British pride did not show regional discontinuity either. There is no indication that those residents are anti-immigrant, socially conservative, or nationalistic.

The main findings suggest that people turned against the entity offered significant resources for place-based policies in their local areas. This behavior may seem irrational, but a closer look reveals that emotional reasons are not the primary factor. People in well-funded regions are no more likely to blame the EU for crime or immigration, and they are more interested in the EU's spending and bureaucracy than sovereignty.

Table 2.5: RD: Attitudes toward Immigration

Treatment variable:				Being in well-funded regions				
Dependent Variable:								
Immigrants from other EU countries pay more in taxes than they get in benefits (W7: 1-5 scale)	0.040 (0.069)							
Immigrants are a burden on the welfare state (W7: 1-5 scale)		0.010 (0.030)						
Feeling thermometer: Polish people (W7: 1-100 scale)			1.734 (1.258)					
Feeling thermometer: Romanian people (W7: 1-100 scale)				-0.189 (0.969)				
Attempts to give equal opportunities to ethnic minorities have gone too far (W8: 1-5 scale)					0.005 (0.018)			
EU citizens in Britain should claim child-benefits for their children living elsewhere (W8: Binary)						0.011 (0.008)		
Britain should allow more workers from other EU countries to come and live in (W8: 0-10 scale)							-0.074 (0.052)	
Identify myself with Britishness very strongly (W9: 1-7 scale)								0.009 (0.030)
Border Fixed Effects	X	X	X	X	X	X	X	X
Robust CI (Upper bound)	0.162	0.045	5.309	2.715	0.042	0.034	0.105	0.091
Robust CI (Lower bound)	-0.163	-0.109	-0.700	-2.067	-0.046	-0.009	-0.173	-0.091
Bandwidth (Estimate)	11.2 km	14.3km	19.1km	25.2km	20.1km	19.4km	17.4km	21.8km
Bandwidth (Bias Correction)	24.9km	25.3km	40.4km	48.9km	37.0km	34.0km	27.5km	35.2km
Effective N. Controll	2793	4140	1222	1596	5547	5533	5021	5848
Effective N. Treatment	2255	2971	928	1102	4112	4245	3717	4254

Note: *p<0.05; **p<0.01; ***p<0.001

Robustness checks

All the tables for robustness checks are available in Appendix. While most RD models in the main section use border fixed effects, Table A1 shows that adding different sets of covariates or dropping border fixed effects do not change the main findings. While adding the full sets of covariates results in the loss of samples and the coefficients fluctuate, the results stay negative and significant for all the specifications.

I used local authority areas as the unit of clustering for variance estimation. Models in Table A2 use different geographic levels for clustering. The results without any clustering return large standard errors, but the approval of the EU in well-funded regions is negative and significant at the 95% confidence interval for all the models.

As shown earlier, the treated regions had heterogeneity in their exposure to the EU funds, but dropping outliers did not change the results. Cornwall and West Wales received a higher amount of the ESIF funding as *Less Developed Regions*, Highlands and Islands had prior exposure to the EU funding as *Convergence Areas*. Merseyside made it to the *Transition Regions* status even though their GDP per capita seems to be above the threshold. As robustness checks, Table A3 presents the RD results for the EU approval in Wave 9, using different definitions of "well-funded regions". I dropped the respondents in those three areas, and the result did not change significantly.

The results with arbitrary bandwidth (20km, 30km, 40km, 50km) instead of CCT, different order of polynomial for point estimation (2, 3) and bias correction (3, 4), as well as the results using different kernel (Uniform and Epanechnikov) are presented in the Table A4. They are all consistent with the main findings.

In addition to the RD, a simple difference-in-difference analysis with different definitions of well-funded areas is given in Table A5. Table A6 presents a two-stage least square analysis, using the well-funded region as the instrument variable and per-capita funding as the treatment variable. The results are consistent with the main findings in both analyses, and more estimated per capita funding leads to less support. More detailed descriptions for Tables A5 and A6 are given in Appendix F and G. They indicate that the findings are not unique to geographic RD.

Discussions on mechanisms and subset analysis

The main findings are contrary to conventional wisdom, but earlier sections outlined five possible mechanisms to explain negative effects - dislike for inefficient pork-barrel politics, welfare chauvinism, misinformation, misattribution, information bias. While it is impossible to directly assess how the respondents perceived the EU-funded projects themselves with the BES data, it is possible to narrow down the potential mechanisms by evaluating which socioeconomic/skill/age groups reacted more strongly. Besides, most BES respondents reported the newspapers they read and what information source they used when deciding how to vote in the referendum, which provides a further clue. It can also test the expectation that place-based policies have heterogenous political effects.

It is essential to remind the earlier findings that people's feelings about immigration or sovereignty did not show the corresponding regional disparities. Those in well-funded areas are not satisfied with the EU's economic management and the state of democracy,

and they are interested in spending and bureaucracy of the EU. These findings exclude explanations based on nationalism, anti-elitism, or identity politics.

I analyze what socioeconomic groups are driving the observed effect with the five different mechanisms in mind. First, I subsetted the sample with the educational attainment and socioeconomic status (*NRS social grade*) and then applied the geographic regression discontinuity framework to those subgroups.

Columns 1 - 4 in Table 2.6 report the results subsetted by educational attainment. Among the highly educated group, people in well-funded regions are more likely to disapprove of the EU than those in the less well-funded areas. The magnitude of the effect is about 0.29 points on a five-point scale, which is twice as much as the aggregate outcome shown earlier in Table 2.2. Columns 2 to 4 demonstrate that the coefficients get smaller as the respondents become less educated. Columns 5 - 8 in Table 2.6 present the RD analysis subsetted by socioeconomic status. A similar tendency is observed here, as those with high-socioeconomic status tend to react more strongly against the EU. Subset analyses with labor market status and age groups are presented in Table A7 in Appendix H, but they show no specific trend associated with the regional discontinuity.

The results in this analysis lend support to the anti-pork-barrel attitude or the welfare chauvinism. Misattribution or misinformation bias appears less likely to concentrate among highly-educated, high-SES people. The caricatural description of the anti-EU voters - older people without a university degree, does not represent the groups reacting negatively to the EU-funded projects.

Subsequently, I analyze if the information source about the EU and local area can make a difference. There are two possible ways that newspapers or media can affect the readers' view of EU-funded projects. The first possibility is in line with the information bias hypothesis that readers are influenced by the pro-EU or anti-EU stance of the news source they read. The local EU-funded projects serve as a reminder of the virtue or problems of the EU. The Reuters Institute for the Study of Journalism at Oxford University analyzed the reporting of major newspapers in the UK about the EU and reported a significant divergence in their stances and coverage.[7] I categorized the newspapers by their Brexit stance, according to the report of the Reuters Institute.

Another possibility is that more information about the details will make people more skeptical in evaluating projects, which is in line with anti-pork-barrel attitudes. It is generally thought that those local development programs receive more coverage in local or regional newspapers (Surubanu 2017), and the readers of those papers may be more exposed to potential inefficiencies or problems related to the local development projects. Similar arguments can apply to the radio (Strömberg 2004) as opposed to TV.

I conducted the same spatial regression discontinuity analysis shown earlier, but this time with the respondents' subset reading particular newspapers. Columns 1 to 5 in Table 2.7 show the RDD results. Those respondents who read local or regional newspapers[8] and live in the well-funded areas tend to disapprove of the EU. On the other hand, no discontinuity was observed among the readers of nation-wide newspapers, irrespective

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[7]   The Reuters Institute for the Study of Journalism, May 2014 http://www.ox.ac.uk/news/2016-05-23-uk-newspapers-positions-brexit last accessed December 9, 2019

[8]   Regional newspapers outside England include The Scotsman, The Herald (Glasgow), The Western Mail (Wales). Local newspapers in England are not specified in the BES dataset.

Table 2.6: Subset RD: Education and SES

Treatment variable:				Being in well funded regions				
Dependent variable:				Approve EU (Wave 9: 5 levels)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Highest educational attainment of the respondent:								
Tertiary Education	-0.286***							
	(0.045)							
Upper Secondary (A-level)		-0.145						
		(0.084)						
Lower Secondary (GCSE)			-0.081**					
			(0.025)					
Compulsory/Primary				-0.017				
				(0.046)				
Socioeconomic status of the respondent (Wave 9):								
High(A/B)					-0.247***			
					(0.054)			
Intermediate(C1)						-0.126*		
						(0.052)		
Lower Middle(C2)							-0.065	
							(0.038)	
Inactive(E)								-0.161*
								(0.074)
Border Fixed Effects	X	X	X	X	X	X	X	X
Robust Cl (Upper)	-0.255	0.017	-0.010	0.093	-0.149	-0.050	0.012	0.022
Robust Cl (Lower)	-0.462	-0.407	-0.135	-0.151	-0.413	-0.319	-0.175	-0.362
Bandwidth (Estimate)	13.7km	14.1km	25.7km	19.5km	16.4km	17.9km	22.3km	18.8km
Bandwidth (Bias Correction)	40.0km	25.9km	49.9km	34.0km	31.1km	30.4km	41.7km	31.5km
Effective N. Controll	1434	744	1416	651	1405	1231	1012	629
Effective N. Treatment	981	578	990	532	1009	922	778	476

Note: *p<0.05; **p<0.01; ***p<0.001

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of their editorial stances on Brexit. The readers of the Daily Mail, a hard-line Brexit supporting paper, did not react differently to the local funding compared to the Guardian readers, who read more pro-EU editorials. It appears that the geographic discontinuity is not the result of the media-delivered image of the EU enhanced by the local presence of EU objects. This discredits the information bias theory.

It appears that those who are informed about the place-based policies are likely to disapprove of the EU, and they are not necessarily swayed by the opinions of papers they read. While it is not possible from the data to know which local papers the respondents are reading, local papers' editorials are unlikely to be systematically affected by the area's ESIF funding status.

Wave 7 asked what information source the respondents use to gather information about the EU. Columns 6 to 8 in Table 2.7 show the RD results for this question. Those who gathered information via radio and talking showed a significant regional discontinuity, while the TV users show a smaller gap. As most TV channels operate nation-wide while many radio stations are locally run, it can indicate that those who gather information via local sources react more negatively to local place-based policies.

To test the welfare-chauvinism hypothesis, I subset the respondents according to their response to two welfare-related questions in Wave 7. Table 2.8 shows that the negative attitude toward the EU is concentrated among those sympathetic to the welfare programs and recipients. It may not disprove welfare chauvinism in this particular context of the EU funds, but at least one could say there is no apparent link between hostility to welfare recipients and adverse reaction to the place-based policies.

Thus, while it is challenging to establish an anti-pork-barrel attitude firmly, this section convincingly denies the three other potential mechanisms; miss-attribution, misinformation, and information bias, while casting doubt on the welfare chauvinism argument. Thus it is reasonable to conclude that those highly educated, high SES people, who read local newspapers and somewhat sympathetic to welfare recipients, are likely to evaluate the EU negatively given the management of projects they saw in their area.

Even though the negative return on place-based policies is contrary to the conventional wisdom on pork-barrel politics and clientelism in general, it is imperative to note that the literature on those topics mainly discusses the impact of those policies on the poor. While low-income voters may have reacted positively toward cash transfers and public sector employment, it is not clear how relatively better-off people respond to such policy measures, knowing the potential inefficiencies. As place-based policies are often visible and less targeted, the reaction of the rich would also affect how the areas would politically respond to the policy measures. Rather than whether the government spends money for them, how they spend and managed may become a more prominent criterion, as the amount spent does not necessarily correlate with the improvement in individual utility in the case of place-based policies.

Geocoded Projects and Matching Analysis

The earlier geographic regression discontinuity analysis can deal with the selection issues and omitted variable problems. Still, it is an intent-to-treat analysis and does not use the projects themselves. Even though the chance of gaining EU funding is open to any

Table 2.7: Subset RD: Information source (Geographic RD: CCT bandwidth)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment variable:	Being in well funded regions							
Dependent variable:	Approve EU (5 levels)							
	Wave 9					Wave 7		
Subset: newspaper subscription (Wave 9)								
Local and Regional Newspapers	-0.158*							
	(0.067)							
The Daily Mail (Pro-Brexit, Anti-EU)		0.011						
		(0.038)						
The Guardian (Anti-Brexit, Pro-EU)			0.138					
			(0.106)					
Pro-Leave papers (The Daily Mail / The Sun / Daily Telegraph / Daily Express)				0.020				
				(0.035)				
Pro-Remain papers (Daily Mirror / Guardian / Financial Times)					-0.112			
					(0.071)			
Subset: information source about the EU (Wave 7)								
Talking						-0.209***		
						(0.039)		
Radio							-0.225***	
							(0.038)	
TV								-0.052*
								(0.024)
Border Fixed Effects	X	X	X	X	X	X	X	X
Robust Cl (Upper bound)	-0.002	0.124	0.467	0.133	0.045	-0.157	-0.346	0.012
Robust Cl (Lower bound)	-0.342	-0.064	-0.106	-0.035	-0.319	-0.354	-0.142	-0.119
Bandwidth (Estimate)	26.1km	24.4km	29.7km	14.9km	17.9km	18.5km	20.7km	21.6km
Bandwidth (Bias Correction)	48.8km	47.6km	52.5km	30.9km	32.9km	32.5km	32.6km	34.5km
Effective N. Controll	481	917	483	1369	657	2195	1708	3568
Effective N. Treatment	356	627	308	934	488	1628	1198	2635

Note: *p<0.05; **p<0.01; ***p<0.001

Table 2.8: Subset RD: Perception of welfare

Treatment variable:			Being in well funded regions			
Dependent variable:			Approve EU (Wave 7: 5 levels)			

Too many people these days like to rely on government handouts (W7)

Agree/Strongly agree	-0.007					
	(0.021)					
Neither agree or disagree		-0.264***				
		(0.043)				
Disagree/Strongly disagree			-0.196***			
			(0.055)			

When someone is unemployed, it's usually through no fault of their own (W7)

Agree/Strongly agree				-0.230***		
				(0.030)		
Neither agree or disagree					-0.122***	
					(0.035)	
Disagree/Strongly disagree						0.060
						(0.043)
Border Fixed Effects	X	X	X	X	X	X
Robust Confidence Interval (Upper bound)	0.028	-0.215	-0.048	-0.196	-0.071	0.164
Robust Confidence Interval (Lower bound)	-0.085	-0.430	-0.336	-0.354	-0.237	-0.060
Bandwidth (Estimate)	21.7km	16.6km	19.8km	20.4km	14.5km	28.9km
Bandwidth (Bias Correction)	34.1km	30.9km	34.5km	32.7km	30.3km	47.9km
Effective N. Controll	3248	862	1023	2057	1641	1257
Effective N. Treatment	2248	663	837	1523	1174	922

Note: *p<0.05; **p<0.01; ***p<0.001

entity in the well-funded regions, not all the supposedly well-funded regions may witness big EU-funded projects. To deal with treatment, I conducted a complimentary matching analysis using the recipients' locations.

I geo-located all the local managing authorities of ESIF-funded projects in England by their post-codes, using the data from the Department of Communities and Local Government.[9] The datasets listed all the managing authorities such as local commissions, local authorities, chambers of commerce, but not the end beneficiaries. Therefore, even if the funding was to support the capital investment by small and medium-sized enterprises, the data does not have individual firms' locations; they have the intermediaries' addresses. Nonetheless, it is assumed that most of the end-beneficiaries are located near the managing authorities, since the EU has strict rules about the end beneficiaries' location as described in the previous sections.[10] I excluded the job training projects funded by ESF as the central government departments in London or the Big Lottery Fund in Coventry manage most of those projects across England, and those programs had large targeted areas. Focusing primarily on locally managed ERDF projects has another merit in that none of them had started by Wave 2, unlike labor market projects.

The dataset recorded 1305 projects categorized into 89 different policy objectives, and I classified them into the following six large groupings; 1.Infrastructure and Transport; 2. SME support / Business development / Industrial parks; 3. Climate change measures, Biodiversity, Renewable energy; 4. Community-led local development; 5. Information and Communication, ICT; 6. Research and Innovation, Technology transfer.[11] Community-led local development projects are often targeted at deprived quarters in the cities. Many SME support projects combine several measures, such as developing a business park and grants for new business investments. Some of the climate change measures appear to include infrastructure upgrades.

I sorted all the projects in England in the 2014-2020 EU budget cycle published by July 2020, then I checked for each local authority area in England, what type of EU-funded projects are in place, if any. Table 2.9 shows the decomposition of the projects according to the project types. I also categorized them into four different recipient types; A. Local and Regional Councils; B. Private firms and Chambers of Commerce; C. Nonprofit organizations and Trusts; D. Universities.

Table 2.9: Count of the EU-funded projects in England (ESIF) by July 2020

Infrastructure&Transport	SME/Business development /Industrial parks	Climate change, Biodiversity, Renewable	Community-led local development	ICT	Research&Innovation
149	515	92	45	70	212

With the geocoded project data and the same BES dataset, I test if having cer-

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[9]   Scotland and Wales publish separate datasets with a different format. Only England is featured in this section.

[10]   In some projects, private consulting firms get funding for the projects in specific areas, but the data only has the location of their headquarters, which inevitably resulted in some mismatches.

[11]   A few projects with several different objectives are double-counted for different categories. Some miscellaneous projects, such as government accounting, were not categorized.

tain kinds of EU-funded projects in the area affect people's views on the EU. I use the Genetic Matching (Diamond and Sekhon 2013) algorithm to find two people similar in demographic characteristics. Those who live in the local authority areas with certain projects are in treatment groups, and those without such projects are in control groups. Genetic matching would find the matched sets with the lowest p-value of any covariate differences between the treated and controlled sample. As in the RD sections, dependent variables are the approval of the EU in Waves 2 and 9. I matched the respondents with full demographic and socioeconomic variables (30) used earlier. Online Appendix I shows the list of matched variables and the result of conventional nearest-neighbor matching.

The results in Table 2.10 suggest that a person with identical characteristics shows lower support for the EU if the area benefited from Infrastructure projects or business support programs funded by the EU in Wave 9. As in the RD, such a gap is not observed for Wave 2. Besides, climate change measures also resulted in aggravating the EU approval between Waves 2 and 9. While coefficients are negative across different types of projects, the effect is weaker and not significant for the areas with community-led local development and research and innovation projects.

Table 2.11 shows the genetic matching results according to the recipient types. People react negatively to those projects that local authorities are the beneficiaries, but people do not seem to respond when universities or nonprofit organization receives the funding. As the residents do not turn against local authorities in the earlier results, this may be due to council-run projects' public nature and visibility.

In Online Appendix I, I also report the results using nearest-neighbor matching instead of genetic matching and the results that count projects in a 20 km buffer area outside the

Table 2.10: Matching result: Project type

Dependent variable:	Approve EU (5 levels)					
	W9	W2	ΔW2:W9	W9	W2	ΔW2:W9
Infrastructure and Transport	-0.05682*	0.006471	-0.11889*			
	(0.02821)	(0.012531)	(0.05252)			
SME support / Business development / Industrial parks				-0.06053**	0.012706	-0.09854*
				(0.02287)	(0.010306)	(0.04312)
Number of Matched Observations	6334	3398	2656	9844	5350	4098
Climate change measures, Biodiversity, Renewable energy	-0.02016	0.020747	-0.14448*			
	(0.03093)	(0.013743)	(0.05758)			
Community-led local development				-0.06136	0.01982	-0.14398
				(0.04566)	(0.02029)	(0.08585)
Number of Matched Observations	5356	2890	2282	2410	1310	1012
Information and Communication, ICT	-0.06587	0.02178	-0.09519			
	(0.03363)	(0.01525)	(0.06367)			
Research and Innovation, Technology transfer				-0.04444	0.003058	-0.07724
				(0.02657)	(0.012116)	(0.05106)
Number of Matched Observations	4522	2386	1826	7244	3922	2950

Note:	*p<0.05; **p<0.01; ***p<0.001

local authorities (Tables A8/A9). All the negative and significant results in this section are robust and consistent in those different specifications.

Table 2.11: Matching result: Recipient type

Dependent variable:	Approve EU (W9)				ΔApprove EU (W9-W2)			
Recipient type:								
Local and Regional Council	-0.07525** (0.02371)				-0.17316*** (0.04469)			
Private Firms / Chamber of Commerce		-0.04825 (0.02742)				-0.08267 (0.05280)		
Nonprofit Organizations and Trusts			-0.01344 (0.039242)				0.03209 (0.07341)	
Universities				-0.001645 (0.029054)				-0.07296 (0.05585)
N. of Matched Observations	9008	6754	3420	6078	3694	2780	1494	2520

Note: *p<0.05; **p<0.01; ***p<0.001

These results largely corroborate the earlier findings in the RDD: the EU-funded projects indeed reduce the support for the EU. As the R&I projects in the universities were available in the *More developed regions* funding category, the matching results strengthen the view that conventional regional development policies are causing the political shift.

The projects with wide beneficiaries, such as Infrastructure projects and Climate change measures, were the worst performer in political returns. In contrast, selective ones such as community-led local development in deprived areas returned weaker results. It suggests that place-based policies that are visible and large in scale, which attract local attention and scrutiny, can negatively affect the evaluation. This is in line with the anti-pork barrel attitude presented in the earlier sections.

Suppose well-educated residents are critical of the policies they do not benefit from, as in the welfare chauvinism argument. In that case, the community-led local development policies should be associated with the largest negative effect, and business support projects could potentially have a positive return. However, the results indicate that redistributive aspects are not relevant. It is reasonable to interpret that voters are more critical of deliveries and management of the projects or spending money in an inefficient way, rather than having any projects at all.

Conclusion

This paper deals with the lack of political support from the supposed beneficiaries of place-based policies, about which few attempts were made so far to identify rigorously and theorize. The mechanism is not pinpointed precisely, but the findings suggest that well-informed, well-off people disapprove of inefficient or ill-suited pork-barrel projects in their local areas. Discovering potential heterogeneity regarding receptions of place-based policies is a critical step. More meticulous data of project performance indicators and residents' surveys will uncover this mystery further.

The findings cast doubt on the traditional understanding of pork-barrel politics. It appears that the EU failed to generate political support, especially among the high-skilled and highly-educated voters. Compared to cash transfer or welfare programs,

whose effectiveness to improve political support is well known, place-based policies may be less potent. As economics literature points out, place-based policies have not been successful in eliminating regional economic disparities, and if the contribution to "pork" is more likely to be noticed by well-informed, well-off voters in the area, the usual formula of buying votes of relatively worse-off voters may cease to function.

The results of this paper also have substantial policy implications. As the political backlash against economic globalization became familiar, many policymakers used place-based policies to compensate the regions adversely affected by technological changes, industrial declines, economic globalization, and environmental regulations. It is essential to review whether such compensatory measures have an intended effect at all, and this paper questions the efficacy of such policies to placate the discontent.

Many policy fields, such as protectionism, are known to be economically inefficient yet believed to be politically effective. Such assumptions rarely undergo rigorous scrutiny. However, the political impact of distributional policies needs to take into account the eventual economic impact and heterogenous political reactions among the supposed beneficiaries. Understanding who benefits and who loses from political favor could be an essential step to analyze the question of democratic accountability.

Chapter 3

Paper 2: Gone with the Dirty Air? Closure of Polluting Plants, Fracking Sites, and Changes in Local Public Opinion.

Abstract

If the regions experience industrial shifts from polluting industries to green ones, do the residents change the attitude toward environmental protection and the incumbent government? I compiled original datasets of factory closures, shale gas exploration sites, and green energy plants in the UK during the British Election Study (2014-2020). I investigate if the closure or opening of facilities changed the locals' perceptions about the trade-off between environment and employment or the approval of the government. The results suggest that the fracking ban resulted in the loss of government support in the affected areas, but the factory closures temporarily increased the support for the government. The effects of the fracking ban appear to be driven by economic self-interest, while the government's help to the community after factory closures seems to improve their approval in the short run. On the other hand, the areas that lost industry jobs or fracking opportunities are not different in terms of the growth in pro-environment attitude over time, and green industries do not appear to affect public opinions strongly. The finding suggests that the government may pay an electoral price in the deindustrialized areas if they cut the polluting jobs, but the remedy measures may mitigate such political costs, and the industrial transition may not trigger the political backlash feared by many.

Introduction

Across advanced economies, heavy industries and polluting plants are in decline, and affected communities are suffering from the severe loss of economic opportunities. Such industries have been politically powerful both as employers and unions. Nonetheless, technological changes, international competition, and stricter environmental regulations are all contributing to their demise. Simultaneously, the rapid shift toward green and renewable energy is taking place, completely changing the economic geography of many countries. While green jobs are replacing some old industrial ones, most new jobs did not thrive in old industrial locations, and governments across the world are struggling to manage the economic malaise in adversely affected areas.

Such economic and industrial shifts have political ramifications. The link between deindustrialization and political populism is well-documented (e.g., Dorn et al., 2020), and voters in the "rust belt" and coal-mining regions are attracting significant attention from political scientists as well as from policymakers. Yellow vest movements in France, for example, were associated with the anger among non-urban residents against the introduction of a carbon tax. However, "deindustrialization" and the shift to green energy have different phases and characteristics. It requires careful investigation to discern what is creating the upheaval.

The dynamics between public opinion and the shift from heavy industries to green ones are the key aspect of this debate. Policymakers often fear the backlash against free trade or environmentally progressive policies in industrial areas, promising job protection or applying accommodating regulations. Nonetheless, those assumptions of electoral price and backlash are understudied, and knowing how people react politically to local economic changes would be an essential factor for policymaking.

This paper investigates various critical phases of the shift from heavy or polluting industries to green jobs - closure of large factories, a governmental ban on fracking, and the opening of renewable energy plants - and investigates how it affected the political behavior of residents in the affected areas. In particular, this paper checks if such events affected people's support for environmental protection and their approval of the government, using panel survey data from the UK.

As for plant closures, researchers have paid significant attention to politicians, parties, unions, and employers trying to defend polluting or dying industries despite the political, economic, and social pressure to move away. They often lobbied for lax environmental regulations and demanded job protection. However, it is not straightforward to expect what happens after they finally lose such industries. Do they embrace the transition to green industries once they lose the polluting ones, or do they feel aggrieved and embolden their opposition to the change? Do they come to dislike the government that oversaw the closures or appreciate the safety net and financial support it offers to the affected community? Politicians may think of bailing out rather than accelerating the transition if the electoral price they face is too high.

I also inquired into the effect of the U-turn of the UK government regarding its fracking policy and how people in affected areas reacted to the new environmental regulations curtailing the job prospects and economic opportunities in their local areas. Then I tested the opposite events, the opening of renewable energy plants, including wind, solar,

biomass, and waste-to-energy plants. If people appreciate such economic opportunities, then accelerating the transition could become a politically viable strategy even in the industrialized regions. They are all policy-relevant and vital questions.

The results suggest that the support for the government fell in the areas affected by the fracking ban but temporarily improved in the areas with factory closures. In the case of fracking ban, homeowners, working-class voters and union members reacted negatively after the fracking ban, which suggest that those who would have gained from fracking decreased the support for the government. On the other hand, homeowners and self-employed workers improved their perceptions of the government following the factory closures, at least in the short run. Since the residents in the affected areas became less critical of government cuts at the national and local level after the closure, I interpret the results as they appreciated the help government offered to the community in the transition phase.

On the other hand, the locals' attitudes toward environmental protection were not different from unaffected areas in both cases. Indeed, the attitude toward environmental protection significantly improved in the area that lost factories or fracking opportunities, though it was not distinguishable from unaffected areas. It is worth noting that areas with factories and oilfields did show the initial tendency to have skeptical attitudes toward environmentalism; therefore, the gap in attitudes may remain over time. In the case of green jobs and environmental projects, they did not affect the approval of the government, and they had an inconclusive impact upon environmentalism.

The findings indicate that the government may pay a political price when they take direct action to close polluting industries, but they may not create vengeful voters who despise environmentalism. With some support to smooth out the shock of deindustrialization, they could avoid electoral backlash without eternally bailing out factories. In case of factory closures, the government may not have been directly responsible for the job loss, which could be the key difference compared to the fracking ban. It appears that losing jobs may not result in the backlash, and affected areas seem to accept industrial changes.

Literature review and Theory

It is well-known that the presence of manufacturing industries in the area affects the political behavior of the residents (e.g., Dorn et al. 2020), and many researchers have investigated the long-term legacies of the long-lost institutions (e.g., Dell 2010; Acharya et al., 2016). However, what happens in the transition phase is understudied, and the expectation is not straightforward. As many areas face industrial transition and appear to exhibit the rise of political populism, it is worthwhile to take a closer look at the dynamic nature of political behavior in industrial regions.

Statically, it is not controversial that people defend their areas' economic interests. For a long time, political scientists have studied how geography shapes political behavior (Rodden 2010) and how spatial developments change the residents' political preferences (Nall 2015). Indeed, people do care about the economic well-being of their local areas when they participate in politics (Larssen et al., 2018). While it could be argued that many jobs in polluting sectors are dying, it is perfectly understandable with a rational

framework that the locals would move to defend their local jobs even if it means that the environment of wider areas could be compromised.

Industrial areas are also associated with the rise of populism and anti-establishment feelings. Dorn et al. (2020) claimed the association between the local exposure to the import competition with China and the vote for Donald Trump in the 2016 presidential election. Colantone and Stanig (2018) used the same measure in the UK and claimed that exposure to the trade shock in the area increase the vote for Brexit and populist parties, even if the voters themselves were not employed in the industrial sectors. The measurement of those papers is import competitions and not directly the job loss, but if people turn to dislike international trade after international trade threatens the local industries, then the same negative response could apply to the environmental protection measures.

However, the inter-temporal dynamic is not straightforward. Some studies of disaster relief found that voters' gratitude could be surprisingly long-lasting (Bechtel and Hainmueller 2011), and the same could be said about how they react negatively to the past factory closures. On the other hand, the impact of job loss at the individual level on political behavior is also well studied, and their conclusion appears somewhat different. According to this branch of research, those who lost the job tend to demand more social protection measures and decrease the trust for institutions, but the effect is generally short-lived (Margalit 2019). The increasing demand for welfare programs is rational, and the temporary nature of the shift is understandable because job loss is a temporary phase in their career for most workers. In short, it is in line with more welfare-maximizing motives. If people act according to their rational interest, then people in the area with the dying industry should no longer have a strong reason to oppose environmental protection.

The legacy of the industrial past could be complicated. Many political scientists and economists document long-lasting legacies of past institutions and shocks (Putnam 1994; Dell 2010; Acharya et al., 2016), and loss of industry jobs may not mean losing the political culture associated with them. While many heavy industries, such as petrochemical, steel, heavy machinery, quarrying, and mining, have been disappearing from advanced economies, there is little indication that opposition to strict environmental regulations is declining accordingly in the formerly industrial zones. On the other hand, the local industry's demise certainly changes the incentives and power of those who tried to defend them. For example, it is widely accepted that the Thatcher administration's battle against the coal miners' union in the 1980s for political reasons unintentionally weakened the interest group to stop the UK's transition from coal power plants later in the 2000s. Changing economic situations can change their political interest as well.

How the residents in those transition regions react to the government in charge is not clear either. On the one hand, the local economy's degradation may affect their evaluation of the government (Larssen et al., 2018). On the other hand, it is well established that voters in small economies often do not blame the government for something they cannot control (Anderson 2000), and locals may accept that it resulted from inevitable economic and social changes, thus refraining from blaming the government. The governments often offer help for the displaced workers or adversely affected areas, and even without such tailor-made policies, the affected people may rely on the safety net the government provides. Therefore, how locals would see the government after their areas lost jobs may

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	Support for environmental policies	Support for the government
Backlash / Grievance	Deteriorates; The residents feel bitter about the regulations that harmed the industries.	Deteriorates; The residents find it unacceptable that the government let the job go.
Moving on / Acceptance	Improves; The residents have little to gain from continuing their support for polluting industries.	Improves; The residents may appreciate the help and safety net the government provide for the transition.
Legacy / Inertia	No change; The attitude has formed before the local job loss and survives unaffected.	No change: The residents accept that there was nothing the government could do.

Figure 3.1: Typologies of potential reaction to the loss of polluting jobs

not be so simple, especially if there is a secular trend against those industries.

The remedy measures the government provides may make a difference. Acemoglu and Robinson (2000; 2008) claimed that the economic losers would stop economic changes when there is no credible guarantee of redistribution. In many countries, whether those areas that lost polluting industries can have flourishing green industry is far from certain. Some green industries are strategically located in the formerly deindustrialized areas, but retraining manufacturing sector workers into engineers in the green sector is not always successful.

Therefore, with regard to the loss of environmentally damaging sites, I expect one of the three different patterns of reaction to local deindustrialization, summarized in Figure 3.1. The first possibility is that they blame the environmentally friendly policies for the demise of their local communities and turn against environmental protection. Whereas looser environmental regulations may no longer ameliorate their area's economic conditions, this is in line with the behavioral patterns observed vis-a-vis international trade shocks. Anecdotally, the deindustrialized areas in Northern England and Scotland turned against the Conservative party's privatization of heavy industries in the 1980s, and its anti-Conservative tendency is widely felt today, even though nationalized industries are long gone, and the Labour party did not try to reverse the privatization policy (McCann 2016). Essentially, people may react negatively to environmentally friendly policies for emotional reasons as they lost the industry dear to their community.

The second possibility is that they give up on defending the polluting industries and move on, possibly with less hostility toward environmental protection. Indeed, large factories have been the focal points of mobilization to save jobs, and the unions of workers in heavy industries often lobbied hard to avoid strict regulations of the factories. Employers

also contributed to the well-being of the community, possibly influencing the residents' attitudes. However, once the factory itself is gone, there is no longer a rational reason to devote the resources to political activities against environmental protection. In line with the literature on short-term unemployment shocks, people may adjust their political preferences to match the status quo. In this case, voters' sentiment toward environmental protection will improve in the affected areas.

The third possibility is that they do not react. They may have formed their opinions in their early stage of life, and the legacy of industries may outlive the presence of it. On the other hand, the closure itself may not hamper the secular trend. The long-term impact of cultural legacy on people's political behavior is well-known, and the industrial legacy may serve in a similar way. Growing up in industrialized areas could nurture a more amenable attitude toward polluting industries and may lead to less enthusiasm for environmental protection in general. Such a perspective may not change, even if the industry had gone out of existence.

Correspondingly, three patterns of reaction in terms of the support for the government. They may feel aggrieved as the government passively let go or actively demolished the polluting industries in their area. Negative economic shocks are generally related to low government approval rates, and they may blame the action or inaction of the government in tough times.

Alternatively, there is a small possibility that the voters may appreciate the remedy measures or the safety nets the government provides. As large private employers leave town, the government's role would inevitably become large in the affected communities. Some people may rely on unemployment insurance or welfare benefits the government provides, while the government may actively try to lessen the adverse impact of closure to the community by providing various transitory schemes.

It is also possible to have no reaction, as they already formed their view of the government before the events. Industrial regions often have distinct political cultures, with the tradition of strong unionism, and the attitude toward the government may not change just because the economic situations became desperate. Those three different responses of voters to two different political questions are outlined in Figure 3.2.

Compared to the dying heavy industries, banning fracking and shale gas production may be more contentious, raising questions about the long-term tradeoff between the environment and jobs. They present future job opportunities at least in the medium terms, but they also attract a significant hostile reaction from pro-environmental groups. While the same three patterns of reactions are possible when the government bans or restricts fracking, how their cases differ from the factory closures is another question worth answering. The relevant literature is lacking as there are only a few cases where the government made a significant change on fracking policies.

In all cases, the government measures to accelerate industrial transitions may become an important factor to consider. As industrial and mining jobs die out, politicians often promised that there would be new jobs in green sectors. While the new industry may not provide well-paid jobs for non-college-educated workers like manufacturing sectors used to, it is true that green industries have already provided job opportunities in some areas. It is worth investigating if the presence of renewable industries - wind, solar, biomass - as well as environmental projects change the perception of the environment-jobs tradeoff

	Losing polluting jobs	Gaining green jobs
Government role: Passive	Factory closure	Green energy plants opening
Government role: Active	Fracking ban	

Figure 3.2: Typologies of evets

in the area.

What happens when green industries generate jobs in the area could be the opposite of the three possibilities presented above, but negative reactions would be unlikely. While it is possible that they face NIMBYism or cultural backlash (Stokes 2016), it is not unreasonable to expect that they would welcome local employment and economic activities. The problem could be that most plants in green industries do not employ as many workers as former heavy industries, and the effect could be smaller.

Context of factory closures, environmentalism, in the UK in 2014-2019

The UK provides fitting dependent variables for this study. It saw closures of numerous steel, chemical, automobile, and machinery plants since the 2008 recession, and the trend continued until the period covered by the British Election Study panel data (March 2014-December 2019). Some areas are deeply affected by deindustrialization, and some policy measures to levy carbon emission did affect the profitability of some of the polluting sectors, possibly resulting in some closures of facilities (Bailey et al., 2014). Clusters of small green technology firms emerged in London and some university towns, but they do not correspond to the areas that lost manufacturing jobs (Cheshire et al., 2014). Therefore, the environment-job tradeoff was, at least in the short term in a strictly local manner, not an unfounded argument.

In the years covered by the British Election Studies, the support for environmentalism rose in Britain, and the Conservative government made several promises to advance the cause. While environmental skepticism is related to political ideology and partisanship in some countries, there are several reasons to believe that political ideology and party positions played a limited role in people's preferences over environment-job tradeoff. Indeed, under David Cameron's leadership (December 2005 - May 2016), the Conservative Party shifted its position on climate policies to invest more in green energy, and the correspondence between partisanship and environmental skepticism is less obvious than in some other countries (McCann 2016). The Conservative government successfully initiated the phasing out of coal-powered plants in this period and had one of the most aggressive targets in G7 countries on greenhouse gas emission reduction.

While the Labour party was the pioneer in introducing many environmentally friendly measures during their tenure in power (1997-2010), they also had a stronghold in the industrial areas in Northern England and South Wales. The representatives in those constituencies are not keen on some of the environmental regulations that the EU or the Cameron administration put forward in this period. The Conservatives, based in Southern England without much manufacturing activities, had fewer dissents. Major contentious

issues concerning the environment, such as the expansion of the Heathrow airport and banning fossil fuel cars by 2030, always had bipartisan support and opposition. The Labor party spent the entire BES period as the opposition, and the Conservatives have been the ruling party.

The UK independence party was sometimes associated with environmental skepticism. Although it was an influential political force, they are generally thought of as one issue party focusing on Euroskepticism and migration (Noury and Roland 2020) and were never a competitive force outside of the European elections. It is unclear if their political campaign to exit the EU meaningfully affected the people's preferences over environment-jobs tradeoff. According to the manifest project database, other smaller parties, the Liberal Democrats, the Greens, and the Scottish Nationalist Party, are all environmentally friendly throughout the BES period.[1]

As for the role of the government, the UK authorities did not intervene to prevent most of those closures. They tried to rescue several steel plants from closing and helped employers search for potential buyers of the plants, but in the overwhelming majority of the cases, they did not reverse the decision to close the plants. On the other hand, the government offers policy packages to ameliorate the adversely affected local economies. In the case of the collapse of MG Rover in 2006, the government swiftly processed the redundancy pay and social security benefits for 6,000 workers and offered employment and training advice. It also invested in the affected community to cover the funding shortfall (Bailey et al. 2014). Therefore, one could expect both positive and negative responses to the government, which failed to stop the closure but did much to help the community after the event.

For the analysis of factory closures, I geocoded the closures of potentially polluting factories in the UK, resulting in more than 100 job losses since 1999 from the BBC archives. I also located potentially polluting factories that survived until 2020 from the list of beneficiaries of the two government subsidy programs to compensate for the EU-wide environmental levies. Using the British Election Study (BES) panel data from 2014 to 2019, I investigated if past, present, and future presence of polluting industries change people's attitude, especially focusing on the factory closures that happened during the BES survey period.

Those factories have closed for different reasons, and the environmental concerns or government actions may not be the direct cause of their demise. I analyzed shale gas exploration sites as well, as they were shut down due to the government's policy changes for environmental reasons. While smaller in scale, these cases may generate more acute concerns about the environment-job tradeoff. Moreover, in the case of fracking, the timeline gives a fitting opportunity to test local environmental concerns. The government continued its pro-fracking stances until it made a u-turn and suspended all the activities in November 2019. Exploiting the answers before and after the ban, I could check how people changed their opinions about the environment-jobs tradeoff when the governments need to make the direct decision.

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[1]   Burst, Tobias / Krause, Werner / Lehmann, Pola / Lewandowski, Jirka / Matthieß, Theres / Merz, Nicolas / Regel, Sven / Zehnter, Lisa (2020): Manifesto Corpus. Berlin: WZB Berlin Social Science Center.

Shale gas and Fracking in the UK

The shale gas industry and hydraulic fracturing (fracking) are often the centers of the debate over the "environment-job trade-offs". It often creates employment and wealth in the local community, while the reports of possible danger due to seismic activities, water pollution, and carbon emission led to strong opposition. The UK is thought to have a significant amount of onshore shale gas reserve. Indeed, if 10% of them could be accessed, it could supply Britain's gas for 40 or more years (Sutherland et al. 2020).[2]

There was a very high hope of a positive economic impact for local communities. Most producers had a scheme in place to share the profits with the local community, and later such conditions became mandatory. All of the tax revenues from fracking sites go to the local council, which would enhance the gain for the local community. The Conservative-Liberal Democrat coalition government in the 2010-2015 period was particularly keen on promoting fracking, and the opposition Labour party did not have a clear stance until late 2017. The Conservative Party encouraged fracking in its 2017 manifesto.[3]

Preliminary shale gas exploration started in the UK in 2008, and while small earthquakes in the Preese Hall site halted the operation and ignited the debate over their safety, most restrictions are lifted in 2012 after the inquiry by The Royal Academy of Engineering. The government issued the guideline and regulations as a part of the Infrastructure Act in February 2015, but they are intended to help producers, not to prevent them from drilling.

In 2018, several production sites became operational. However, the earthquake at the Preston New Road site in October 2018 changed the situation. The production at the site was halted immediately. The Welsh government, which was holding consultations about the topic before the accident, concluded that they would also institute the planning moratorium. In March 2019, the UK High Court judged that the environmental regulations specified in the 2015 Infrastructure Act were insufficient.

The government resisted the call for a change. However, the lobbying and demonstrations by environmental groups became intense, and they finally had the U-turn of their policy and decided to place a moratorium in England as well on November 2nd, 2019. Following this decision, all the exploration sites and production facilities using hydraulic fracturing techniques halted their operation.

Table 3.1 summarizes the timetable. Fortunately for this paper, the British Election Studies had panel surveys before and after the government U-turn on fracking, and Wave 17 in November 2019 was just after the government decision to ban fracking. I exploit this and conduct the difference-in-differences analysis. I used the post-2018 waves for this section as there was practically no production before Wave 13 in June 2017.

While most production and exploration sites were still in the early stages, given the high hope of the economic benefit the fracking promised, the government could be blamed for the loss, and the residents may turn against the environmentalism that effectively

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[2]   The right to oil and gas deposits do not belong to the landowners but to the British crown. The producers need permissions from local councils and relevant government departments, and the approval process could take up to 2 years.

[3]   House of Commons Research Briefing "Shale Gas and Fracking", Published in March 30, 2020 https://commonslibrary.parliament.uk/research-briefings/sn06073/

killed the opportunity.

2017.6	General election 2017: the Conservatives had pro-fracking manifesto.
2018.5	BES Wave 14
2018.10	Seismic activity in Preston New Road site halts its operation.
	The government kept pro-fracking stance.
2019.5-6	BES Wave 15, 16
2019.11.2	The UK Government declared moratorium on fracking,
	suspending activities indefinitely. (U-turn)
2019.11-12	BES Wave 17, 18, 19
2019.12	General election 2019
2020.5	BES Wave 20

Table 3.1: Timeline regarding the fracking ban

BES Micro-level data and Research Design

The dependent variables regarding the opinion of individual voters come from the British Election Study (BES). I used the *Combined Waves 1-20 Internet Panel Studies*, conducted by a polling firm YouGov.[4] For the overwhelming majority of respondents, YouGov recorded their parliamentary constituencies, with which I locate the respondents on the map.[5] The Wave 1 began in February 2014, and the Wave 20 took place in June 2020.

The main variables of interest concern the two questions asked in multiple waves. Waves 4, 6, 7, 16, and 17 included the following question; "*Some believe that protecting the environment should have priority even if that reduces economic growth. Others believe that economic growth should have priority even if that hinders protecting the environment. What is your opinion?*". The response options had 11 levels ranging from *0: Economic growth should have priority* to *10 - Protecting the environment change should have priority*. In addition, Waves 1, 2, 3, 4, 6, 7, 12, 14, 18 included the following question; "*Do you think that each of these has gone too far or not far enough?: Measures to protect the environment*". The respondents could choose from 5 levels ranging from *1: Not gone nearly far enough* to *5: Gone much too far.*

The government approval is checked by *Do you approve or disapprove of the job that the UK government is doing?*, which have 5 levels of answers; *1 - Strongly disapprove* to *5 - Strongly approve*. In addition to the questions regarding the environment and government, I checked the attitude regarding anti-intellectual tendencies, the trust of the politicians, and how much the residents pay attention to politics. For the anti-intellectual attitude, I used the question *I'd rather put my trust in the wisdom of ordinary people than the opinions of experts* , for which respondents can choose from *1 - Strongly disagree* to *5 - Strongly agree*. As for the trust in politicians, *How much trust do you have in Members*

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[4] The project is managed by the consortium of the University of Manchester, The University of Oxford, and The University of Nottingham. YouGov conducted the operation.

[5] Constituency was the smallest geographical unit available in the dataset. Some local authority areas changed boundaries within the BES period.

of Parliament in general? is used, whose answer ranging from *1 - No trust)* to *7 - A great deal of trust).* Lastly, the question *How much attention do you generally pay to politics?* is tested to see the level of political engagement.

For most models, parliamentary constituency fixed effects or individual fixed effects were used to compare the pre- and post-event changes of the political attitudes. Available demographic and socioeconomic variables in the BES dataset included Age, Sex, Ethnicity, Highest qualification, Homeownership, Socioeconomic status, Marital status, Disability, Vote choice in 2010, and religiosity. [6]. As for geographic covariates other than factory closures and openings, local authority level data are drawn from the Office of National Statistics (ONS). I collected the statistics for the GDHI per capita and the unemployment rate of the local authority level, as well as their growth rate.

As for the main independent variables, I collected all the articles that include the keywords "factory closure," "plant closure," "factory close," and "plant close" from the homepages of BBC and their regional branches, dating back to January 1999. Then I selected the case of factory closures with more than 100 local job losses, including transfer to other regions.[7] I located all the 279 factory closures on the maps at the plant level, then categorized them into pre-BES and post-BES closures by the announcement date. I omitted the closure of the sites strictly dedicated to research and development or back-office functions, as they are unlikely to be related to polluting activities. I checked if the respondents' parliamentary constituency had factory closure announcements between each BES panel survey wave.[8]

While many polluting factories have died out in the UK, many plants survived until today. If the past and present closures of plants are highly correlated with the number of surviving plants, the interpretation of empirical results may become questionable. To deal with this issue, I made the geocoded data of major polluting factories present throughout the BES period. The EU state aid database lists the beneficiaries of two major state aid measures funded by the UK government targeted at polluting industries after January 2014; *Climate Change Scheme (Non-agricultural)* and *Compensation for Indirect Research Costs from Remission Obligation and FIT in the UK*. Both measures were in response to the EU-wide regulation of polluting industries, and the state aid measures are intended to compensate for the cost of compliance. The list is an almost comprehensive list of major factories and power plants operated in this period.[9]. Using

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[6]   Full demographic covariates include age, sex, white, homeownership, renter status, social grade, full-time employment, student, inactive, retired, secular, non-christian, university degree, disability, being married, household size, household income, current union membership, having preschool kids in the household, having school-age kids in the household, having sick elderly in the household

[7]   Some closures below this scale was not necessarily reported by BBC.

[8]   Some residents are likely affected by what is happening in nearby areas outside the constituencies. I created the 20km buffer areas outside constituencies and counted the factory closures/openings in the expanded area as well. I chose the thresholds as the average commuting distance in the UK is 14 miles, which is approximately 20km (Department of Transport 2016). The analysis using the constituencies with buffer is presented in the Appendix.

[9]   I confirmed with the IBIS database that all the mass-producing car plants and large-scale steel plants in the UK are included in the list. While factory closure data and the surviving factory data have certain mismatches as I used different data sources, the sector profiles of the two datasets match well, and many of the beneficiaries also later appeared in the factory closure datasets

the same method, I checked the presence of surviving factories in the constituencies of the BES respondent, as a control variable.

The BBC had archived articles only after mid-1998, and I do not have the indicator of deindustrialization before that year. This can be problematic if the voters' preferences are set in the early years and do not move for a long time. To deal with industrialization's long-run legacies, I located coal mines from the Coal Authority in the UK. While the UK coal industry was instrumental in industrialization and the labor movement, most coal mines are dormant today. Therefore, I use the coal mine dummy as the proxy that the constituency had the industrial legacy that is not captured by closed or survived plants. The coal mines indeed predicted the historical industrial areas very well, except for traditional shipbuilding areas such as Sunderland and Southampton.[10]

The data of prospective areas for shale production, active oil fields, licenses, as well as gas and oil wells are from the UK Oil and Gas Authority (OGA). The data of historical coal mines are from the UK Coal Authority. I linked them to the local authority area and parliamentary constituencies each BES respondent lives in.

For the dataset of renewable industries, I used the Renewable Energy Planning Database (REPD) issued by the Department for Business, Energy & Industrial Strategy. They had the location and description of renewable energy facilities across the United Kingdom, with their date of application, construction, and operation. I omitted dams and storage facilities. Three main groups are wind, solar, and biomass/waste-to-energy. As in the factories, I checked if the expanded constituencies had any of these facilities opened during the BES period.

The research design is simple. For the fracking ban in November 2019, I applied the difference-in-differences design to the BES dataset. As for the factory closures and green plant openings, there were multiple time frames, and I used simple fixed effects models. I check if the factory closures and plant openings between the two Waves changed their answers regarding the questions outlined above. In addition, I present OLS controlling for legacy factors (Historical coal mines and factory closures before 2014) and survivors (the presence of surviving plants at the point of each BES wave). I also use the event studies design to see short and long-term consequences.

As the fracking ban and the rise of renewable energy plants are relatively recent events, I cannot investigate the medium-to-long term repercussion with the data. However, factory closure data is available from 1999, so I can look at some long-term repercussions. Consequently, I used the following two different treatment periods: one year following the factory closure/plant opening and indefinite treatment from 1999. When I used the former, I dropped the areas that had factory closures more than a year ago. With two measures, I attempt to distinguish the nuanced effects of factory closures.

There could be a couple of concerns about the empirical design. The first is measurement. While the major factory closure data can capture a sudden shock of job loss, there could be an ongoing closure of smaller factories or scaling down of large factories before the event. However, in terms of how people perceive the industrial decline, the factory closures that major media sources report will have more effect than quiet restructure of

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[10]   I also prepared the location of *Britz* raid, i.e., the German bombing of industrial sites during WWII, but the list included non-industrial urban centers such as central London, so I mainly use coal as the control variable for the long-lasting legacy of historical industrialization.
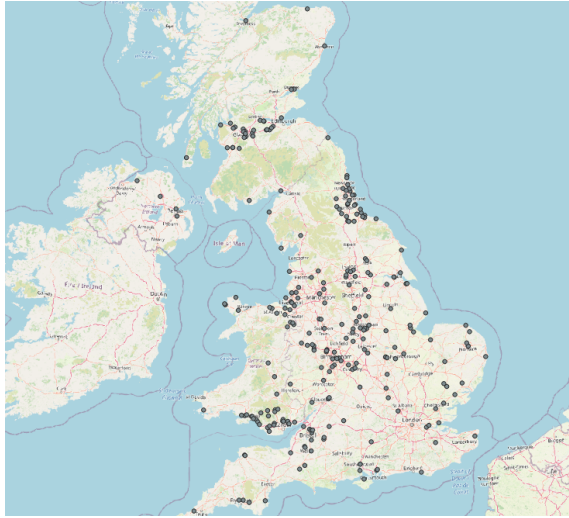
A. Factory closures with
more than 100 job loss
(January 1999 - August 2020)
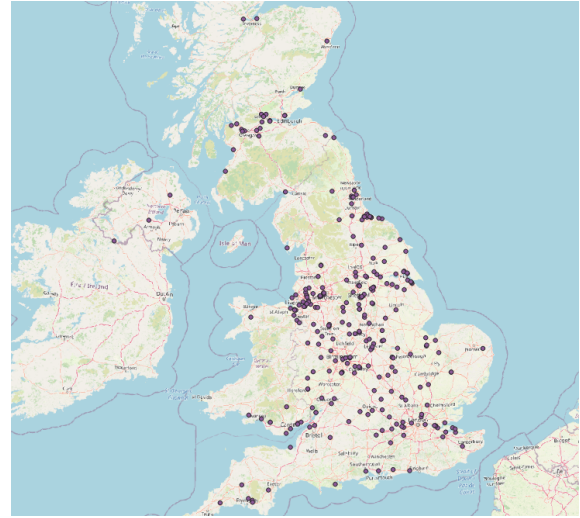
B. Polluting factories
Operating in 2014-2020
(Including those that closed in 2014-2020)
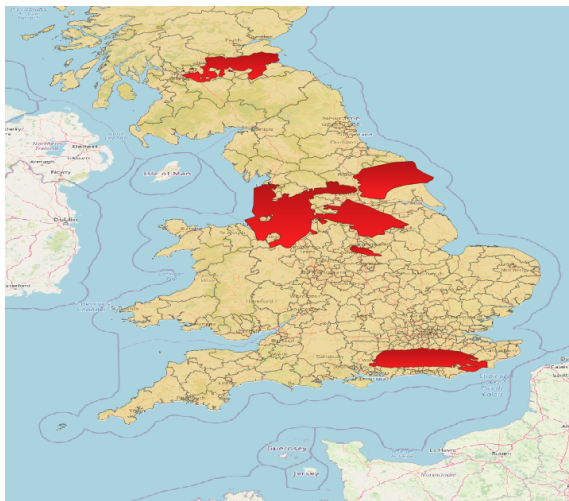
C. Areas with Shale Gas Reserve
(Fracking prospect areas)
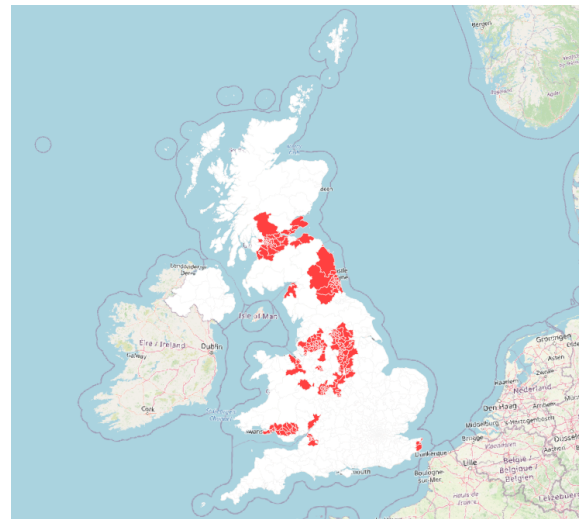
D Parliamentary Constituencies with
historical coal mines

Figure 3.3: Factory closures and shale gas prospect areas

	BES waves before factory closures or renewable plant openings	Within one year following factory closures or renewable plant openings	More than one year following factory closures or renewable plant openings	Parliamentary constituencies with major factory closures in 1999-2013
Short (1 year)	Control	Treatment	Not used	(Control)
Long	Control	Treatment	Treatment	Treatment

Figure 3.4: Typologies of Treatment

some jobs or bankruptcies of small firms that the BBC's regional offices do not report. Moreover, the closure of small factories tends to occur when a core factory in the area closed down, affecting the upstream suppliers. Therefore, while people may have been affected by the gradual deindustrialization events that are not captured in this research, it is reasonable to assume that the shock of major plant closures to the residents will be greater than that of gradual scale down, and not confounded by it, especially for those who are not directly employed at the manufacturing sector. [11]

The second concern is about pre-trend. It is highly likely that at least some people in the area know how local industries are struggling, and the prospect of impending failure would surely affect people's opinions about environment-job trade-offs before the announcement of closure. While this paper presumes most of the plants in question had a fear of closing down, I show how pre-trend looks visually with the event studies analysis.

The concerns about endogeneity are that politicians may try to save the industries in the area where the local political will to save them is strong. While this is a legitimate concern, the UK government was not successful in rescuing the heavy industrial plants, and except for Tata Steel in Port Talbot, there is no indication that plant closures in the list were annulled by political interference. As noted above, the UK government did provide subsidies for polluting plants to adapt to the new environmental regulations, but the receipt of such subsidies does not appear to prevent many plants from closing down. The UK government did provide ample support for affected communities. In conclusion, it is highly unlikely that local opinions about environment-job trade-off affect firms' choice on whether or not to close down the facilities in the area.

Main Results

Table 3.2 presents the main results with regard to the political impact of factory closures in the short run. Those who had a factory closure in their constituency within a year are treated. Columns 1-4 demonstrate that factory closures do not appear to affect the support for environmentalism in either of the relevant questions. On the other hand, in Column 7-8, the same events did result in higher support for the government. The magnitude is around 0.04 to 0.06 on a 5-point scale. Curiously, in Column 5-6, the attention to politics fell in the affected areas as well.

Table 3.3 presents the long-term results, and having factory closure in the preceding years is the treatment. The support for environmentalism does not appear to move in this specification either. However, in Columns 5-8, the impact observed in the short-term analysis on the government approval and attention to politics seems to dissipate in the long run. They suggest that the impact of factory closure on the local public opinion could be temporary.

While all the models in Tables 3.2 and 3.3 had the wave fixed effects to deal with the time-variant factors, Columns 1-4 in Table 3.4 suggests that the support for environmentalism rose after the factory closures when time fixed effects are removed. The same individuals did improve the support for environmental protection after the closure, but

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[11]   Local manufacturing job data is available at the local authority level, but it is not fine-grained to fit the BES dataset or parliamentary constituencies.

they may be in line with the general trend at that time. However, Columns 5-8 suggest that, after controlling for the time, the effect disappears even without individual fixed effects. Compared to the regions with surviving factories or regions with historical coal mines, the areas with factory closures do not show distinct change.

Figure 3.5A presents the event study analysis of the support for environmental protection before and after the factory closure. It appears that factory closure tends to coincide with the improvement in the support for environmentalism, but the events themselves do not appear critical. These findings suggest that while factory closures themselves do not affect the support for environmentalism, it does not hinder the nationwide trend of the gradually warming sentiment toward environmentalism.

Table 3.5 indicates that in a static comparison, the local presence of factories, irrespective of closed ones or survived ones, correlates with environmental skepticism and low government support after controlling for individual-level covariates. While the factory closures does not seem to affect the growing support for environmentalism, the community with such industries are indeed starting from low baseline support, and the differences with non-industrial areas may persist as the speed of the improvement in the support is indistinguishable from the other areas.

Table 3.6 presents the results of the fracking ban. This section use the difference-in-differences framework, and the treatment is the interaction term of having shale gas reserves in the area and the periods after the fracking ban. Columns 1-4 demonstrate that the support for environmentalism was not affected after the ban, in line with the results from factory closures. However, the government approval fell in the affected areas after the ban. As the decision was announced in November 2019 and the latest available wave was June 2020, there is no long-term analysis for this section. Given that the short-term results from factory closures suggested the improvement in the government approval in the immediate aftermath of the event, the effect of the fracking ban on the government approval is contrasting.

Figure 3.5B shows the pre-trend analysis of the deficit in the government approval in the shale-gas prospect areas compared to the other areas. The government approval in the UK fractured during this period, so I used the differences instead. The graph suggests that the regional difference was constant between the previous periods but aggravated after the fracking ban. This consolidates the findings with the difference-in-differences framework.

Tables 3.7 and 3.8 presents the short-term and the long-term effects of opening green energy facilities in the area, respectively. The treatment follows the specification of the analysis of factory closures. While it appears that openings of green facilities may have had an impact on the support for environmentalism, the results are subject to the specifications and thus inconclusive. Unlike factory closures or fracking ban, no impact is observed regarding the support for the government or the attention to politics in the affected areas.

In summary, none of the local events - factory closures, fracking ban, or opening of green energy facilities - appear to have concrete impacts on the residents' attitude toward environmentalism. While the pace of the improvement in the attitude regarding environmentalism is indistinguishable from unaffected areas, it appears that such events do not prevent the secular trend toward more environmentally friendly opinions. There

Table 3.2: Results with the factory closures (Short-term)

Dependent variable:	Environmental protection is more important than economic growth		Measures to protect the environment has gone too far		How much attention do you generally pay to politics?		Approve of The UK government	
	(11 levels)		(5 levels)		(11 levels)		(5 levels)	
Factory closures (+ 1 year) * Factory presence	-0.02331 (0.06524)	-0.04531 (0.05435)	0.022555 (0.018890)	0.01184 (0.01902)	-0.060257** (0.022474)	-0.09530* (0.04387)	0.03792* (0.01538)	0.05582* (0.02309)
Individual Fixed Effects	Y		Y		Y		Y	
Constituency Fixed Effects		Y		Y		Y		Y
Wave Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6394	0.06381	0.6152	0.03363	0.7989	0.02406	0.6647	0.07281
Degrees of Freedom	71787	141176	166901	230025	321264	416566	233883	320793
Note:						*p<0.05; **p<0.01; ***p<0.001		

Table 3.3: Results with the factory closures (Long-term)

Dependent variable:	Environmental protection is more important than economic growth		Measures to protect the environment has gone too far		How much attention do you generally pay to politics?		Approve of The UK government	
	(11 levels)		(5 levels)		(11 levels)		(5 levels)	
Factory closures (+ 10 years) * Factory presence	0.04094 (0.05847)	-0.03889 (0.04361)	-0.007169 (0.018251)	-0.001905 (0.019136)	-0.05945** (0.02211)	-0.04332 (0.04227)	0.01551 (0.01599)	0.04217 (0.02344)
Individual Fixed Effects	Y		Y		Y		Y	
Constituency Fixed Effects		Y		Y		Y		Y
Wave Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6374	0.06217	0.6157	0.03343	0.7982	0.02377	0.6616	0.07377
Degrees of Freedom	75432	149510	171300	235303	334818	432726	242781	331902
Note:						*p<0.05; **p<0.01; ***p<0.001		

Table 3.4: Impact of factory closures on environmentalism; time series and cross-section analysis

Dependent variable:	Environmental protection is more important than economic growth (0 Growth is more important - 10 Environment is more important)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Within one year of factory closure * Post-closure	0.36611*** (0.06656)	0.53876*** (0.09223)			-0.101392 (0.089316)	-0.092705 (0.089043)		
Within ten years of factory closure * Post-closure			0.65643*** (0.05911)	0.91958*** (0.08312)			0.01251 (0.07820)	0.01488 (0.07787)
Individual Fixed Effects	Y		Y					
Parliamentary Constituency FE		Y		Y				
Demographic Covariates		Y		Y	Y	Y	Y	Y
WaveFixed Effects					Y	Y	Y	Y
Subset with factories					Y		Y	
Subset with coalmines						Y		Y
Adjusted R squared	0.6151	0.02105	0.6132	0.07565	0.09423	0.09136	0.09222	0.09056
Degrees of Freedom	70018	141800	75436	74227	16103	17348	20096	21340
Note:						*p<0.05; **p<0.01; ***p<0.001		

Table 3.5: Static Correlation between the presence of polluting factory and the political attitude

Dependent variable:	Environmental protection is important than economic growth		Measures to protect the environment has gone too far		The world's climate is changing but not due to human activity	Approve of The UK government
	(11 levels)		(5 levels)		Binary	(5 levels)
Presence of polluting factory	-0.15557*** (0.01561)		0.074164*** (0.004946)		0.012165*** 0.003669	-0.027372*** (0.004393)
Demographic Covariates	Y	Y	Y	Y		
WaveFixed Effects	Y	Y	Y	Y		
Adjusted R squared	0.0006548		0.0009479		0.0001577	(5 levels)
Number of observation	150140		235942		63359	(5 levels)
Note:					*p<0.05; **p<0.01; ***p<0.001	
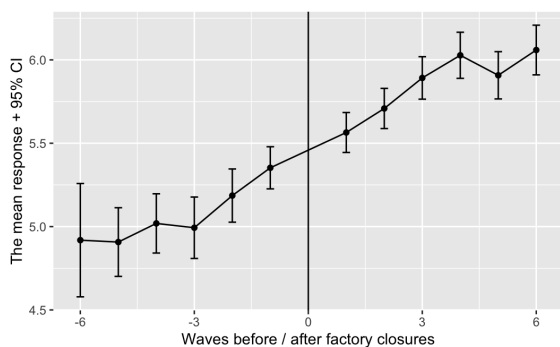
A. The average answer to; *Environmental protection is more important than economic growth* in the waves before and after factory closure in the area.
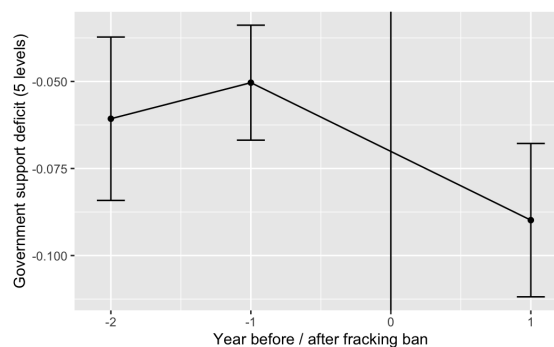
B. The government support deficit in the areas with shale gas prospect in years before and after the fracking ban

Figure 3.5: Trend analysis

Table 3.6: Difference-in-Differences Results with the Fracking ban

Dependent variable:	Environmental protection is more important than economic growth		Measures to protect the environment has gone too far		How much attention do you generally pay to politics?		Approve of The UK government	
	(11 levels)		(5 levels)		(11 levels)		(5 levels)	
Shale gus prospect * Post-ban	0.00340 (0.02873)	0.01318 (0.03231)	0.001269 (0.007522)	-0.02074 (0.01228)	0.020667 (0.014332)	0.002478 (0.022408)	-0.03418*** (0.01294)	-0.04495*** (0.01375)
Individual Fixed Effects	Y		Y		Y		Y	
Constituency Fixed Effects		Y		Y		Y		Y
Wave Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6473	0.0195	0.7338	0.02847	0.82	0.01648	0.6639	0.07504
Degrees of Freedom	39438	93402	33325	42722	94601	161648	44749	101460
Note:							*p<0.05; **p<0.01; ***p<0.001	

Table 3.7: Results with the opening of Green Energy Plants (Short-term)

Dependent variable:	Environmental protection is more important than economic growth		Measures to protect the environment has gone too far		How much attention do you generally pay to politics?		Approve of The UK government	
	(11 levels)		(5 levels)		(11 levels)		(5 levels)	
Green energy plants	-0.25784*	-0.2502	0.02759	0.02723	-0.015728	0.01761	-0.01329	0.0001215
* Post-opening (+ 1 year)	(0.11500)	(0.1352)	(0.01947)	(0.02489)	(0.027175)	(0.05341)	(0.01910)	(0.0274666)
Individual Fixed Effects	Y		Y		Y		Y	
Constituency Fixed Effects		Y		Y		Y		Y
Wave Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6375	0.06346	0.6157	0.03368	0.7981	0.02392	0.6639	0.07287
Degrees of Freedom	71655	143450	168042	231273	324628	420277	235962	323165
Note:							*p<0.05; **p<0.01; ***p<0.001	

Table 3.8: Results with the opening of Green Energy Plants (Long-term)

Dependent variable:	Environmental protection is more important than economic growth		Measures to protect the environment has gone too far		How much attention do you generally pay to politics?		Approve of The UK government	
	(11 levels)		(5 levels)		(11 levels)		(5 levels)	
Green energy plants	-0.20489**	-0.11485	0.03142	0.02010	-0.008092	0.01353	-0.02038	-0.01828
* Post-opening (+ 10 years)	(0.07483)	(0.09118)	(0.01863)	(0.02724)	(0.025526)	(0.04885)	(0.01811)	(0.02081)
Individual Fixed Effects	Y		Y		Y		Y	
Constituency Fixed Effects		Y		Y		Y		Y
Wave Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6375	0.06218	0.6157	0.03343	0.7982	0.02377	0.6616	0.07376
Number of observation	75432	149510	171300	235303	334818	432726	242781	331902
Note:							*p<0.05; **p<0.01; ***p<0.001	

is no indication of backlash against environmentalism at all.

On the other hand, in terms of government approval, the three events had divergent impacts. The factory closures appear to result in a temporary increase of government approval, but the effects dissipate over time. The fracking ban decreased the support of the government in the affected areas. The openings of the green energy sites do not seem to impact the local government approval, but it may be because of limited impact on local employment market. The following section attempts to analyze these divergent results further.

Discussions on Government Approval

Table 3.9 introduces the subset analysis of the impact of the fracking ban on government approval, applying the same difference-in-differences framework to the subsample of respondents with certain socioeconomic characteristics. It appears that the effects are concentrated among the union members, working-class voters, homeowners, and the retired. It is natural to consider that the former two groups would have benefited from the increasing employment opportunity for blue-collar workers the fracking would have brought in the area, while the latter two groups could benefit from the increasing asset prices. On the other hand, people with a university degree or full-time employment, self-employed workers, and renters did not show a drop in government approval. Renters even showed a positive sign. They are less likely to benefit from the economic opportunity fracking brings to the area. Therefore, it appears that those who lost potential economic gains by the fracking ban are the group that lost the support for the government. It

appears that this is the straightforward case of economic voting but applied at the local level.

Tables 3.10 and 3.11 present the subset results of the impact of factory closures on government approval. Contrary to the fracking ban, homeowners show improvement in the approval of the government, though the effect dissipates in the long run. Self-employed people show long-lasting improvement in government approval. Unlike the fracking ban, union members and working-class voters do not show a statistically significant reaction.

Table 3.12 shows how factory closures impacted various measures to evaluate the government. Following the factory closures, residents in the affected areas shifted their responses to the following two statements; "*Cuts to public spending in general has gone too far*" and "*Cuts to local services in my area has gone too far.*" The respondents in the affected area disagreed more strongly with those opinions after the factory closures, though the effect weakens in the long run. This implies that the residents felt that the national government spend significantly in their local areas, at least compared to the situation before the closure. Given the prior findings of the increasing support for the government, it can be interpreted as suggestive evidence that the residents in the affected areas appreciated the government's support to the community in the immediate aftermath of the events. On the other hand, their evaluation of government handling of the economy or attitude toward welfare benefits did not show a significant change after factory closures.

Table 3.9: Subset results: Fracking ban and Government approval

Dependent variable:	Approve of the job the UK government is doing (1 Strongly disapprove - 5 Strongly approve)							
Subset	Homeowner	Renter	Union member	Self-employed	Working class	University degree	Retired	Full-time
Shale prospect * Post ban	-0.06335***	0.02200	-0.06194*	-0.03924	-0.04957*	-0.02567	-0.07293***	-0.02745
	(0.01580)	(0.02696)	(0.03125)	(0.04347)	(0.02012)	(0.01837)	(0.02361)	(0.02140)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
WaveFixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.5873	0.5616	0.6106	0.6206	0.5596	0.6024	0.5914	0.5916
Number of observation	36700	13683	8466	4924	18025	27004	17473	22858
Note:						*p<0.05; **p<0.01; ***p<0.001		

Table 3.10: Subset results: Factory closure and Government approval (Short-term)

Dependent variable:	Approve of the job the UK government is doing (1 Strongly disapprove - 5 Strongly approve)							
	Homeowner	Renter	Union member	Self-employed	Working class	University degree	Retired	Full-time
Within one year after closure * Factory presence	0.04357*	0.03355	0.05408	0.14962***	0.03264	0.03209	0.04413	0.048066
	(0.01851)	(0.03119)	(0.03766)	(0.05400)	(0.02255)	(0.02390)	(0.02676)	(0.025886)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
WaveFixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6767	0.6264	0.6739	0.6938	0.6465	0.6858	0.6759	0.6763
Number of observation	53449	22856	12571	7194	33124	40030	25001	41163
Note:						*p<0.05; **p<0.01; ***p<0.001		

These findings suggest that people are reacting according to their economic self-interest; when the working-class voters and homeowners felt that the fracking ban reduced

Table 3.11: Subset results: Factory closure and Government approval (Long-term)

Dependent variable:			Approve of the job the UK government is doing (1 Strongly disapprove - 5 Strongly approve)					
	Homeowner	Renter	Union member	Self-employed	Working class	University degree	Retired	Full-time
Within ten years after closure	0.016655	0.009785	0.01446	0.12592*	-0.012878	0.024045	0.01421	0.01860
* Factory presence	(0.019791)	(0.032585)	(0.03652)	(0.05108)	(0.023274)	(0.023364)	(0.02826)	(0.02599)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
WaveFixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6733	0.6238	0.6696	0.6923	0.6427	0.6833	0.6726	0.6738
Number of observation	54822	23381	12904	7328	34125	40971	25702	42138
Note:						*p<0.05; **p<0.01; ***p<0.001		

Table 3.12: Results with questions regarding the government performance before and after the factory closures

Dependent variable:	Cuts to public spending in general has gone too far.		Cuts to local services in my area has gone too far.		The present government has handled the economy well.		Too many people these days like to rely on government handouts.	
	(5 levels)		(5 levels)		(5 levels)		(5 levels)	
Within one year after closure	-0.04258*		-0.04234**		-0.01790		0.013451	
* Factory presence	(0.01658)		(0.01593)		(0.05118)		(0.023457)	
Within ten years after closure		-0.026219		-0.02364		0.08866		0.004445
* Factory presence		(0.014920)		(0.01407)		(0.05530)		(0.021584)
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Wave Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R squared	0.6632	0.6606	0.6052	0.603	0.7619	0.7604	0.7019	0.7008
Number of observation	178528	183826	170684	175913	22436	22838	104269	105967
Note:						*p<0.05; **p<0.01; ***p<0.001		

their potential wage or asset premium, they disapproved of the government. When homeowners and self-employed workers felt that the government investment in the community following the factory closures was vital for the transition, they increased the support for the government, at least in the short run. There is no indication of emotional backlash in the context of the industrial shift in the local area.

They are in line with the findings from the short-term unemployment shock (Margalit 2019). People would act far more rationally in the face of economic difficulty than the stereotypical views of angry voters in the rust belt would suggest. The governments may mitigate the political backlash if they can offer appropriate compensatory measures, and the economic shock will not overturn the opinion trend to leave the legacy of polluting jobs.

The temporary increase in government approval during the local hardship may be surprising. However, if the government is perceived to be doing well to compensate for the loss of private-sector jobs and economic opportunities, it is understandable that people highly evaluate the government in a limited time frame.

Conclusion

Political development in times of a significant industrial change is a long-term process, and it may be difficult to investigate it in the short time framework. Nonetheless, the industrial shift is not a smooth and linear process, and it is imperative to understand how public opinion shifts in response to such evolution. This paper serves as a reminder

that people may fear or exaggerate the political backlash in the face of great social transformation.

The findings imply that the trend toward more environmentally friendly political preferences is not affected by the loss of polluting jobs in the area, but such events result in the shifting perception of the government among the affected population. The government's decision to ban fracking did lose support among potential beneficiaries, and presumably, the governmental help to ease the private sector economic shock resulted in a temporary increase in the support. If these seemingly rational responses from voters and the lack of backlash can hold in different contexts, politicians will be able to consider optimal transition strategies without becoming overly cautious of the political implications.

Admittedly, this paper does not have great data about the governmental actions following the factory closures or fracking ban, and it does not suggest what options policymakers should take to smooth out the transition process. There is an opportunity for future research in terms of the impact of different remedy packages. This paper suggests that green energy plants may not be politically effective, but there are numerous different options in response to such local economic hardship and significant policy implications.

People react negatively when the government gets rid of their economic gains, positively when the government helps in their hardship; they are not surprising conclusions. However, given the alleged political backlash and the rise of populism in the industrial regions, such a straightforward relationship can be revealing. If factory collapse does not change the people's opinion about the environment instead of keeping running factory, and if government remedy measures can mitigate the negative feeling, then the governments may find better options than subsidizing those operations in fear of political costs.

Chapter 4

Paper 3: Choosing Voters? Partisan Sorting of Voters following Close Municipal Elections in France.

Abstract

Do local politics and policies influence residential migration? Applying a regression discontinuity design to micro-level mobility census data in France, I examine whether the partisanship of the local government affects the propensity of individuals in different socioeconomic groups to move in or out. The results demonstrate that retired people and independent workers, who tend to support the Right in municipal elections, have a high propensity to move into the Right-controlled municipalities. The partisan impact was particularly substantial for recent retirees and residents of larger, newly-built homes. I also find that the Right mayors set local property tax lower than their marginally elected Left counterparts. The effects of partisanship on the sorting of early retirees and the tax rate changes were pronounced when the election was close. The findings suggest that local politicians could influence residential sorting, and hints at their strategic incentives to increase their supporters in the area.

In France, the United Kingdom, and the United States, more than 10% of residents move homes each year. In the five years up to 2012, approximately 30% of French and 40% of Swedes moved (Eurostat 2017). People are moving, yet politics are mostly based on specific territories. This potential mismatch leads to important yet empirically under-explored questions about mobility and district-based politics. Do people move in response to local policies and politics? Does the movement of people affect the strategies and incentives of politicians?

Geographic mobility of capital and labor has long been regarded as a virtuous factor for local politics, especially in the literature of fiscal federalism. The threats to move out are believed to discipline underperforming local governments. As local governments have the incentive to attract and retain businesses and taxpayers, the competition would force them to run efficiently or to take the policies that suit the interest of the residents (e.g., Tiebout 1956; Brennan and Buchanan 1980; Weingast et al. 1995). According to these works, a proper provision of public goods and better public finance would attract people, and people's geographic relocation will punish the deviating governments. In line with these theories, Peterson (1981) and Ferreira and Gyourko (2009) claim that residential sorting can limit the scope for partisanship and restrict a politician's desire to pursue highly partisan policies.

However, if mayors and governors have specific supporting blocks, it could be possible to drive their opponents away (Hirschman 1993; Glaeser and Schleifer 2005) or to attract their likely supporters with certain policy measures, in pursuit of better electoral prospects in the future. Voters may move in response to partisan or narrowly targeted policies, rather than to the quality of public goods or the state of public finance. Such partisan sorting is contrary to the efficiency-maximizing outcome of the fiscal federalism models and their predictions that local politics become nonpartisan.

Whereas the topics of domestic migration and local politics have attracted attention from various branches of social sciences, the relevant papers are overwhelmingly theoretical, and there have been markedly few empirical investigations on this topic. The difficulty in tracking individual-level migration patterns as well as the complexities of local politics and policies could have been preventing rigorous observational analysis. Some political scientists investigated "political sorting" in which people are sorting into the communities of politically like-minded people or co-partisans, with mixed results (Cho, Gimpel, and Huo 2013; Mummolo and Nall 2016). However, the local governments and policies are mostly absent in these works. To my knowledge, this paper is the first attempt to connect the partisanship of the local government and voters' migration decisions.

In 2018, the French statistics agency made available the micro-level mobility census data of domestic migration in 2015, which contains more than 19 million individuals as a representative sample of the French population. I merged it with an original dataset of the municipal elections in 2008 and 2014, and the local tax rates in 2008, 2014, and 2018. I also used micro-level housing census data in 2016 and 2013. When combined, these datasets enable an unprecedented level of analysis of domestic migration and local politics. I investigate if people move into or out of specific local jurisdictions in response to the partisanship of the local governments, using a regression discontinuity design based on close municipal elections.

The results suggest that the groups that predominantly supported the Right in the

municipal elections - the retired - did move to the Right-controlled municipalities. The effect was particularly significant for early retirees when the election in the recipient municipality was close. Self-employed people, another supporting block of the Right, also showed a moderate tendency to move into the Right-controlled cities. The other politically neutral groups do not display any indication of sorting. Placebo comparing the 2013 and 2016 housing census shows that there was no prior trend.

I also found that the narrowly elected mayors of the Left and the Right show a significant divergence in policy decisions in terms of how they increase or decrease local property tax, which can be an indicator of various other policy stances. Interestingly, the partisan impact on the tax rate is significant when the winning margin was small. I surmise that the partisanship of the newly elected government results in a meaningful difference in policies, which altered the patterns of domestic migration, resulting in partisan sorting. Narrowly elected mayors would have a strong incentive to modify the composition of the residents compared to their electorally safe counterparts. The results hint that there could be strategic calculations of electorally vulnerable mayors to take hardline policies to attract their supporters.

While it is not possible to know from the data whether the local policies were the primary reason for the observed relocation, I present some suggestive evidence that the tax and other housing-related policies do affect residential flows. The sorting was particularly significant among the retired people who moved into larger, newly built houses or apartments, but retired people in social housing did not show the same sorting pattern. I claim that the Right mayors attracted relatively wealthy, early retirees with the policy options they like, which will, in turn, improve their reelection prospects.

The theoretical implications of the findings are thus significant, as the political sorting literature would predict that people will sort into homogenous areas, and fiscal federalism claims that the sorting will force mayors to act in a nonpartisan manner. I observed the difference in migration patterns between politically similar areas with a different set of politicians. Rather than people naturally sorting into communities with the same political preferences, I present an explanation based on politicians and policy decisions, which will challenge the conventional understanding of the political sorting process.

Literature review

Public choice theorists have analyzed the topic of domestic migration and local policies for a long time. The literature depicts mobility in a positive light, as it encourages competition and disciplines local governments (Tiebout 1956; Brennan and Buchanan 1980; Weingast 2009). Tiebout's canonical model demonstrated that sorting of individuals across jurisdiction leads to an efficient provision of public goods. Under the numerous assumptions, including perfect mobility and an infinite number of local jurisdictions, people would move to local areas that fit their tastes for the public goods and local taxation. Competition among local authorities guarantees the efficient provision of public goods as in the market, resulting in people sorting according to their preferences. Tiebout expected that people sort into the area with public goods provision and tax rate closest to their preferences, thus creating stable and efficient equilibria. Brennan and Buchanan

(1980) extended the model and suggested that the local governments will be pressured to reduce tax and expenditure, thereby acting in fiscally responsible ways. Brennan and Buchanan's arguments are instrumental in the concept of *Fiscal Federalism* (Weingast 1995). The Tiebout model was also influential for the famous *City Limits* theory (Peterson 1981), positing that the sorting will hinder subnational authorities from providing generous redistributive programs, and force them to take fiscally conservative policies.

Whether the Tiebout sorting needs politicians at all has been subject to debate (Epple and Zelenitz 1981; Henderson 1985), but politics play a minimal role in the model. By design, the model treats the preferences of the incumbent residents as homogenous within a community, and consumer-voters choose the jurisdictions whose residents' preferences are similar to their own. Consequently, the models derived from Tiebout's framework tend to feature no partisan politicians, and many of them predict that any local government would act similarly given the residents' preferences, which will be homogenous in the long run.

Empirical investigations of the Tiebout model are notably limited. The difficulty in obtaining comprehensive data of residential movement and local policies may have led to this paucity. As an exception, Epple, Romer, and Sieg (1999) exploited municipal boundaries and structurally estimated the voter preferences for public goods in the Boston metropolitan area, using income quantiles and housing characteristics. They found that people with stronger imputed preferences for public goods live in municipalities with better provision. Their findings support the Tiebout hypothesis, but they do not use the data of movement and assume that the current geographic distribution of households is the result of their past movement.

On the other hand, Young et al. (2013) use the data from the Internal Revenue Service and estimated the tax revenue loss by migration from each state. They find that the state tax rate change does not necessarily affect the migration decisions of millionaires. Young's findings go against the Tiebout model, though the result is limited to the inter-state migration of extremely wealthy individuals. As implied in the methodologies and data choices by those empirical papers, the analysis of domestic migration and local policies or politics has proved to be extremely challenging, and the Tiebout sorting remains a mostly theoretical endeavor. Nonetheless, the scarcity of empirical research is particularly remarkable given that the widely cited model of fiscal federalism is entirely based on the sorting of business and taxpayers in response to local policies (Weingast 2009).

In the literature on political behavior, there are a couple of behavioral studies on partisan geographic sorting. However, they primarily address the sorting of people into the areas with politically like-minded or co-partisan residents (Cho, Gimpel, and Hui 2013). Mummolo and Nall (2016) analyzed the migration decision of registered party members in the US and examined if they move to the area with their co-partisans. Their surveys reveal that while both Democrats and Republicans have the preferences to live close to their co-partisans, the priority of the political factor is very low in choosing the moving destination. Using voter registration data, the authors detect no empirical support for partisan sorting in the US. Their research supports the macro-level study of Glaeser and Ward (2006) that observes the resilience or increase of politically mixed districts in the United States. Nonetheless, as in the Tiebout sorting, local politics and policies are mostly absent from these works on partisan sorting.

The literature on sojourners and refugees can be relevant to this research in terms of people's movement and local politics. Gaikwad and Nellis (2018) run a nation-wide survey in India and found the hostility of long-time urban dwellers toward the newcomers. Similarly, Bracco et al. (2017) find that refugees coming to Italy tried to avoid municipalities controlled by the far-right parties. They suggest that migration and local politics do interact. Unlike this paper, however, these authors deal with politically and economically powerless groups that the electorate dislike, and not the migration of voters. How voters migrate in response to local politics and policies, thereby changing the composition of the electorate, remains an open question.

While there are a limited number of works in residential sorting, even fewer empirical papers deal with how the presence of residential sorting shapes politicians' incentives. Ferreira and Gyourko (2009) found no evidence of partisan differences in US local politics and attributed the results to the Tiebout sorting. The authors cite Peterson's (1981) argument that inter-jurisdictional competitions prevent politicians from taking highly partisan policies, as residents can move to another area. According to their interpretations, the presence of residential sorting would lead to effectively non-partisan local authorities, and politicians would play a minimal role in shaping politics.

Recent works in political science revealed that local politicians do affect the composition of voters by exploiting the timing of elections (Anzia 2013), manipulating registration and micro-targeting different groups (Hersh 2015), or in extreme cases, illegally bringing in the voters from other districts on the election day (Hidalgo and Nichter 2016). While it is also widely known that partisan politicians do lead to different policy choices (de Benedictis-Kessner and Warshaw 2016), the literature does not pay much attention to how politicians can change the compositions of residents rather than turnout.

Economic geography and development economics produced a few theoretical works related to mobility and politics. The theoretical paper by Glaeser and Schleifer (2005) presents formal models of racial sorting in which politicians use scare tactics. They introduce the concept called the Curley effect, which signifies "increasing the relative size of one's political base through distortionary, wealth reducing policies (p. 2)." They draw their theories from a mayor of Boston, James Curley. Curley, who was supported by working-class voters of Irish origin, employed anti-Anglo-Saxon rhetoric to drive the middle-class residents of English origin away from the city. However, the authors do not conduct systematic empirical analysis, and appear skeptical about whether political sorting is taking place in the modern democracies (Glaeser and Ward 2006). A classic work of Hirschman (1993) has a similar argument. His essay suggests that the exile of intellectuals in the former communist countries in Eastern Europe strengthened the rule of the Communist forces. He indicates that the governments did not stop them leave knowing the positive consequences of their exit for their stable rule. These works are relevant to the core argument this paper makes; the effect of politics on the inter-jurisdictional migration. However, they mainly deal with the authoritarian leaders who maintain power for a long time with repressive policies to expel their opponents. It is yet to be seen whether these theories are applicable in modern liberal democracies.

Facing the same challenge that public choice theorists faced, empirical investigations on the Curley effect or Hirschman's hypothesis are sparse as well. Anelli and Peri (2017) document how emigration from Italian municipalities following the financial crisis resulted

in a lack of local political change and more corruption in high emigration areas. However, their analysis relies on the total number of emigration from each municipality, and not the composition of emigrants. Furthermore, they do not look at local circumstances affecting emigration, but they analyze how exogenous emigration shaped local politics, using instrumental variables. It is fair to say that the frameworks developed by Glaeser and Schleifer, as well as by Hirschman, have not been directly tested in or extended to democratic settings.

In summary, in the literature of partisan sorting, politicians' incentives and actions are absent. The Tiebout sorting look at residents' preferences for tax and public goods, but not that of partisan politicians. Glaeser and Schleifer, as well as Hirschman, introduced politicians to the picture, but they both analyze long-term authoritarian policies to expel voters. Thus, there is a theoretical gap in the literature in that little is known about the systematic sorting process linking politicians' actions and voters' responses in modern democracies. Besides, all the three relevant currents of the literature are rich in theories but lack empirical investigations.

Argument and hypothesis

The core argument of this paper is simple; I predict that the policies and politics can cause residential sorting, mainly by attracting voters who are choosing the destinations from various locations. If certain demographic groups tend to support specific parties, I expect those groups to be more likely to move into the areas ruled by the parties they tend to support. As for politicians, the prior is that narrowly elected politicians may be more eager to encourage the sorting.

By using a regression discontinuity design, I try to disentangle local government partisanship from local political culture. Comparing politically mixed areas with similar aggregate political preferences, I assess if the partisanship of the local governments makes a difference in voter sorting. These effects of local politics, independent of residents' political inclinations, are not fully dealt with in the existent theoretical works. As emphasized before, the public choice works deriving from the Tiebout model tend to emphasize that sorting suppress partisan divergence rather than accentuate it, as sorting would constrain fiscal freedom (Brennan and Buchanan 1980). [1]

In most advanced countries, subnational politicians and mayors have a significant mandate in local tax, housing, zoning, schooling, policing, and recreation. These policies may well affect the attractiveness and affordability of the community for specific demographic groups, thereby affecting the composition of residents in the future. Unlike Glaeser and Schleifer, I expect that the pull effect (attracting supporters) is more significant than the push effect (expelling the opponents).

Admittedly, policy variables would explain a small fraction of people's decisions to move (Mummolo and Nall 2016). Dominant reasons for movement are career opportunities, having children, living with someone else, retirement options, or the availability and

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[1]   What Tiebout himself would have said about the role of local politicians has been a subject of a
       long debate (Epple and Zelenitz 1981; Henderson 1985) and its interpretation is beyond the scope
       of this paper.

price of dwellings for rent or purchase (Eurostat 2017). However, even if people move due to reasons unrelated to policies, people can choose the destination community with policies they favor, among the set of municipalities from which they can have access to the workplace, markets, schools, or those of their partners. When people need to move due to job changes, for example, they would still consider local property tax and public services when purchasing houses.

Moreover, local policies often affect the factors people consider when they move. For example, whereas few people would move to certain places because of the zoning regulations, such regulations affect the affordability and the value of dwellings as well as the atmosphere of the neighborhood, which would, in turn, affect housing choice. Local policies may not determine whether or not people move, but it can profoundly shape the destination selection.

As for the profile of those who sort, people without a job concern would have greater freedom to choose their lodging, as they do not have to live nearby offices or schools. As those people have fewer constraints in choosing the destination when they move, the relative importance of policy-related aspects, such as tax and home value, may become more pronounced. Indeed, one of the vital assumptions in the Tiebout model was consumers having dividend income and no need to commute. Those who just retired may be a primary example. Increased numbers of retired people migrate (Eurostat 2017), and given their relative size and higher tendency to vote or devote time to political activities, their choice of destination may affect the political balance in the recipient area. It is particularly common to migrate just after retirement.

From the politicians' point of view, the cost and benefit of encouraging voters to move in or out would depend on the political circumstances. Partisan provision of private goods can lead to inefficiency, resulting in an under-provision of public goods or higher tax burdens. This may reduce the support from generic local voters. A mayor may not see the need to institute such policies when they have secure reelection prospects or a broad support base. However, if the cities are divided into two political camps, and they are closely matched, then a slight change in the composition of voters may affect the political outcomes profoundly. In major advanced economies, four to ten percent of people move to a different municipality in a year (Eurostat 2017), and even if policies can affect only a fraction of movers per year, the accumulated effect over time can be consequential. Therefore, narrowly elected mayors may have more incentive to encourage sorting.

In conventional models of political economy, forward-looking politicians do not take policies that can result in an intense backlash from the opponents, and they should cater to the Median voter rather than the support base (Downs 1957). Nonetheless, given the generally low salience and turnout of local elections, local politicians may think that attracting their core supporters and encouraging the opposition supporters to leave could be more reassuring a strategy for their reelection than appealing to the uncommitted median voter.

Background of the 2014 municipal elections in France

Its institutional and political characteristics make France a great place to test the hypotheses. France is divided into more than 30,000 municipalities (*communes*), and this study uses 7,404 municipalities with a population larger than 1,000, where the municipal election results are available via the Ministry of Interior. Municipal elections are held simultaneously across France and contested in a party-list plurality system in two rounds. The party-list led by the winning mayor is guaranteed to have the majority in the city council, so the mayor's party has full control over local policies. The mayoral term in France is six years without formal term limits. The mandates of municipal councils and mayors are uniform regardless of the size of communes.

France has a relatively centralized political system, and municipalities would be the appropriate units of analysis for this test. In the international standard, French municipal authorities have important roles in providing local services, both in terms of mandate and budget allocation (World Bank and United Cities and Local Governments 2008). Municipal governments oversee infrastructure, social housing, education, security, and development, among others. The French system grants local governments important freedom regarding public employment, public procurement, setting fees for public properties, and adding top-ups to various nationally funded welfare payments. Before 2018, French municipalities charge various taxes including local income tax (*taxe d'habitation*), and local property tax (*taxe foncière*), as well as business tax (*taxe d'entreprises*). Municipal councils can set the rate of various local taxes freely within the bundle set by the national government (Djaïz and Martin 2016). Compared to the municipal authorities, mid-tier regional and departmental governments in France played minor roles, at least until the reform of regional governments in 2016.[2]

Before the 2017 presidential election, local politics in France were characterized by a two-party system. The Right block consisted of the *Union pour un Mouvement Populaire* (UMP), the *Union des Démocrates et Indépendants* (UDI) and various small center-right parties and candidates. The Left block included the *Parti Socialiste* (PS), the *Europe Ecologie Les Verts* (EELV), *Parti Radical de Gauche* (PRG) and their allies. These two blocks contested in most of the second round. The National Front, a far-right party, did not ally with any major party and gained only a handful of municipalities in 2014. Several small far-left parties gained municipalities with electoral pacts with the Left Block, but the number was limited. The winner-takes-it-all and two-round first-past-the-post system lead to the dominance of the Left Block and the Right Block in the second rounds, either by eliminating fringe parties or by incorporating smaller parties into the joint list. The 2014 municipal elections were salient with a respectable turnout of 63.55%, and both camps ran large-scale nationwide campaigns.

For the analysis of residential sorting, it is crucial to figure out who is supporting which party. However, fine-grained opinion data on French local elections are not available. It is difficult to use the opinion data from presidential elections, as less organized extreme and centrist parties are more competitive in the nationwide contests, and the

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[2]   Inter-municipal bodies called *établissement public de coopération intercommunale* (EPCI) plays a meaningful role in urban issues such as planning, infrastructure, and public housing. Nevertheless, most EPCI councilors concurrently hold the seat in municipal councils as well.
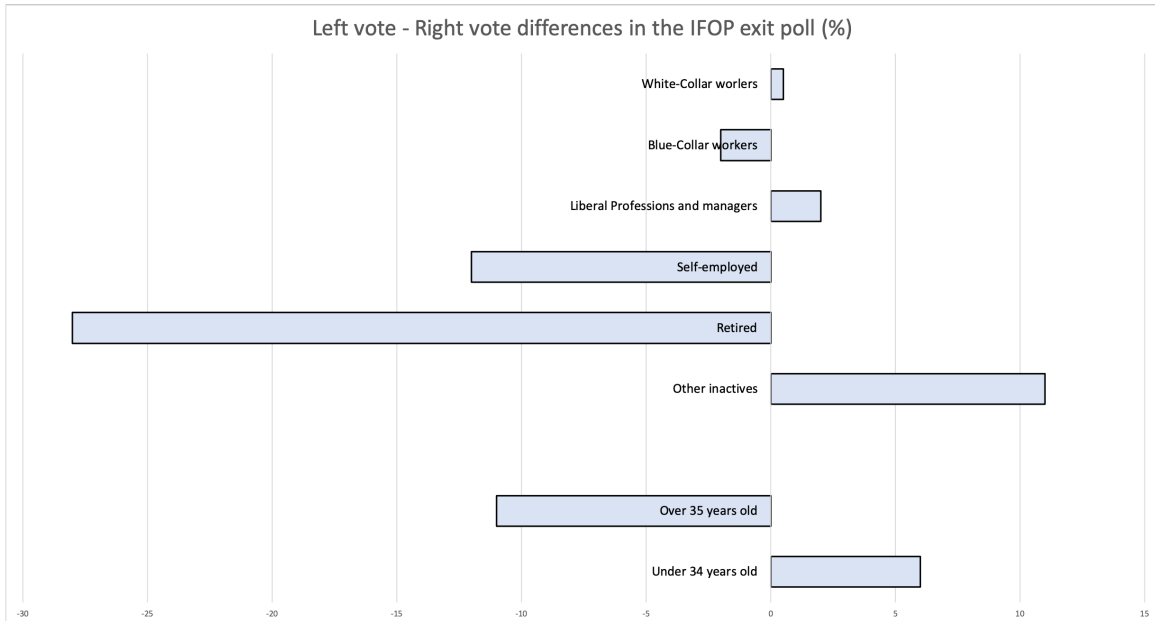
Figure 4.1: Left-Right voting gap (%) in the 2014 municipal elections: IFOP exit poll

issues are radically different. Instead of calculating each individual's propensity of supporting the Right or the Left in a local ballot, I use an approximation by demographic groups' political inclinations. On the day of the first round of the 2014 municipal elections, the French Institute of Public Opinion (IFOP: *Institut francais d'opinion publique*) conducted a detailed exit poll. It was a nationwide survey and not disaggregated by municipalities but enables us to discern which demographic groups supported which party in these particular municipal elections. Socioeconomic categories included the retired, self-employed, blue-collar and white-collar workers, and other inactive groups. Figure 4.1 demonstrates that the retired people show particularly high support for the Right, the gap with the Left being nearly 30%. To a lesser extent, self-employed people also mildly support the Right, whereas the "other inactives" - including homemakers - tended to support the Left modestly. Among the voters in other categories, the Left and the Right closely matched. In the figure in the appendix, 50% of the retired answered in the exit poll that local tax was the vote-deciding issue, compared to 26% among the other inactive people. Education, public housing, and culture were not crucial for the retired, as each category only got 4%.

Given the IFOP opinion poll and the argument, the hypothesis is that retired people are significantly more likely to move to the Right-controlled municipalities than the others. To a lesser extent, the same should be the case for self-employed. There should not be a substantial effect on other demographic groups, such as blue-collar workers and white-collar workers. Tax rates could be the best policy tools to attract the retired, and I expect the Right mayors to set lower tax rates and see a higher inflow of the retired.

Data

In the summer of 2018, the National Institute of Statistics and Economic Studies (*Institut national de la statistique et des études économiques*), abbreviated INSEE, made available the detailed data of residential mobility from the population census in 2015. The dataset contains individual-level data about whether they relocated in the past year, the municipality (*commune*) of their current residence, the municipality they lived a year before[3], as well as their socioeconomic characteristics including age, sex, occupation, labor market status, homeownership, and household structure. The dataset, containing more than 19 million people who were subject to the census, enables us to identify what kind of people moved from which commune to which one.[4]

The raw data of municipal elections in 2001, 2008, and 2014 are retrieved from the Ministry of Interior. I categorized each mayoral list by party affiliations and created the data set of the vote share and election victory of the Left block, the Right block, and others.[5] Besides, from each department in France, I collected municipal and departmental tax rates in 2008, 2014, and 2018, and housing occupancy data from the 2016 housing census. All the other municipality level data are drawn from INSEE.

With the micro-data of domestic migrants, I match the migration destinations and origins of each individual with the local election results in 2014. I subsetted the sample to different socioeconomic groups, such as the retired and white-collar workers, then analyzed the migration pattern with the political orientations of the groups they belong to, referring to the IFOP exit poll. Unlike the United States and other countries, the same set of coalitions are competing for mayoral offices across the country simultaneously; they are internally coherent and externally contrasting. At least regarding retired people, there was a relatively good correspondence between their socioeconomic status and which party they are likely to support at the local level.

Regression Discontinuity Design

In this paper, the municipalities with the Left mayors are in the treatment group, and those with the Right mayors are in the control group. I analyze how people moved from or into the municipal area within one year following the 2014 municipal elections. To test my hypotheses, however, it is imperative to detach the effects of local politics and policies from those of local socio-political characteristics. Since the Left mayors are not randomly assigned, simple correlational analyses would result in a significant selection bias. As argued by Mummolo and Nall (2017), people may want to live with likeminded people, irrespective of the government partisanship. Unobserved variables may simultaneously affect people's decision to move in or out, as well as to the election of mayors with

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[3]   Some of those who moved did not report the municipality they lived before. Consequently, compared to the analysis of moving-in, the analysis of moving-out has fewer units.

[4]   I excluded non-French citizens and children in compulsory education from the sample. I also removed units in the French overseas departments.

[5]   All the party-lists are required by law to declare their affiliations to any of the national level party or coalition. Most independent candidates need to declare whether they belong to the Left or the Right.

particular political affiliations. For example, religiously conservative municipalities may elect the Right mayor and attract religious people, who happen to support the Right.

The regression discontinuity design (RDD) exploits the discontinuity in the treatment assignment to solve such omitted variable problems. I use the electoral margin of the Left candidate against the Right candidate as a forcing variable. It is assumed that other relevant variables that affect the movement of people are at least continuous around the cut-off line on the Left-Right vote share. In this particular case, there should not be any discontinuity of various covariates between communes where the Left candidates narrowly won and where they lost marginally. However, the marginal differences in vote share would result in contrasting sets of governments and policies, as the winning party-list obtains mayorship and the majority in the municipal council. The winner-takes-all system of the French municipal elections ensures that the discontinuity is sharp around the cut-point. In the municipalities where the Right narrowly defeated the Left, the Right-leaning people are unlikely to move in because of like-minded people or conservative local culture, but they may still favor the Right government's policy, which will last for at least six years.

Therefore, treatment is having a Left mayor and Left-controlled councils, despite a similar level of support for the Right parties. I only used the subset of municipalities where they effectively had a two-way race between the Right and the Left. I omitted the municipalities in which centrist, ecologist, regionalist, far-left, and far-right candidates won or came to the second place. As each of those small fringe parties gained only a handful of municipalities, they could not be incorporated into the RDD analysis for the lack of statistical power. The 2014 Election data was available for 10,034 municipalities with a population over 1,000, and this condition leaves 7,404 municipalities. However, fringe parties tend to win in a very small municipalities, the remaining sample still covers 84% of the original sample in terms of population. Therefore, most municipalities, especially relatively large ones, do not drop in the omission process.

The framework of RDD is simple. Local linear regressions combine choosing a suitable bandwidth with a linear control function and are the primary method in this paper. The bandwidths for the main results are drawn from the *CCT bandwidth* (Calonico, Cattaneo, and Titiunik 2014) and reports robust nonparametric confidence intervals. In the online appendix, I present the results with conventional *IK bandwidth* (Imbens and Kalyanaraman 2009), as well as arbitrary bandwidth of 2.5, 5, 10, 25, 50, and 100%.

The unit of analysis is individual, and the primary dependent variable is the propensity of a person to move in or out. For example, for the case of moving out, the value for each individual takes one if he or she moved to a different municipality this year, zero if they stayed. For moving in, the value takes one if he or she was in a different municipality in the previous year, zero otherwise[6]. I subsetted the sample into various demographic groups and analyzed them separately. Within a bandwidth, a triangular kernel is applied to give more weight to the units that are close to the cutoff point. For each subsample, I apply the following local linear regression to both sides of the cutoff line within the bandwidth.

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[6]   Movers are not double-counted; i.e., those who left the municipality is not in the sample for the analysis of moved in, and those who moved into the municipality is not in the sample for the analysis moving out.

$$P[Move]_{i,m} = \alpha + \beta I(\text{Left\_Mayor}_m) + f(\text{Left-Right\_Margin}_m) + \epsilon_i$$
$$s.t. \quad \text{Left-Right\_Margin} \in (-\hat{h}, \hat{h})$$

where $P[Move]_{i,m}$ is the propensity of an individual i in a certain demographic group to move into or out from municipality m. $\hat{h}$ is a neighborhood around the cut-point; Having a Left Mayor after 2014 in the municipality of origin or destination is the treatment, Left-Right electoral margin in the 2014 municipal elections is the forcing variable, and f() is some continuous function for covariates and unobservables. Standard errors are clustered at the commune (municipality) level, as it is the unit of treatment assignment.

France had municipal elections in March 2014, while the mobility census was conducted in 2015. The INSEE conducted the 2015 mobility census throughout the calendar year 2015, and the surveyors asked the respondents if they lived in a different municipality a year before. Among those who are surveyed before March 2015, some may have moved before the municipal elections in March 2014, but it should not concern the overwhelming majority of the cases. The date of the survey for each unit is not available in the dataset.[7]

As placebo tests and robustness checks, I applied the same regression discontinuity design to the housing census data in 2013 and 2016. The housing census data have only a limited number of demographic variables of the head of households, but they contain the year they moved into their current dwellings. Thus, I exploit the 2013 housing census data for the primary placebo test with the 2014 municipal election data, as the 2014 elections cannot affect the residents' migration decisions in 2013. The placebo can eliminate the effect of unobserved variables in the municipalities that had close elections in 2014. The analysis of the migration data in the 2016 housing census should work as robustness checks of the main results.
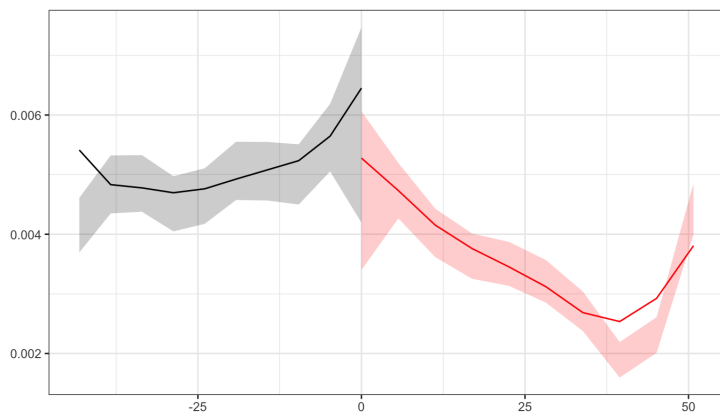
Figure 4.2: McCrary density test (following Cattaneo et al 2019) for the 2014 municipal elections

Before the RD analysis, I conducted a McCrary test to check if there is any irregularity at the cut-point regarding the number of municipalities with close elections. Figure 4.2

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[7]   The 2017 mobility data is also available. However, the presidential election in 2017 completely changed the French party system and there are some political realignment of the incumbent mayors in the run-up to the event. 2015 was largely unaffected.

shows no statistically significant discontinuity around the cut point. The upward slope toward the center suggests that numerous municipalities had close elections. While the Right did perform better than the Left in the 2014 municipal elections, neither of the two major camps had any systematic advantage in close elections.

Main Results

Table 4.1 presents the RD results of the propensity of different socio-economic groups to move into the municipality. Column 1 shows that a retired person, who is likely to support the Right, has a lower propensity to move into the Left-controlled municipalities. This result means that the retired prefer the cities ruled by the Right as their migration destination. The observed partisan effect of 0.225 percentage points is non-negligible, as only 2.79 percent of retired people move each year. Columns 2 and 3 contrasts the results for the two groups of self-employed people, who tend to support the Right. Whereas the employers do not appear to sort into the Right-controlled municipalities, the independent workers without employees do show a higher likelihood of moving into the Right-controlled cities, by 0.333 percentage points. White-collar workers or blue-collar workers, who were more or less evenly split into the Left and Right supporters in the IFOP exit poll, do not show the partisan sorting. Column 6 reports the result for homemakers, who are likely to support the Left, and they do not appear to sort either.

The results for the retired people and independent workers are perfectly in line with the expectations. They tend to support the Right and are more likely to move into the cities governed by the Right. The null effect for white-collar workers and blue-collar workers are also according to the hypothesis. On the other hand, employers and home-makers did not show the expected partisan effect. Whereas there is no ground to assume that independent workers are more likely to support the Right than employers do, those with employees may face more constraints in choosing the destinations. Homemakers would also face similar constraints depending on the preferences of other members of the household. Coupled with the fact that the partisan bias of the retired in the IFOP exit poll was far more sizable compared to the other groups, the findings in Table 4.1 are broadly consistent with the hypotheses.

Table 4.2 reports the RD estimates of the propensity of an individual to move out. No demographic groups show statistically significant partisan bias, and the results appear random. Unlike the findings for moving in, the partisanship of mayors does not appear to affect who is likely to leave the cities. It suggests that pull factors could be more prominent than push factors.

Table 4.3 outlines the RD results for retired people, subsetted by age groups. In Columns 1 and 2, retired people aged between 65 and 79, as well as early retirees younger than 64, show a higher propensity to move into the Right municipality compared to the generic results for the retired. The early retirees recorded an unusually large effect of 0.627 percentage points. On the other hand, Column 3 shows that the retired people over 80 do not show partisan sorting. Similar to the case of self-employed workers with employees, the low mobility of the people over 80 can be driving the lack of partisan impact.

Table 4.4 describes the RD results for independent workers without employees, divided by age groups. Contrary to the retired, older independent workers over 55 show very high propensity to move into the Right-controlled municipalities in Column 3, while their younger counterparts below 39 do not show any sorting in Column 2. This gap could be due to generational partisan differences observed in the IFOP poll. In any age group of retired people and independent workers, the partisanship of the mayors did not affect the propensity to move out.

The graphs in Figure 4.3 confirm the results in Tables 4.3 and 4.4, with different cut-off points of the age. Early retirees and older self-employed workers are particularly likely to move into the Right-controlled municipalities. Interestingly, Figures 4.3A and 4.3G suggest that the sorting effect among these groups is evident only when the election results are close. If narrowly elected mayors are observing more inflows of likely supporters, it is in line with the hypothesis of this paper. The graphs for politically neutral groups are presented in the Appendix.

The findings indicate the presence of partisan sorting when mayors narrowly won the city. If early retirees and independent workers who are likely to retire soon migrate to the Right-controlled municipalities, they may constitute lasting supporting blocks for those marginally elected Right mayors.

Table 4.1: Main RD Results: Move-in

Dependent variable:	Moved into the Municipality in 2015					
Treatment variable:	Left mayor 2014-2020					
	(1)	(2)	(3)	(4)	(5)	(6)
Retired person	-0.00225 (0.00077)					
Self-employed with employees		-0.00023 (0.00120)				
Self-employed without employees			-0.00333 (0.00108)			
Employee: White-collar workers				0.00023 (0.00093)		
Employee: Blue-collar workers					-0.00095 (0.00121)	
Homemaker						0.00063 (0.00086)
Robust Clustered CI (95%): lower bound	-0.00432	-0.00241	-0.00741	-0.00163	-0.00461	-0.00302
Robust Clustered CI (95%): upper bound	-0.00096	0.00313	-0.00261	0.00231	0.00054	0.00134
CCT Bandwidth (For Estimate: Unit: %)	7.151	14.376	19.111	6.714	8.946	17.107
CCT Bandwidth (For Bias Correction: Unit:%)	13.664	26.276	36.352	18.651	21.554	27.756
Effective Number of Control	228931	31909	59314	137625	107181	57764
Effective Number of Treatment	182003	24572	45413	107551	77492	37824
Total number of Observation	2742022	217157	307335	1522239	964228	300175

Table 4.2: Main RD Results: Move-out

Dependent variable:	Moved out from Municipality in 2015					
Treatment variable:	Left mayor 2014-2020					
	(1)	(2)	(3)	(4)	(5)	(6)
Retired person	-0.00019 (0.00406)					
Self-employed with employees		-0.00115 (0.01081)				
Self-employed without employees			-0.00507 (0.01525)			
Employee: White-collar workers				0.00177 (0.01507)		
Employee: Blue-collar workers					-0.00319 (0.01211)	
Homemaker						0.00337 (0.00944)
Robust Clustered CI (95%): lower bound	-0.01005	-0.02859	-0.03117	-0.03548	-0.02723	-0.01935
Robust Clustered CI (95%): upper bound	0.00863	0.02219	0.03995	0.03562	0.02974	0.02361
CCT Bandwidth (Estimate)	29.968	25.232	25.098	23.792	26.476	38.397
CCT Bandwidth (Bias Correction)	48.335	37.811	41.641	37.623	41.620	63.752
Effective Number of Control	782542	50019	71012	364186	246944	169820
Effective Number of Treatment	537492	34959	54006	280745	179262	112391
Total number of Observation	2720169	213867	300987	1489533	943585	430225

Table 4.3: RD Results: Propensity of a retired person to move in / out

Treatment variable:	Left mayor 2014-2020					
Dependent variable:	Moved into the Municipality in 2015			Moved out from the Municipality in 2015		
	(1)	(2)	(3)	(4)	(5)	(6)
Retired: Aged 65 - 79	-0.00462 (0.00078)			0.00005 (0.00333)		
Retired: under 64		-0.00627 (0.00103)			-0.00159 (0.00598)	
Retired: over 80			-0.00009 (0.00103)			-0.00160 (0.00557)
Robust Clustered CI (95%): lower bound	-0.00710	-0.00885	-0.00279	-0.00781	-0.01634	-0.01577
Robust Clustered CI (95%): upper bound	-0.00355	-0.00468	0.00218	0.00768	0.01127	0.00984
CCT Bandwidth (Estimate)	9.106	4.776	15.113	28.926	25.153	22.059
CCT Bandwidth (Bias Correction)	14.571	15.300	23.582	45.561	41.421	35.437
Effective Number of Control	165161	34479	124320	402249	134229	128963
Effective Number of Treatment	111695	24579	88416	274280	96799	84116
Total Number of Observation	1459923	557674	724435	1450025	552434	521359

Table 4.4: RD Results: Propensity of a self-employed person without employees to move in / out

Treatment variable:	Left mayor 2014-2020					
Dependent variable:	Moved into the Municipality in 2015			Moved out from the Municipality in 2015		
	(1)	(2)	(3)	(4)	(5)	(6)
Independent: Aged 40-54	-0.00326			0.00130		
	(0.00148)			(0.00333)		
Independent: under 39		0.00158			0.00956	
		(0.00151)			(0.02896)	
Independent: over 55			-0.00760			0.00658
			(0.00144)			(0.00641)
Robust Clustered CI (95%): lower bound	-0.00825	-0.00575	-0.01169	-0.02038	-0.05465	-0.00931
Robust Clustered CI (95%): upper bound	-0.00097	0.00172	-0.00529	0.01984	0.07730	0.02265
Bandwidth (Estimate)	20.000	22.050	17.342	28.180	22.500	27.598
Bandwidth (Bias Correction)	30.180	31.853	31.318	43.389	41.262	36.774
Effective Number of Control	24059	25799	12980	30759	25240	18578
Effective Number of Treatment	17070	20860	8680	21681	21346	12605
Total Number of Observation	121979	112276	73080	120261	108269	72457

Robustness and Placebo tests

All the main results in the previous section use CCT bandwidth with nonparametric local linear regressions. Every model reports robust nonparametric confidence intervals, and the standard errors are clustered at the municipality level. The different RD estimates with IK bandwidth and arbitrary bandwidths of 2.5, 5, 10, 25, 50, and 100% are presented in the online appendix. The results with IK bandwidth are consistent with the main results in that the partisan effects are observed for retirees' propensity to move in, but not to move out. No significant results for late retirees are observed either. The partisan impact was consistently negative with different arbitrary bandwidth as well. Balance tests of the municipal level statistics are presented in the Appendix, and there are no meaningful differences in municipal covariates among the cites with small electoral margins.

With the relationship between partisanship and location decisions of retired voters established, I seek to explore a range of issues related to robustness. I check whether the municipal election results in year t are correlated with the migration decisions of retired people in the year before the election; t-1. I applied the same regression discontinuity to housing census data in 2016 and 2016. This time, the dependent variable takes 1 if a retired head of household moved into a new dwelling in the municipality, 0 otherwise. Due to the nature of the data, I do not observe the socioeconomic groups of household members, and the outcome variable takes 1 in the case of intra-municipal movement as well.

Columns 1 to 3 in Table 4.5 present the robustness checks using the 2016 housing survey. While the magnitude of the effects is smaller than that of the main results, it follows the established pattern that the younger retirees tend to move into new dwellings in the Right controlled municipalities. Columns 4 to 6 show the placebo tests with the 2013 housing survey. They show no significant partisan effects, among the retired in

general or early retirees in particular. Coupled together, they support that the observed partisan effect was due to the changes after the 2014 municipal elections. Thus, the findings strongly suggest that the mayors elected narrowly in the 2014 municipal elections attract the likely supporters in 2015.

Table 4.5: Robustness Checks and Placebo tests; RD results with Housing census data

Treatment variable:	Left mayor 2014-2020					
Dependent variable:	Moved into a new dwelling in 2015			Moved into a new dwelling in 2013		
Data:	2016 Housing census			2013 Housing census		
	(1)	(2)	(3)	(4)	(5)	(6)
Head of household:						
Retired	-0.00135			0.00085		
	(0.00064)			(0.00063)		
Retired: Aged 65-79		-0.00177			-0.00074	
		(0.00062)			(0.0050)	
Retired: Under 64			-0.00593			0.00125
			(0.00097)			(0.00118)
Robust Clustered CI (95%): lower bound	-0.00293	-0.00306	-0.00907	-0.00026	-0.00182	-0.00073
Robust Clustered CI (95%): upper bound	0.00012	-0.00025	-0.00471	0.00251	0.00049	0.00439
Bandwidth (Estimate)	14.911	16.550	13.986	17.786	30.475	14.059
Bandwidth (Bias Correction)	24.114	24.384	29.011	34.476	46.182	29.892
Effective Number of Control	466979	286695	60875	607360	471642	104400
Effective Number of Treatment	358144	210673	48215	429447	339616	85017
Total Number of Observation	3675034	2064717	509280	3959637	2008569	916457
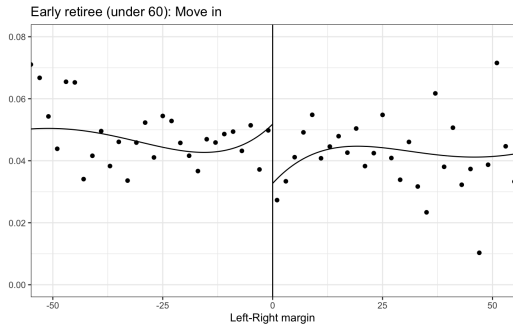
A. Early Retiree: Move-in
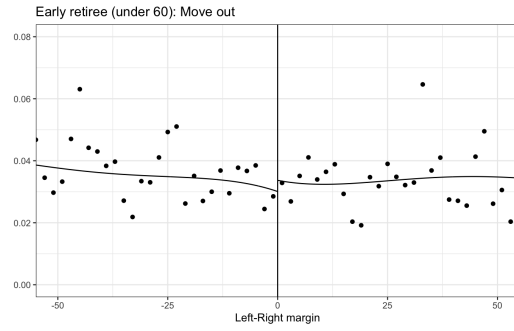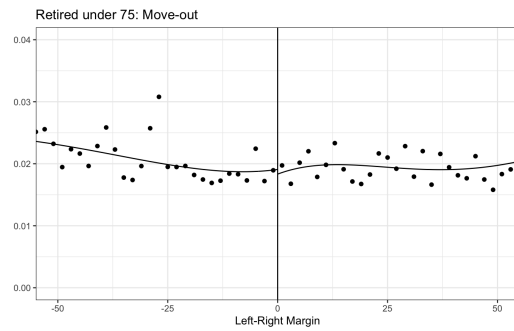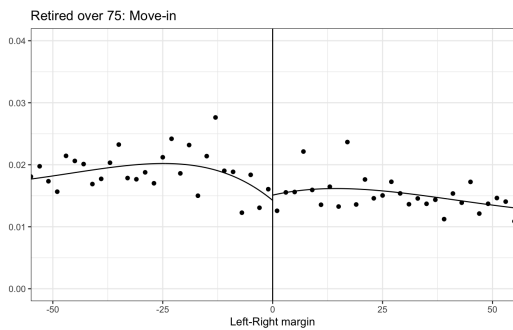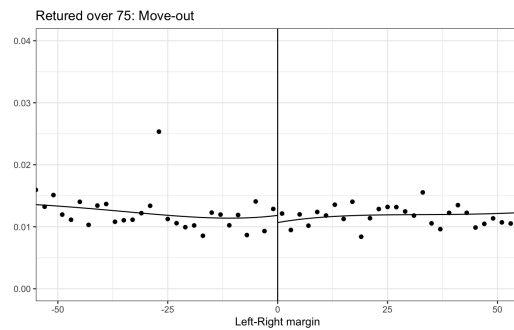
B. Early Retiree: Move-out
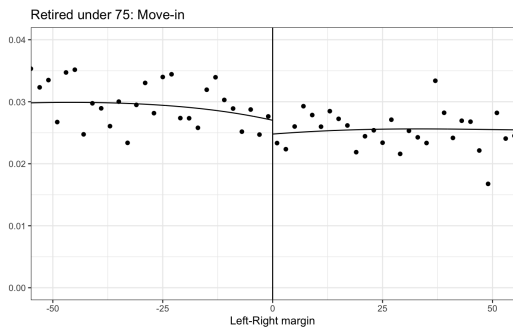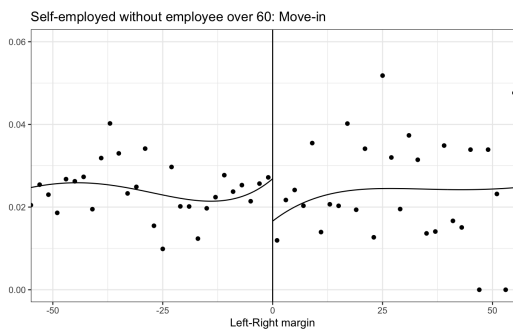
C. Retiree under 75: Move-in
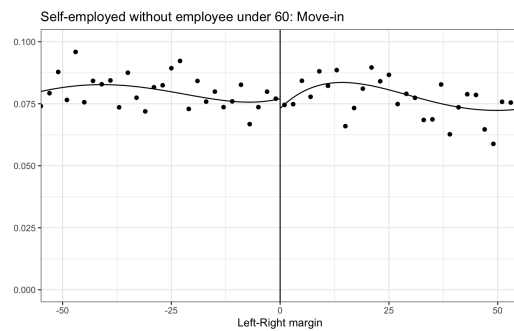
D. Retiree under 75: Move-out

E. Late Retiree: Move-in

F. Late Retiree: Move-out

G. Self-Employed Over 60: Move-in

H. Self-Employed Under 60: Move-in

Figure 4.3: RD graphs for the propensity of a person to move in or out in 2015
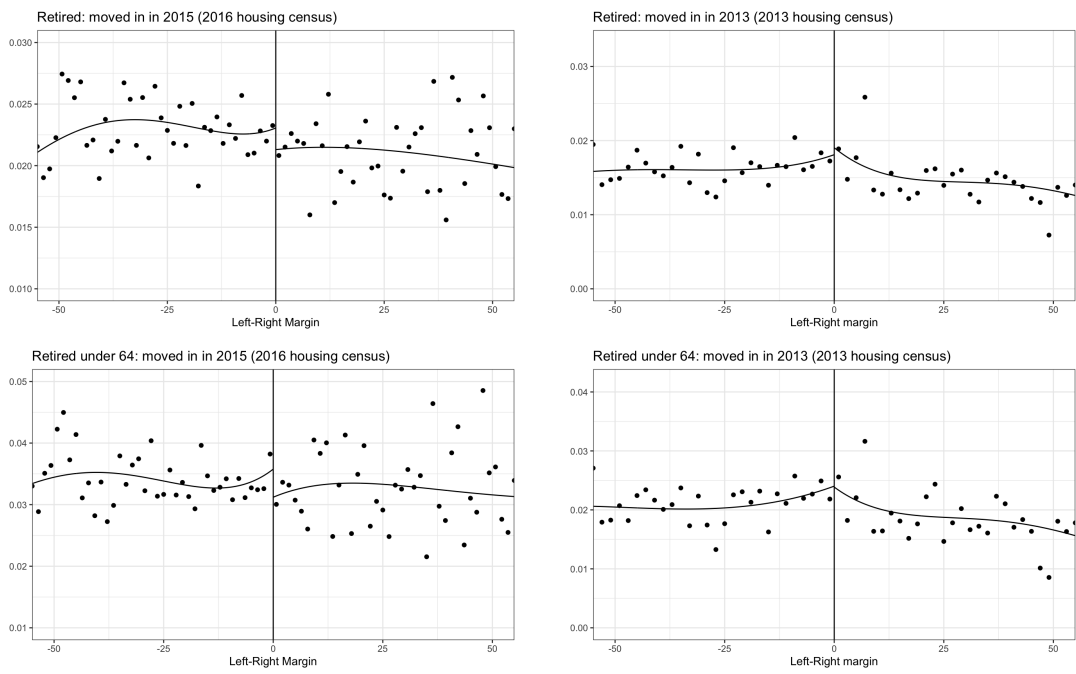
Figure 4.4: Robustness Checks and Placebo Tests; with the 2016 and 2013 Housing Census Data

Analyses of local policies

The main results demonstrate that retired people and independent workers, who tend to support the Right, are moving to municipalities with narrowly elected Right mayors. It is imperative to find the corresponding differences in local policies if the actions of mayors are generating the observed sorting. Using the same RD design, I analyze the two local policy areas that could directly affect residential sorting: property tax, and social housing construction.

According to the IFOP exit poll, 50 percent of the retired people based their voting decision on local tax issues, so the tax rate could be one of the key factors if local policies are driving the sorting process.[8] From each department in mainland France, I gathered the data of various municipal tax rates in 2008, 2014, and 2018.

French municipalities have two major sources of tax revenue; residential income tax (*Taxe d'habitation*), and property tax (*Taxe foncière*).[9] Each municipality can decide the rate for these taxes, but various exemptions are uniformly applicable across France. The residential income tax is a flat-rate tax on residents' income, and those households whose income is smaller than a certain level enjoy a 65% deduction.[10] Those taxes have communal tax rates and inter-communal tax rates, and the municipal authorities have an important say in setting inter-communal rates.

I expect that lowering property tax may be more effective than reducing income tax if the mayor wishes to attract retired people. Before 2016, people over 60 in France benefited from generous income-based exemption schemes for the residential income tax. None of these nationwide age-based exemptions applied to the property tax before October 2016 (Djaïz and Martin 2016).[11] Though the subsequent reforms curtailed some of these exemptions, retired people with substantial savings and relatively modest income level may find lower property tax more appealing than lower income tax. For those retired people who are thinking of buying a house, the cumulative cost of the property taxes could be non-negligible. [12]

I apply the same regression discontinuity design as in the main analysis, using the changes in tax rates from 2014 to 2018 as outcome variables. The running variable is the

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[8]   I do not claim that tax policy is the main driving force, but tax policy is may reflect the broad policy stance of the municipal government.

[9]   There are two different rates: property tax on land (*Taxe foncière sur les propriétés bâties*) and property tax on building (*Taxe foncière sur les propriétés non bâties*). The property tax on buildings is applied to houses, apartments, industrial and commercial buildings, and other immobile constructions. The property tax on land applies to yards, parking spaces, and other unbuilt spaces dependent on buildings, as well as unused land in general. I used the linear average of the two rates, but the use of different aggregation methods did not substantially change the results.

[10] The threshold depends on the size of the household, but it is only slightly smaller than the median income. In 2019, the threshold for a household of a married couple without children was 43,688 Euros. The latest available figure for the median income for two-person households is 45,700 Euros in 2016.

[11] If the resident is receiving a state benefit for the disabled, handicapped, or old age, he or she is exempted from the property tax on buildings as well as the residential tax. However, the applicants were less than 0.3 percent of the population in 2016.

[12] The tax rate is imposed upon the 50% of the annual rent-equivalent value of the property, and the rates range from 12 % to 84% for buildings, and from 43% to 260% for yards and rural housing.

Left-Right margin in the 2014 municipal elections. Unlike the main analysis, however, the unit of analysis for this section is a municipality, not an individual. The standard errors are clustered at the department level in all the models.

Table 4.6 provides the results. Column 1 reports that the Left mayors are weakly associated with an increase in the property tax, by 0.4 percentage points. The result that includes the inter-communal rate in Column 2 is greater both in magnitude and robustness. The effect on the residential income tax looks random in Columns 3 and 4. Placebo tests, using the property tax rate increase in the term prior to the election, do not show any significant results in Column 5 and 6. Column 7 shows no discernible differences in the tax rate at the beginning of the mayor's term in 2014.

The results imply that the Left mayors are likely to increase the property tax more, which is consistent with the expectation. Interestingly, the property tax rate graphs show that the increase or decrease in property tax is more pronounced when the outcome of the preceding election was close. This is consistent with the pattern observed in the main analysis of residential sorting.

I ran a similar RD analysis on the social housing construction data and observed that the Left mayors build more social housing units, and the Right mayors tend to do less. It is consistent with the partisan interpretation of the findings on tax. The results are presented in the Appendix.

Table 4.6: RDD: Local tax rate changes

| Dependent variable:	Change in tax rates						
Treatment variable:	Left mayor 2014-2020						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Change in communal property tax 2014-18	0.402 (0.206)						
(Including Inter-communal rate)		0.538 (0.250)					
Change in communal income tax 2014-18			0.015 (0.217)				
(Including Inter-communal rate)				0.964 (0.678)			
Placebo: Change in communal property tax 2008-14					-0.056 (0.492)		
(Including Inter-communal rate)						-1.470 (1.521)	
Communal property tax rate in 2014							2.023 (2.331)
Robust Clustered CI (95%): lower bound	0.003	0.064	-0.490	-0.614	-1.251	-4.451	-2.002
Robust Clustered CI (95%): upper bound	0.901	1.168	0.515	2.376	0.947	1.511	7.665
Bandwidth (Estimate)	40.684	29.376	32.509	36.942	27.300	33.872	28.076
Bandwidth (Bias Correction)	65.306	46.958	46.731	51.888	35.098	47.085	35.082
Effective Number of Control	1534	1119	1232	1385	1055	1278	1079
Effective Number of Treatment	1090	866	952	1026	811	976	837
Total number of Observation	7466	7466	7466	7466	7460	7466	7466
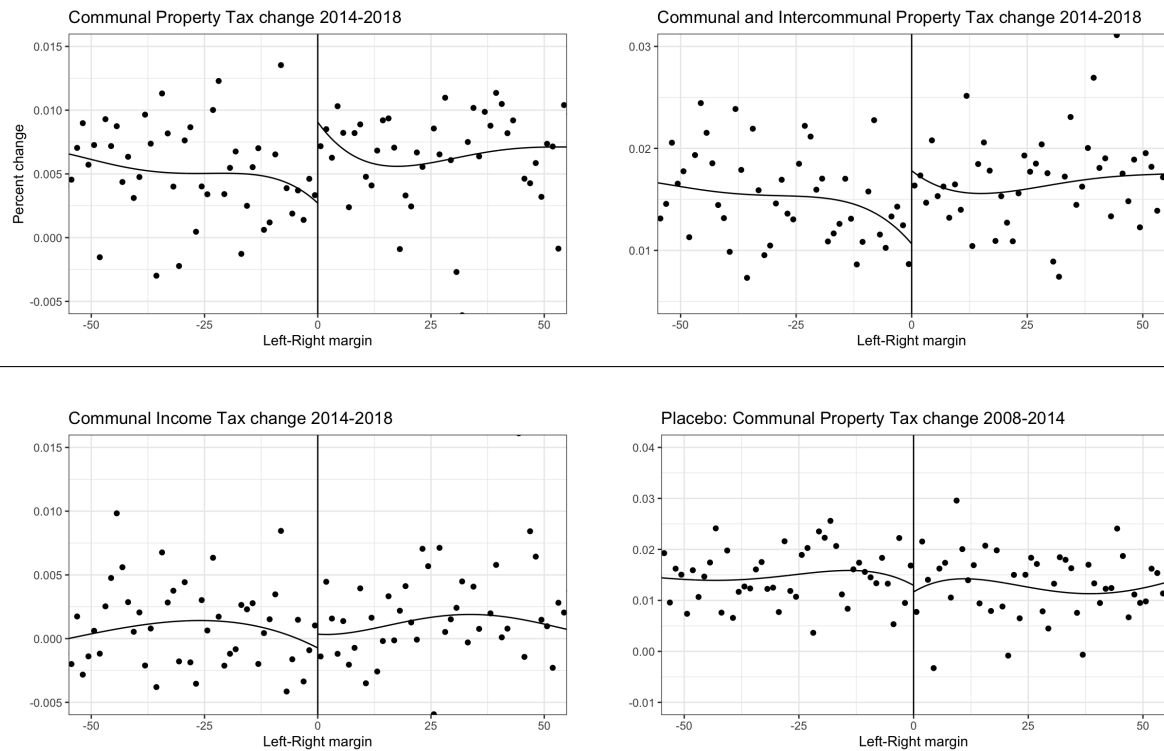
Figure 4.5: RD graphs for tax rate changes

If lower local property taxes and other related policies are instrumental in residential migration of the retired, then those who with higher tax burden will be more likely to respond. Owners of large homes are most likely to pay property taxes, and I expect them to be sensitive to local policy changes. At the same time, social housing occupants are unlikely to pay substantial property tax (Djaïz and Martin 2016). If the tax policies are one of the significant factors, I expect the former group to show a higher tendency to move into the Right-controlled municipalities than the latter does. The running variable of the RD analysis is the Left-Right margin in the 2014 municipal elections. The dependent variable is the propensity of a retired head of households to move into a new dwelling in the municipality. I used the 2016 housing census for this analysis.

Columns 1 to 3 in Table 4.7 show the results depending on homeownership characteristics. The partisan effect is significant for the retired who owned a house or rent a private apartment. However, those retired people who live in social housing do not seem to be migrating to the Right-controlled municipalities. Columns 4 to 6 break down the sample according to the size of the dwelling. The partisan effect is robust only for those who live in large dwellings with more than 5 rooms, shown in Column 6. Column 7 reports significantly large effects among those retired people who live in newly constructed dwellings. Albeit a tiny sample, the partisan gap of 3.8 percentage points is unusually large. The findings clearly support the hypotheses in that those retired people who would live in newly-built, larger homes are more responsive to the partisanship of the government.

The RD results in this section confirmed that the Right mayors tend to decrease property taxes or increase them with a smaller amount, while the Left mayors tend to

build more social housing. Retired people who live in recently-built larger dwellings are likely to move into the Right-controlled municipalities, while those who live in smaller units and social housing do not. This strongly supports the partisan presence of partisan sorting, which is the direct result of mayors' policy choices. OLS analysis on the mobility census data also shows that lower property tax is associated with higher in-migration of the retired. While the analysis cannot have a causal interpretation, it is consistent with the findings of this paper. The results of the OLS analysis are presented in the online appendix.

While my analysis in this section does not establish a causal effect of policies on the movement of voters, it strongly suggests that observable policy differences exist between the Right municipal governments and the Left governments after close municipal elections. The fact that both voter sorting and tax rate differences are observed for the partisan mayors in politically mixed places suggests that an essential part of the sorting is driven by local policy choices or anticipation of them.

Table 4.7: RD results for the retired: housing characteristics in the 2016 housing census

Dependent variable:	Moved into a new dwelling in the municipality in 2016						
Treatment variable:	Left mayor 2014-2020						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Head of Household - House characteristics:							
Retired - Owned House	-0.00097 (0.00039)						
Retired - Private Apartment		-0.00439 (0.00161)					
Retired - Social Housing			0.00102 (0.00121)				
Retired - Less than 2 rooms				0.00020 (0.00158)			
Retired - 3 to 4 rooms					-0.00088 (0.00059)		
Retired - More than 5 rooms						0.00108 (0.00410)	
Retired - House completed after 2014							-0.03803 (0.00597)
Robust Clustered CI (95%): lower bound	-0.00193	-0.00884	-0.00257	-0.00444	-0.00242	-0.00209	-0.05754
Robust Clustered CI (95%): upper bound	-0.00016	0.00180	0.00299	0.00323	0.00015	-0.00032	-0.03135
Bandwidth (Estimate)	15.227	16.551	12.252	15.142	17.888	14.506	18.711
Bandwidth (Bias Correction)	24.185	33.297	23.126	21.557	38.025	29.610	37.748
Effective Number of Control	337595	72417	51662	64913	285975	163125	6412
Effective Number of Treatment	260294	49202	39880	48085	199661	127328	4565
Total number of Observation	2785765	444677	373713	435608	1784714	1454712	38595

Conclusion

From Downs (1957), social scientists have thought of voters as static units, and politicians are supposed to gain the majority by various means, ranging from partisanship, ideology, and redistribution to scare tactics and machine politics. However, subnational politicians can affect the composition of voters, which may lead to different electoral calculations. The findings in this paper encourage political scientists to reconsider the present understanding of district-based politics in general.

This paper demonstrates that voters are responding to local politics and policies when they relocate. Retired people, who overwhelmingly support the Right, are attracted to the municipalities governed by the Right. The Right municipal governments, in turn, are likely to set lower property tax rates. Both of the effects are particularly strong when the Right mayors are narrowly elected.

The evidence remains suggestive regarding the intentionality of subnational politicians. However, policy-driven sorting poses several questions concerning local politics and democracy. The sorting process may compromise electoral accountability if people congregate in the municipality governed by their favorite mayor and are departing from the places that are ruled by their opponents. Unlike in the Tiebout model and its variations, underperformance and inefficiency may be sanctioned less frequently if the core supporters are gathered or bought off. Politicians may become less susceptive to the demand and the pressure from their opponents and more inclined to deviate from what the Median voter wants. It may add a new explanation for the extraordinarily high incumbency advantage of local elected leaders. Thus, the findings can make a significant contribution to the literature on political accountability.

Moreover, this mechanism may render some radical or divisive policies more viable for reelection, as the subnational mayors and governors face the voters more supportive of the incumbents' programs through the sorting process. Many policy options that are deemed economically inefficient, such as machine politics, clientelism, and corruption, could be a politically efficient way to secure reelection chances if the scale of sorting is significant. Voters who cannot easily move may suffer from this effect. Such a process could worsen the potential political polarization according to the geographic cleavage. As such, it is imperative to take political sorting into account for future research on polarization and accountability. Similar studies in the different electoral and federal arrangements and different partisan compositions may further advance the understanding of the cause and consequences.

Chapter 5

Conclusion of the dissertation

At first glance, the findings from the first and second paper may appear contradictory, as the government is blamed for its attempt to revamp the economy in the first, but the government gets a temporary support surge in the second case. However, the types of support the government provides are different. In the case of place-based policies, they are often infrastructure projects and other high-profile measures whose effectiveness is theoretically and empirically questionable. It is possible that they want the governmental support to survive the challenging phase but do not necessarily appreciate the governmental plan for the long-term economic revival.

In all three papers, people's reactions are far more nuanced than the conventional wisdom would suggest, and they tend to differ depending on the socioeconomic characteristics of the residents. Voters do not necessarily show simple and straightforward reactions, such as exodus to the low-tax locations or turning to populism after an economic shock hits the local economy. It appears that people attribute the responsibilities to the government more or less correctly in such difficult circumstances, and the economic interest of voters explains the second and third papers.

The second and third papers bring optimism in that people appear to react rationally to the local shocks. This straightforwardness makes the job of policymakers far easier, as they can concentrate on economically efficient policy options. However, the first paper brings back the dilemma in that there is not guaranteed success in the government action in declining regions.

The crucial common ground of the three papers, in addition to the topic, is that the findings are not in line with the conventional wisdom in the relevant academic fields. Place-based policies are often assumed to garner support in the area, factory closure is associated with anger and political populism, and policy-induced sorting was thought to be insignificant. With rigorous empirical design and careful treatment of the data, this dissertation claims that the literature in political science and urban economics has not found an answer to the critical geographic question today. It calls for further research in how changing economic geography interacts with the political landscape today.

While not all the mysteries have been solved regarding the residents' political behavior, future research should also pay attention to politicians' incentives and the effects of different policy measures. As advanced economies face a transition to a new phase of the economy, regional divergence in economic performance is inevitable to a certain extent.

However, how politics and policies respond to such challenges would transform how the politics and economy would be in each advanced economy, and it requires constant and close attention.

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.1 Appendix for *"Biting the Hands that Feed Them? Place-Based Policies and Decline of Local Support."*

Appendix A: Detailed information about the ESIF in the UK and the government-led regional development programs

European Regional Development Fund (ERDF) and European Social Fund (ESF) are the primary tools the EU uses to foster regional development in relatively advanced member states, which together are referred to as European Structural and Investment Funds (ESIF).[1]

ERDF covers most of the conventional regional development policies, such as the financial support for small and medium-sized enterprises, investment in infrastructure, transport, broadband, energy, business services, and information and communication technologies. Large firms are also eligible for the funding as long as the investment concerned is related to research and innovation, energy, environment, ICT, and cooperations with local small and medium-sized enterprises. Any regional development policies except for constructions of nuclear power stations, airports, manufacturing of tobacco, and undertaking of firms in difficulties can be applicable to the ERDF.

ESF financially support local employers, public authorities, and other training institutions to assist with employment and social inclusion, as well as vocational training and retraining. The eligible projects for ESF includes 1) Promoting employment and mobility, 2) Promoting social inclusion, combating poverty and any discrimination, 3) Education, training, vocational training, life long learning, 4) Institutional capacity for public authorities and stakeholders and efficient public administration.

Both for ERDF and ESF, the aid may take the form of grants, prizes, repayable assistance, other financial instruments, or a combination of them. While the EU assesses the applications and finances more than 50% of each approved project's expenditure, the national governments, local governments, and relevant private actors must co-finance the project to ensure their commitment.

In the UK, the Department for Business, Innovation, and Skills coordinates UK-wide policies of ESI. In England, the Ministry of Housing, Communities, and Local Government is responsible for ERDF, and the Department for Work and Pensions is for ESF. ESI stresses the importance of Community-led local development and encourages local actors, rather than the national governments, to come up with proposals. In England, the projects are evaluated and managed through the Local Enterprise Partnership (LEP) areas, while the Scottish and Welsh Governments and the Northern Ireland Executive are in charge of the delivery of ERDF and ESF in their own nations. Thus there are four layers of government involved in the ESI at the local, regional, national, and EU levels, but the EU is the predominant funder and often has the final say on the project approval.

Prior to the Brexit referendum in June 2016, the UK government scaled back the

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[1]   "Regulation (EU) No1303/2013 of the European Parliament and of the Council." *Official Journal of European Union* https://ec.europa.eu/digital-single-market/en/news/regulation-eu-no-13032013-european-parliament-and-council Accessed 24 August 2019

regional development policies under the broad framework of austerity programs. They abolished the Regional Development Agencies and put an end to earmarking except for school and public health grants in 2012, in exchange for the increase in autonomous tax revenues.[2] Even though the UK government changed its approach and unveiled two programs to foster regional development after the Brexit referendum, they are smaller in scale compared to the ESI schemes. The *Transforming City Fund*, similar to ERDF, allocated 1.28 billion Pounds for the five years from 2018/19 to 2022/23. The *Housing and Infrastructure Funds*, had 2.3 billion pounds for the four years between 2017/18 and 2020/21[3]. Those national schemes are primarily targeted at England and cover different policy areas[4], but it is clear that ERDF and ESF were vital sources for local development projects for local areas, especially in relatively struggling regions with limited autonomous tax revenues.

It is difficult to know the entire amount the UK government committed to de facto regional policies in addition to those funds presented in the main section, as there is no ministry to oversee regional development explicitly. In the national budget for the fiscal year 2019-20, the total amount allocated for *Business, Energy and Industrial Strategy* was 1.8 billion Pounds, and *Housing and Community* received 2.3 billion Pounds.[5] Part of them can be relevant to local development.

It was clear to the voters in the benefiting area that voting for Brexit in June 2016 would risk the continuation of these benefits. The exit of the UK from the EU indeed jeopardized the funding arrangement. In July 2018, more than two years after the referendum, the UK government finally committed to funding those who would have funded according to the EU rules[6], but until then, the status of the current ESI funding recipients was left uncertain. As of March 2020, there is no funding program secured for those who would have benefited from the ESI in the 2021-2027 budget cycle had the UK stayed in the EU.

It could be worth noting that the outcome variables in this paper measure one's approval or evaluation of the EU, and not local representatives.[7] It is possible that relatively well-informed, well-educated groups with high-socioeconomic status regard the entities that distribute those projects as wasteful or inefficient, but not their local representatives who managed to get the funding. While those regions are net beneficiaries of EU funds, the taxpayers do contribute to regional development projects all across the EU, and per-

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[2] Ferry, Martin, and John Bachtler. 2013. "Reassessing the concept of policy termination: the case of regional policy in England." *Policy Studies* 34(3): 255-273.

[3] Her Majesty's Treasury. 2018. "Copy of the Budget Report: October 2018" Ordered by the House of Commons to be printed, 29 October 2018

[4] Scottish, Welsh, and Northern Irish devolved governments are in charge of regional development programs in their respective nations.

[5] Her Majesty's Treasury. 2018. "Copy of the Budget Report: October 2018" Ordered by the House of Commons to be printed, 29 October 2018

[6] Her Majesties Treasury "Funding from EU programs guaranteed until the end of 2020" https://www.gov.uk/government/news/funding-from-eu-programmes-guaranteed-until-the-end-of-2020 accessed September 19, 2019

[7] The Members of the European Parliaments (MEPs) are elected in a block-level proportional representation system, and MEPs do not have strong mandates regarding specific projects in the area they represent.

ception of the local EU-funded projects and the EU's competence may affect the overall evaluation of the EU.

Appendix B: McCrary density test

Figure A1 and A2a show the McCrary density test results to show there is no manipulation of the running variable in the regression discontinuity design. Visually, there is no evidence that the eligibility border was manipulated. However, the treatment areas have slightly fewer respondents near the border than the control area. This could result from two rural treatment areas - West Wales and Scottish Highlands and Islands - having fewer respondents than the nearby control areas.

Figure A2b shows the McCrary density test without those who love nearby the border with these two rural regions. They do not show a discontinuity of unit numbers, and it appears that the distributions are smooth across the cut-point. In the robustness checks, I present the results without those two regions, and they are consistent with the main findings. The balance test with border fixed effects in Figure 2 of the Main paper did not show any discontinuity related to the urban-rural divide either.
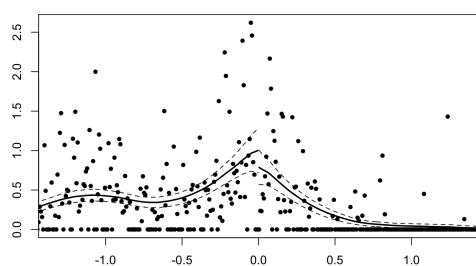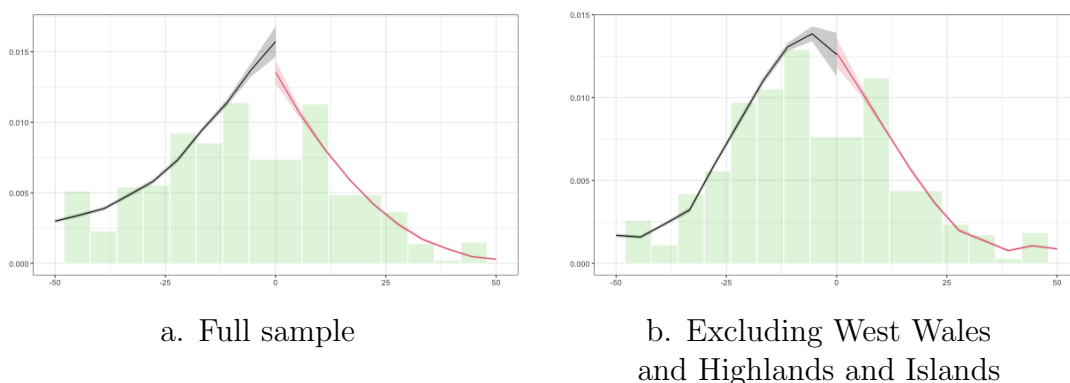
Figure A1: McCrary test (IK)

Figure A2: McCrary test (CCT)

a. Full sample

b. Excluding West Wales
and Highlands and Islands

Appendix C: Robustness checks with different covariates and clustering for RDD

Full demographic covariates for RDD include age, sex, ethnicity, social grade (6 categories), labor market status (full-time, part-time, inactive, retired, student, unemployed), Anglican Christian, non-christian, monthly church attendance, sexuality, marital status, homeownership, university degree, enrollment to any university, household size, being a parent, household income, past or current union membership, having a routine job, having preschool kids in the household, having school-age kids in the household, having sick elderly in the household, Facebook usage, and Twitter usage. Some of them include a substantial number of non-response.

Core demographic covariates include age, sex, ethnicity, social grade (6 categories), labor market status (Full-time, Part-time, inactive, retired, student, unemployed), Anglican Christian, non-christian, sexuality, marital status, enrollment to any university.

Geographic covariates include unemployment rate in 2016 (From Nomis Labor market statistics), its growth from 2008, the urban rate in 2011, population density in 2011, and Gross Domestic Household Income (GDHI) per capita in 2011 (From 2011 census). The linear distance to London is also included.

Border fixed effects use one of the seven different continuous borders (Scottish Highland, Lincolnshire and South/East Yorkshire, Lancashire and Durham (Southern border), Staffordshire and Herefordshire, Northumberland, Devon, Wales) to which the respondents is the closest. NUTS 2 regions are treatment unit, and individual respondents are located by their local authority areas, if it is not available, I used parliamentary constituencies.

Table A1 presents the results with different sets of covariates, and Table A2 uses different geographic unit for clustering to estimate variance. The effects are consistently negative and significant.

Table A1: Robustness checks with different covariates

Treatment variable:	Being in well-funded regions						
Dependent Variable:							
Approve EU: Wave 9	-0.179	-0.166	-0.111	-0.174	-0.140	-0.180	-0.187
	(0.031)	(0.026)	(0.025)	(0.024)	(0.024)	(0.031)	(0.031)
Border Fixed Effects		X	X	X	X	X	X
Geographic Covariates			X		X		X
Core Demographic Covariates				X	X	X	X
Full Demographic Covariates						X	X
Robust CI (Upper bound)	-0.141	-0.140	-0.067	-0.145	-0.107	-0.130	-0.117
Robust CI (Lower bound)	-0.284	-0.267	-0.193	-0.263	-0.220	-0.296	-0.288
Bandwidth (Estimate)	12.5km	16.5km	18.3km	16.7km	17.5km	20.2km	19.0km
Bandwidth (Bias Correction)	30.1km	31.4km	32.4km	31.7km	35.0km	31.0km	28.1km
Effective N. Controll	3743	4447	4581	4444	4578	2827	2630
Effective N. Treatment	2804	3232	3681	3228	3437	2134	1958

Table A2: Robustness Checks: Results with different units for clustering

Treatment variable:	Being in well-funded regions							
Dependent Variable:								
Approve EU: Wave 9	-0.138	-0.122	-0.180	-0.166	-0.180	-0.166	-0.152	-0.123
	(0.064)	(0.058)	(0.024)	(0.021)	(0.023)	(0.019)	(0.057)	(0.051)
Variance clustered at;								
NUTS 2 region level			X	X				
Nearest border level					X	X		
Parliamentary Constituency level							X	X
Standard errors not clustered	X	X						
Border fixed effects		X		X		X		X
Robust CI (Upper bound)	-0.011	-0.014	-0.159	-0.142	-0.159	-0.153	-0.049	-0.037
Robust CI (Lower bound)	-0.337	-0.316	-0.267	-0.254	-0.260	-0.241	-0.333	-0.300
Bandwidth (Estimate)	19.2km	21.9km	12.8m	17.3km	12.0km	16.6km	18.4km	21.7km
Bandwidth (Bias Correction)	33.2km	36.4km	30.5km	31.8km	30.5km	33.5km	32.1km	35.4km
Effective N. Controll	5080	5670	3917	4576	3336	4447	4764	5619
Effective N. Treatment	3865	4121	2804	3512	2801	3232	3865	4121

Appendix D: Robustness checks with different definitions of well-funded regions

As most of the UK regions had the GDP per capita below the EU average in 2011, most of the *More developed regions* are not far from the cut-off line of the 90%, and relatively comparable with the *Transition regions*. Nine NUTS 2 regions in the UK had the GDP per capita between 90% and 92% in 2011 and marginally missed out the *Transition regions* status, while another eleven regions had the GDP per capita between 93% and 100%. Most of them are geographically adjacent to the *Transition regions*. In 2011, the 90% threshold of GDP per capita corresponded to 23,580 Euros. The UK region of Dorset and Somerset had a GDP per capita of 23,600 Euros and categorized as *More developed regions*. The neighboring region of Devon recorded 22,500 Euros and was categorized as *Transition regions*. The small differences put them in very different positions regarding ESI funding availabilities. The only exception within the UK is Merseyside, which had 23,700 Euros, 120 Euros above the cut-off threshold. The area was previously categorized as an exception as "phasing in" region. In the following empirical analysis, the results without Merseyside are presented.

As robustness checks, Table A3 presents the RD results for the EU approval, using different definitions of "well-funded regions". As noted in the earlier section, Merseyside was selected as *Transition regions* even though the GDP per capita in 2011 was above the 90% threshold, while Cornwall, West Wales, and Scottish Highlands and Islands were treated as *Convergence regions* in the previous EU budget cycle. I dropped the respondents in those areas, and the result did not change significantly.

Table A3: Robustness Checks: Results excluding Merseyside, Cornwall, West Wales, and Scottish Highlands

Dependent Variable:	Approve EU: Wave 9 (1 Strongly disapprove - 5 Strongly approve)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment Variable:							
Being in Well-funded region	-0.173	-0.169	-0.158	-0.180	-0.149	-0.154	-0.141
	(0.030)	(0.033)	(0.034)	(0.031)	(0.031)	(0.032)	(0.039)
Sample Excluding:							
- Merseyside (Political assignment)		X			X		X
- West Wales and Cornwall (*Less Developed Regions*)			X		X	X	X
- Highlands and Islands (Former *Convergence area*)				X		X	X
Robust Confidence Interval (Upper bound)	-0.134	-0.117	-0.046	-0.143	-0.078	-0.109	-0.069
Robust Confidence Interval (Lower bound)	-0.272	-0.272	-0.387	-0.286	-0.241	-0.261	-0.263
Bandwidth (Estimate)	13.7km	15.6km	18.0km	12.5km	19.3km	13.5km	15.0km
Bandwidth (Bias Correction)	31.2km	32.0km	37.3km	29.7km	32.0km	30.3km	27.5km
Effective N. Controll	4058	4445	4306	3738	5032	3908	4326
Effective N. Treatment	2854	2734	2989	2804	2855	2352	2017
Note:						*p<0.05; **p<0.01; ***p<0.001	

Appendix E: Robustness checks with arbitrary bandwidth, different order of the local polynomial, and kernel

The results with arbitrary bandwidth (20km, 30km, 40km, 50km) instead of CCT, different order of polynomial for point estimation (2, 3) and bias correction (3, 4), as well as the results using different kernel (Uniform and Epanechnikov) are presented in the Table A4. They are all consistent with the main findings.

Table A4: Robustness Checks: Results with Arbitrary Bandwidth and kernel (Geographic RD)

Treatment variable:	Being in well-funded regions							
Bandwidth	20km	30km	40km	50km	CCT	CCT	CCT	CCT
Polynomial order of:								
Point estimator	1	1	1	1	2	3	1	1
Bias correction	2	2	2	2	3	4	2	2
Kernel	Triangular						Uniform	Epanechnikov
Dependent Variable:								
Approve EU: Wave 9	-0.138	-0.092	-0.081	-0.067	-0.170	-0.246	-0.096	-0.159
	(0.022)	(0.017)	(0.015)	(0.014)	(0.028)	(0.042)	(0.039)	(0.025)
Border Fixed Effects	X	X	X	X	X	X	X	X
Robust CI (Upper bound)	-0.161	-0.129	-0.093	-0.092	-0.122	-0.130	-0.072	-0.131
Robust CI (Lower bound)	-0.327	-0.251	-0.195	-0.179	-0.254	-0.296	-0.238	-0.252
Bandwidth (Estimate)	20km	30km	40km	50km	34.2km	38.5km	9.4km	16.9km
Bandwidth (Bias Correction)	20km	30km	40km	50km	54.2km	59.3km	27.6km	31.8km
Effective N. Controll	5243	7082	8224	9312	7919	8185	2240	4447
Effective N. Treatment	3984	5118	5353	5683	5239	5353	2071	3439

Appendix F: Difference-in-differences results with different definitions of well-funded regions

Table below presents initial difference-in-differences results in England, using the approval of the EU in Wave 2 and Wave 9 as a dependent variable. Scotland and Wales have their own devolved regional development policies and excluded from the initial results. Being in the *Transition regions* had negative effects on the respondents' evaluation of the EU in Wave 9, the effects ranging from -0.21 to -0.28 points in the 5-point scale. The effects are missing in Wave 2, suggesting that the negative effects appeared after most of the EU-funded projects started. Removing Merseyside or adding Cornwall - the only English region in *Less developed regions* category - did no make meaningful changes in all the specifications. As there was no data before January 2014, this section does not have the pre-trend analysis.

Table A5: Initial results: Difference-in-differences in England with different definitions of "well-funded regions"

Dependent variable:	Do you approve or disapprove of the job that the EU is doing? (Wave 2 and 9) (1 Strongly disapprove - 5 Strongly approve)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Being in *Transition Regions** Post-treatment (Wave 9)	-0.21332*** (0.04931)	-0.24239*** (0.05740)	-0.2802*** (0.05412)						
Being in *Transition Regions** Post-treatment (Except Merseyside)				-0.21791*** (0.0537)	-0.23665*** (0.05873)	-0.2842*** (0.05511)			
Being in *Transition Regions* or *Less Developed Regions** Post-treatment (Including Cornwall)							-0.21480*** (0.04928)	-0.24443*** (0.05739)	-0.2543*** (0.05763)
Being in *Transition Regions*	0.02817 (0.04251)	0.08841 (0.04762)	0.07054 (0.04256)						
Being in *Transition Regions* (Except Merseyside)				0.02771 (0.04350)	0.08385 (0.04884)	0.06934 (0.04329)			
Being in *Transition Regions* or *Less Developed Regions* (Cornwall)							0.02878 (0.04249)	0.08919 (0.04763)	0.08536 (0.05060)
Full Demographic Covariates	N	Y	Y	N	Y	Y	N	Y	Y
Full Geographic Covariates	N	N	Y	N	N	Y	N	N	Y
Adjusted R squared	0.03928	0.08014	0.07666	0.03972	0.08381	0.07804	0.03933	0.08042	0.0833
Number of observation	17535	9919	8160	16924	9566	7876	17569	9935	9610
Note:								*p<0.05; **p<0.01; ***p<0.001	

Appendix G: Two-stage least square analysis with per-capita EU funding

The differences in the eligibility status should result in the greater scope and amount of the EU funding, but the connection between the funding amount itself and the support for the EU is not established. I conducted a two-stage least square analysis to confirm the observed effect via more funding, using the well-funded region as the instrument variable and per-capita funding as the treatment variable. Per-capita funding data is only available at the NUTS-2 level for the seven-year period between 2014 and 2020, not at the local authority level or annually, so this is only a rough proxy of the scale of the EU funding budget the region actually received by Wave 9. Table A6 reports that being in well-funded region does result in higher per capita EU funding for regional policies, and higher per-capita EU funding is associated with lower approval of the EU.

Table A6: 2SLS results: Eligibility status and per-capita funding

	First stage		Second stage	
Dependent variable:	Per capita EU Funding in 2014-2020 (EUR) in their local area		Approval of the EU (Wave 9) (5 levels)	
Treatment Variable:				
Being in well-funded region	245.739*** (2.484)	254.4697*** (3.4840)		
Estimated $Percapita\hat{E}UFunding$ (in 100 Euro)			-0.05089** (0.006442)	-0.02483** (0.007984)
Full Demographic Covariates		X		X
Full Geographic Covariates		X		X
Nation Fixed Effects	X	X	X	X
Adjusted R squared	0.2589	0.2785	0.002187	0.1031
N. Observation	28015	14872	28015	14872

Note: *p<0.05; **p<0.01; ***p<0.001

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Appendix H: Subset analysis with age and labor market status

People who voted to leave the EU in the referendum were on average older, so this group may react more strongly against the projects compared to the younger group with university degrees, who tend to be more supportive of the EU projects.

Subset analysis with labor market status and age groups are presented in Table A7, but they show no specific trend associated with the regional discontinuity. Students and people under 34 in well-funded areas did not show negative results, but those aged 35-49 and in full-time jobs show more negative attitudes toward the EU than those over 65 or the pensioners did.

Table A7: Subset Results (Geographic RD: CCT bandwidth)

Treatment variable:	Being in well funded regions							
Dependent variable:	Do you approve or disapprove of the job that the EU is doing? (Wave 9: 5 levels)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age group of the respondent:								
Over 65	-0.191***							
	(0.032)							
50-64		-0.067*						
		(0.027)						
35-49			-0.472***					
			(0.047)					
Under 34				0.128				
				(0.087)				
Labor market status of the respondent:								
Full-time job					-0.180***			
					(0.040)			
Student						0.040		
						(0.298)		
Inactive							-0.144*	
							(0.070)	
Retired								-0.057**
								(0.020)
Border Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Robust Confidence Interval (Upper bound)	-0.140	-0.004	-0.421	0.347	-0.109	0.779	0.062	-0.014
Robust Confidence Interval (Lower bound)	-0.292	-0.147	-0.646	-0.123	-0.327	-0.867	-0.282	-0.122
Bandwidth (Estimate)	14.8km	19.8km	16.9km	22.5km	21.9km	21.5km	19.3km	20.4km
Bandwidth (Bias Correction)	30.6km	34.3km	33.2km	36.1km	36.2km	33.5km	32.9km	34.4km
Effective N. Controll	1180	1781	1018	872	2077	140	412	1757
Effective N. Treatment	893	1387	724	642	1394	116	339	1440

Note: *p<0.05; **p<0.01; ***p<0.001

Appendix I: Matching results; Nearest-neighbor matching and matching with 20km buffer

For matching, used full demographic covariates include age, sex, ethnicity, social grade (6 categories), labor market status (full-time, part-time, inactive, retired, student, unemployed), Anglican Christian, non-christian, monthly church attendance, sexuality, marital status, homeownership, university degree, enrollment to any university, household size, being a parent, household income, past or current union membership, having a routine job, having preschool kids in the household, having school-age kids in the household, having sick elderly in the household, Facebook usage, and Twitter usage. Some of them include a substantial number of non-response.

The main section used the Genetic matching algorithm, but the following section reports the results using nearest-neighbor matching instead of genetic matching, as well as the results that count projects in a 20 km buffer area outside the local authorities. All the negative and significant results in this section are robust and consistent in those different specifications.

Table A8: Nearest neighbor matching result: Project type in local area and the evaluation of the EU

Panel A: Wave 9 with nearest-neighbor matching						
Dependent variable:	Do you approve or disapprove of the job that the EU is doing? (Wave 9: 5 levels)					
Infrastructure and Transport	-0.06408* (0.02800)					
SME support / Business development / Industrial parks		-0.05850* (0.02280)				
Climate change measures, Biodiversity, Renewable energy			-0.02650 (0.03091)			
Community-led local development				-0.03151 (0.04581)		
Information and Communication, ICT					-0.04951 (0.03369)	
Research and Innovation, Technology transfer						-0.02788 (0.02667)
Number of Matched Observations	6334	9844	5356	2410	4522	7244

Panel B: Wave 9 with 20 km buffer and nearest-neighbor matching						
Dependent variable:	Do you approve or disapprove of the job that the EU is doing? (Wave 2: 5 levels)					
Infrastructure and Transport	-0.12105*** (0.02339)					
SME support / Business development / Industrial parks		-0.31715*** (0.02865)				
Climate change measures, Biodiversity, Renewable energy			-0.04686* (0.01900)			
Community-led local development				-0.02755 (0.02516)		
Information and Communication, ICT					-0.04983* (0.02321)	
Research and Innovation, Technology transfer						-0.15109*** (0.02543)
Number of Matched Observations	9250	6014	14212	8130	9470	7808

Note: *p<0.05; **p<0.01; ***p<0.001

Table A9: Nearest-neighbor Matching result: Recipient type in local area and the evaluation of the EU

Dependent variable:	Approve EU (W9)							
	Without 20km buffer				With 20km buffer			
Recipient type:								
Local and Regional Council	-0.06970*** (0.02367)				-0.30608*** (0.02809)			
Private Firms / Chamber of Commerce		-0.04855 (0.02744)				-0.09279*** (0.02369)		
Nonprofit Organizations and Trusts			-0.01812 (0.03891)				-0.03518 (0.01934)	
Universities				-0.03191 (0.02926)				-0.03191 (0.02926)
N. of Matched Observations	9008	6754	3420	6078	6310	9072	13700	6078

Note: *p<0.05; **p<0.01; ***p<0.001

Appendix J: Discussion on the findings of Colantone and Stanig (2018)

Colantone and Stanig (2018) demonstrated that the local job loss due to the globalized competition was causing the local residents to vote for Brexit. One needs to disentangle locations of place-based policies and deindustrialization. While Colantone and Stanig used the shift-share instrument to identify the causal mechanism, for the purpose of this paper, it just needs to be established that local job loss or deindustrialization is not the confounding factors with respect to the EU funding scheme.

I use the actual job losses in the local or nearby areas in order to control for the effect of deindustrialization. For this purpose, first, I added the following figures as the geographical covariates; the manufacturing employment growth and routine job growth in 2014-2016, as well as in 2008-2014 following the 2008 recession. I checked the increase in unemployment in these periods as well. All the data are at the local authority level. In addition, I collected the articles, including the keywords "factory closure", "plant closure", "factory close", and "plant close" from the homepages of BBC and their regional branches, dating back to 1999. Then I selected the case of factory closures with more than 100 local job losses, including transfer to other regions. I located all the 279 factory closures on the maps at the plant level, then categorized them into pre-Brexit and post-Brexit closures by the announcement date. I checked if the BES respondents' local authorities had major factory closures before the Brexit, which I used as the main covariates in this section. The map of factories is presented below as Figure A6.

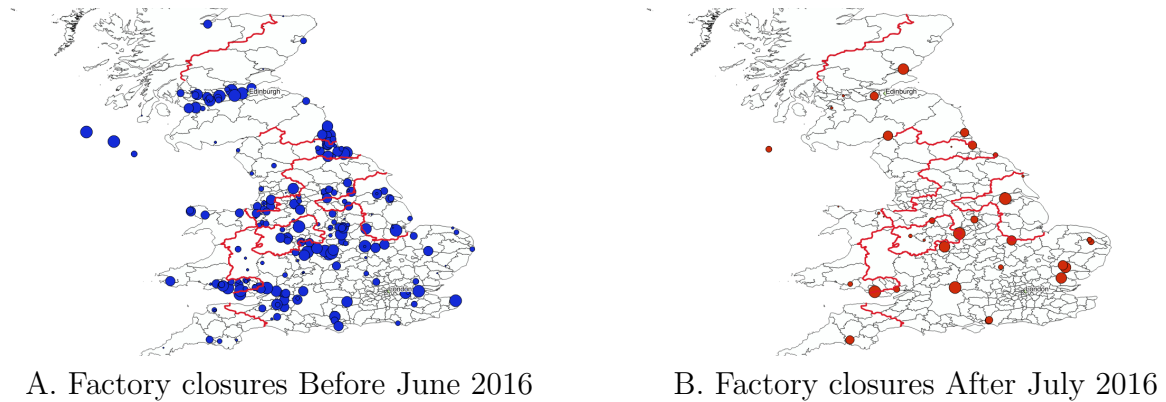| A. Factory closures Before June 2016 | B. Factory closures After July 2016 |

Figure A3: Factory closures with more than 100 job losses since 1999

The detailed labor market data were not available for some local authorities, so the sample is slightly different from the main analysis. The following Table A10 presents the analysis with deindustrialization indicators. While including such covariates did increase the standard errors, the magnitude of coefficients did not move significantly from the main results, and the effects are negative and significant for all the models.

Table A10: Check with local factory closures and manufacturing job loss.

Dependent Variable:	Approve EU: Wave 9 (1 Strongly disapprove - 5 Strongly approve)			
	(1)	(2)	(3)	(4)
Treatment Variable:				
Being in Well-funded region	-0.164	-0.149	-0.169	-0.146
	(0.071)	(0.074)	(0.073)	(0.073)
Factory closures before BES	X	X		X
Factory closures between W1 and W7	X	X		X
Manufacturing job loss 2008-2014			X	X
Manufacturing job loss 2014-2016			X	X
Routine job loss 2008-2014			X	X
Routine job loss 2014-2016			X	X
Δ Unemployment 2008-2014		X	X	X
Δ Unemployment 2014-2016		X	X	X
Full Geographic Covariates	X	X	X	X
Full Demographic Covariates	X	X	X	X
Border Fixed Effects	X	X	X	X
Robust Confidence Interval (Upper bound)	-0.010	-0.007	-0.005	-0.007
Robust Confidence Interval (Lower bound)	-0.398	-0.413	-0.410	-0.410
Bandwidth (Estimate)	23.0km	22.1km	22.3km	22.3km
Bandwidth (Bias Correction)	35.0km	33.4km	33.6km	33.8km
Effective N. Controll	3060	2948	2948	2948
Effective N. Treatment	2326	2085	2137	2137

Appendix K: RD graphs

The main analysis uses CCT bandwidth with Border fixed effects and clustered standard errors. The following visual representations of the RD graphs do not necessarily match the results in the main tables, but they reflect the general tendencies observed in the main results.

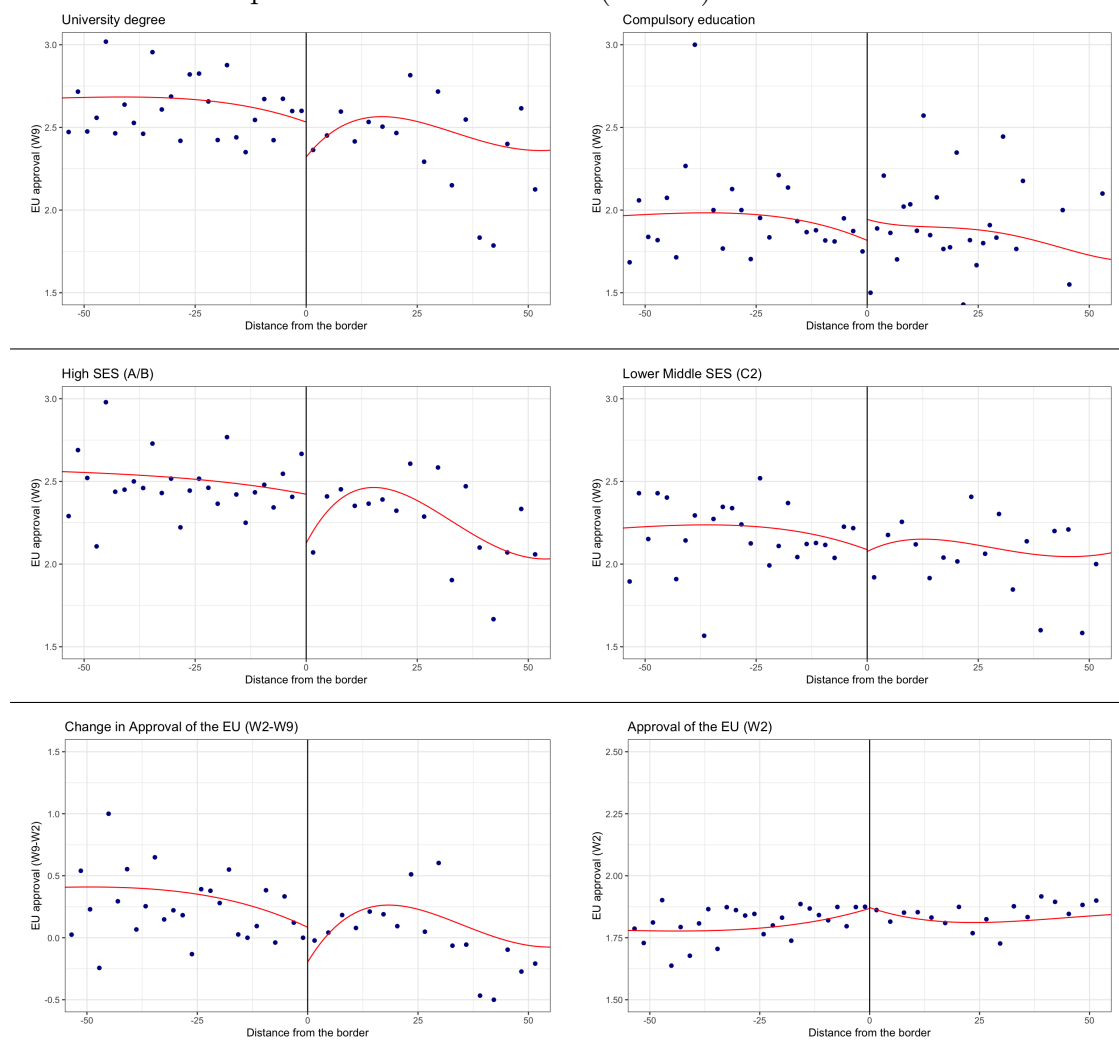RD Graphs on Evaluation of EU (Wave9): Education and SES

Figure A4: RDD graphs

Appendix L: Examples of ESIF-funded projects

As noted, there are many different types of the project, and it is difficult to summarize. Nonetheless, the following visual images and represents some of the typical projects funded by the ESIF and its billboards.

Recipient of funds	Name of Project	Fund	Investment £m
Hitachi Europe Ltd	Smart Energy Islands	ERDF	8637179
Cumbria Chamber of Commerce & Industry Ltd	Cumbria Growth hub	ERDF	2326133
Leeds City Council	Stourton Park & Ride Smart Energy Grid	ERDF	3185419.75
Canal & River Trust	Titford Pools & Canal Improvement Project	ERDF	1015000
Teeside University	Digital Skills for Growth	ESF	521510
Strategic Employer Engagement in Devon	Strategic Employer Engagement in Devon	ESF	578961

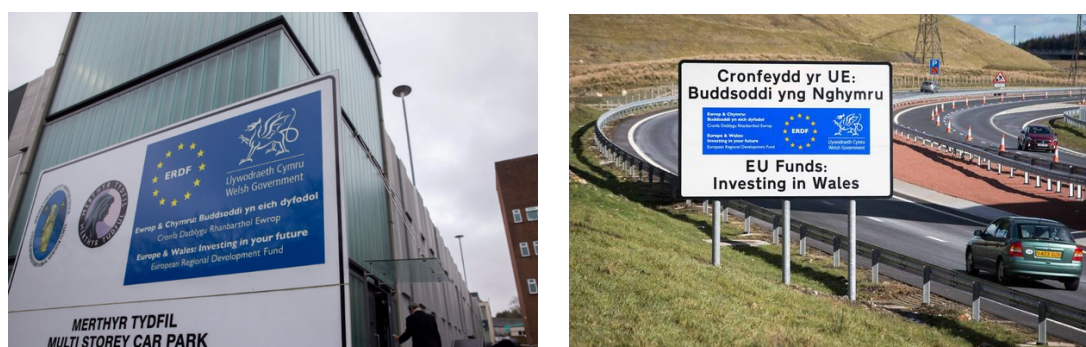Figure A5: Example of typical ESIF funding recipients and projects

Figure A6: Example of the EU Funded Projects and Billboards (From Wales online: https://www.walesonline.co.uk/news/politics/how-much-money-wales-gets-12765100)

Online Appendix M: Geographic distribution of ERDF recipients in England

As discussed in the main sections, I have the addresses of managing authorities and not the end recipients. Nonetheless, comparing the locations of beneficiaries of infrastructure or climate change projects and those of research and innovation projects reveal that more developed regions (e.g., South East) hardly get the EU funding for conventional place-based policies.
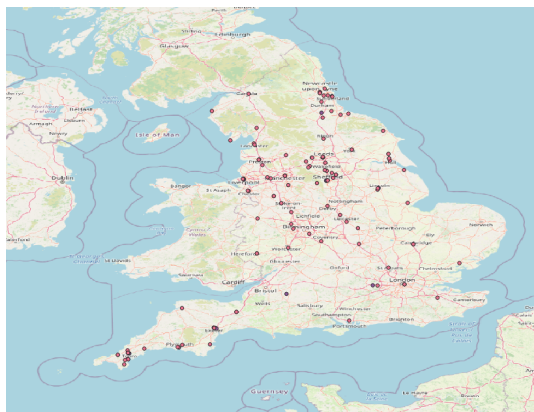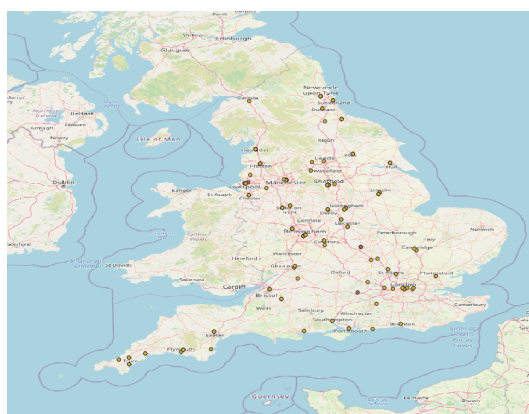

A. Recipients of EU-funded
infrastructure and development projects
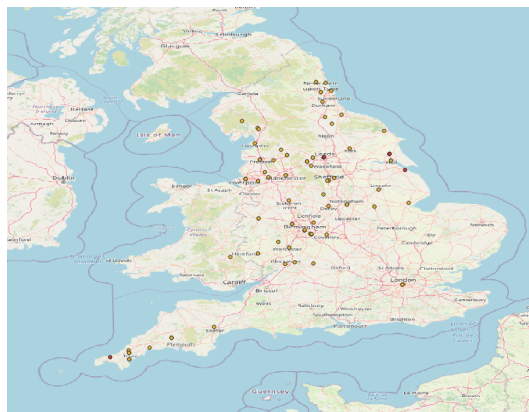
B. Recipients of EU-funded
climate change, energy, renewables projects
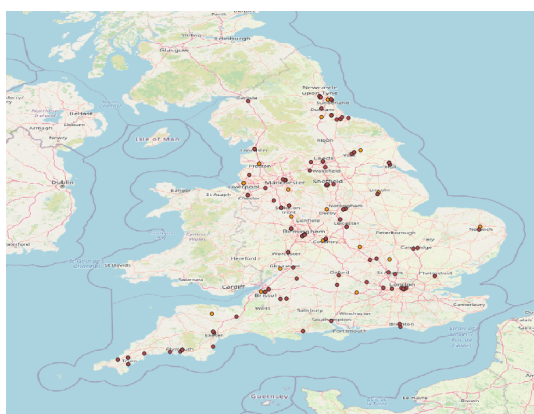
C. Recipients of EU-funded
research and innovation projects

D. Recipients of EU-funded
projects for universities

Figure A7: Geographic distribution of the Recipients of ERDF Funding in England (Not equal to project location)

.2 Appendix for "*Choosing Voters?*
Partisan Sorting of Voters following
Close Municipal Elections in France."

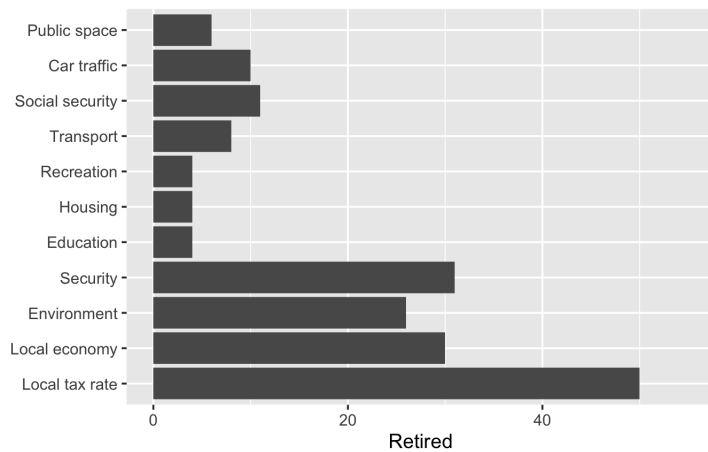**Appendix a: Vote deciders in the 2014 municipal elections, according to the IFOP exit poll**

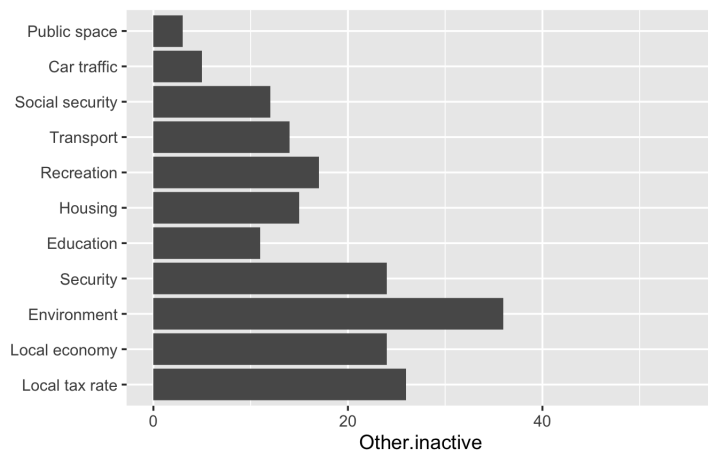Figure B1: Retired: Vote deciding issues (%)

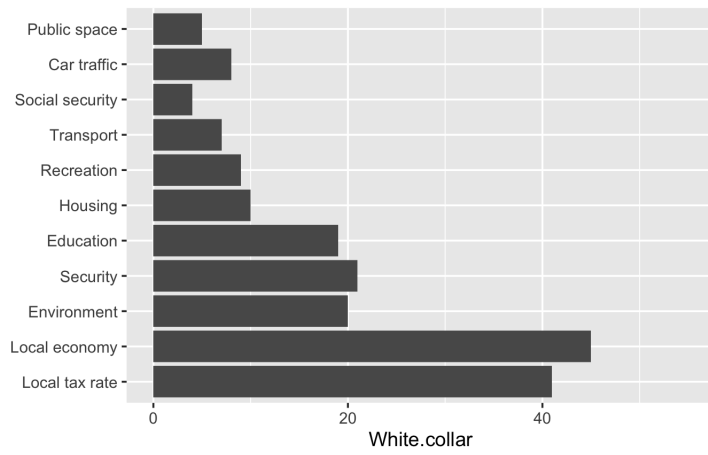Figure B2: Other Inactive: Vote deciding issues (%)
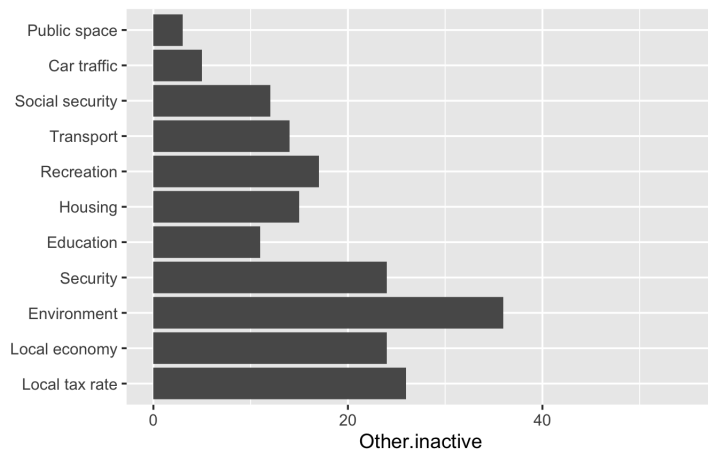
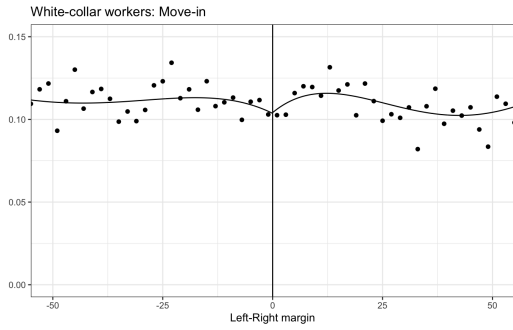Figure B3: White-collar: Vote deciding issues (%)
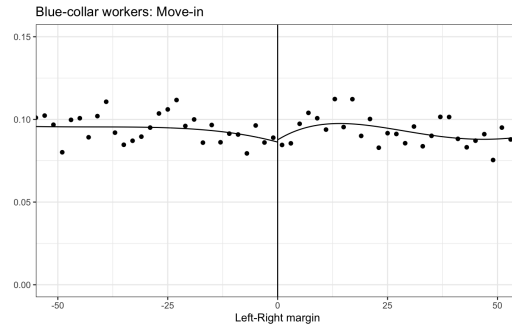

Figure B4: General average: Vote deciding issues (%)
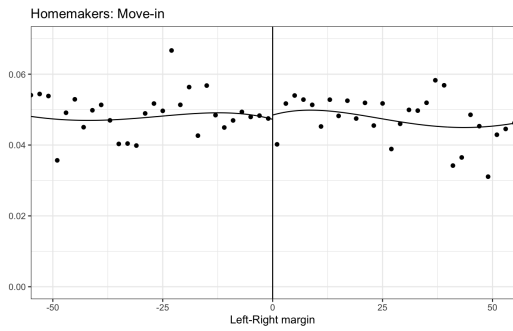
Appendix b: RD graphs for non-retired groups

A. White-collar workers: Move-in

B. Blue-collar workers: Move-in

C. Homemakers: Move-in
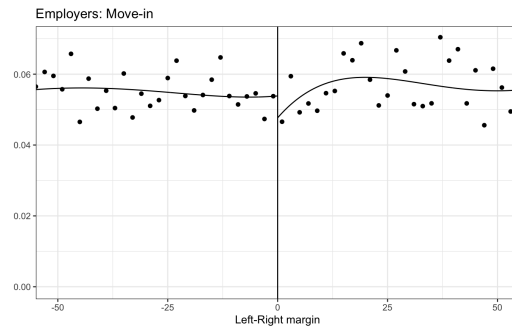
D. Employers: Move-in

Figure B5: RD graphs for the propensity of an non-retired individual to move in in 2015

Appendix c: RD results with IK bandwidth

Table B1: RD Results with IK bandwidth: Propensity of a retired person to move in / out

Dependent variable:	Moved into the Municipality in 2015				Moved out from the Municipality in 2015			
Treatment variable:				Left mayor 2014-2020				
Move-in:								
Retired	-0.03906 (0.007533)							
Retired: Aged 65 - 79		-0.04120 (0.008751)						
Retired: under 64			-0.03110 (0.008978)					
Retired: over 80				-0.006536 (0.008411)				
Move-out:								
Retired					0.007811 (0.009148)			
Retired: Aged 65 - 79						0.004218 (0.004974)		
Retired: under 64							0.007811 (0.009148)	
Retired: over 80								0.001128 (0.008476)
Bandwidth	0.4276	0.3999	1.144	1.0635	0.9734	0.7695	0.9734	0.9066
Effective Number of Observation	22692	11528	10974	11850	9008	19118	9008	10254

Appendix d: RD results with arbitrary bandwidths

Table B2: RD Results with arbitrary bandwidth: Propensity of a retired person to move in

Dependent variable:	Moved into the Municipality in 2015					
Treatment variable:	Left mayor 2014-2020					
Retired	-0.007576	-0.002490	-0.004034	-0.001397	-0.002435	-0.002969
	(0.0021653)	(0.0014841)	(0.0009768)	(0.0005984)	(0.0004525)	(0.0003780)
Bandwidth	2.5	5	10	25	50	100
Effective Number of Observation	143187	300007	549746	1156271	2006789	2495283

Appendix e: Analysis on the government turnover and migration pattern

To supplement the regression discontinuity analysis, here I present the corroborating evidence focusing on the change of the governments, with standard OLS analyses with departmental fixed effects. I checked if the Left gain from the Right and the Right gain from the Left in 2014 affected the migration pattern of retired people in 2015. I controlled for various factors, including logged population, unemployment rate, the share of agriculture employment, industry employment, commuters, migrants, as well as per capita figures of childbirth, housing vacancy, number of health centers, care homes, daycare facilities, tennis courts, and business establishments. The results reported in Table 11 indicate that the retired are more likely to move to the newly Right-controlled municipalities and less likely to move to the newly Left-controlled ones. The effect is particularly significant when the Right gained the municipality from the Left. As observed in the main results, the effects of the new government are greater when I use the subsample of the municipalities with relatively close elections.

Table B3: OLS with Departmental Fixed Effects: Government Turnover and Propensity of retired people to move in

Dependent variable:	Propensity of retired people to move in							
Sample:	Whole sample				— Cities with electoral margin smaller than 10% —			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Election result 2014:								
Left gain	−0.002*		−0.003*		−0.012*		−0.008	
	(0.001)		(0.001)		(0.005)		(0.005)	
Right hold	0.005**		0.003*		0.003**		0.002*	
	(0.0003)		(0.001)		(0.0003)		(0.001)	
Right gain		0.006**		0.007**		0.017**		0.022**
		(0.001)		(0.001)		(0.003)		(0.003)
Left hold		−0.006**		−0.004**		−0.003**		−0.002**
		(0.0003)		(0.0003)		(0.001)		(0.001)
Covariates	NO	NO	YES	YES	NO	NO	YES	YES
Department FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,194,070	2,194,070	2,194,070	2,194,070	499,275	499,275	499,275	499,275
R^2	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004
Adjusted R^2	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003
Residual Std. Error	0.162	0.162	0.162	0.162	0.158	0.158	0.158	0.158
Degree of freedom	2193975	2193975	2193968	2193968	499188	499188	499181	499181

Note:	*p<0.05; **p<0.01; ***p<0.001

Appendix f: RDD balance test of municipal covariates: CCT bandwidth

Table B4: Balance test of municipality level covariates: CCT bandwidth

Treatment variable:				Left mayor 2014-2020				
Agriculture Share	-0.00530 (0.00929)							
Share of Population under 15		0.00035 (0.00370)						
Share of Migrants			-0.00296 (0.00797)					
Share of Commuters				0.01107 (0.01836)				
Unemployment					-0.00695 (0.00618)			
Median Salary (Euro)						-0.14657 (0.32180)		
Log Population							-0.07829 (0.15992)	
Share of those who moved in in 2015								0.00140 (0.00202)
Robust Clustered CI (95%): lower bound	-0.02824	-0.00683	-0.02046	-0.03250	-0.02153	-0.96254	-0.43297	-0.00334
Robust Clustered CI (95%): upper bound	0.01486	0.00761	0.01688	0.05295	0.00771	0.58731	0.32938	0.00592
Bandwidth (Estimate)	20.647	26.588	23.523	28.398	21.320	21.142	18.202	28.391
Bandwidth (Bias Correction)	27.581	39.816	29.974	42.229	30.748	30.827	25.901	39.284
Effective Number of Control	834	1044	929	1101	861	665	732	1101
Effective Number of Treatment	670	813	751	864	686	489	586	860
Total number of Observation	7584	7584	7584	7584	7530	4362	7584	7584

Note: All the data is from the 2015 census

Appendix g: RDD balance test of municipal covariates: IK bandwidth

Table B5: Balance test of municipality level covariates: IK bandwidth

Treatment variable:	Left mayor 2014-2020							
Agriculture Employment Share	-0.00657 (0.01507)							
Share of Population under 15		0.01471 (0.01350)						
Share of Migrants			-0.00425 (0.01851)					
Share of Commuters				0.00702 (0.04677)				
Unemployment					-0.02331 (0.01575)			
Median Salary (Euro)						0.3636 (0.5106)		
Log Population							-0.2357 (0.2143)	
Share of those who moved in in 2015								0.001460 (0.009270)
Bandwidth	1.9811	1.598	1.7630	2.544	1.5165	5.477	4.342	1.0189
Effective Number of Observation	144	121	132	195	112	341	356	87

Note: All the data is from the 2015 census
Note: *p<0.05; **p<0.01; ***p<0.001

Appendix h: Summary statistics: Election results

Table B6: Summary statistics: Election results

Statistic	N	Mean	St. Dev.	N	Mean	St. Dev.
	2014 Election vote share (First round) —			2008 Election vote share (First round)		
Left	9,854	29.458	32.805	2,966	42.514	23.723
Right	9,854	40.824	35.425	2,966	41.595	22.481
2008-2014 govenment change:						
Left gain		0.016	0.126	Right gain	0.068	0.253

Appendix i: Summary statistics: Demographic variables in the 2015 Mobility census

Table B7: Summary statistics: individual-level demographic data for the 2015 mobility census

	Mean		Mean
Retired	0.255	Age	44.560
Blue-Collar Workers	0.114	Female	0.529
White-Collar Worlers	0.149	Homeowner	0.544
Independent worker	0.029	Social Housing Occupants	0.177
Employer	0.020	Foreign-born	0.092
Homemaker	0.028	Single	0.219
Apprentice	0.011	Couple	0.267
Limited-contract workers	0.041	No household member working	0.173
Unemployed	0.080	Moved in a year	0.078