
June 2018 No.381

# Did Austerity Cause Brexit?

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## WORKING PAPER SERIES

Centre for Competitive Advantage in the Global Economy

Department of Economics


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July 22, 2018

**Abstract**

Did austerity cause Brexit? This paper shows that the rise of popular support for the UK Independence Party (UKIP), as the single most important correlate of the subsequent Leave vote in the 2016 European Union (EU) referendum, along with broader measures of political dissatisfaction, are strongly and causally associated with an individual's or an area's exposure to austerity since 2010. In addition to exploiting data from the population of all electoral contests in the UK since 2000, I leverage detailed individual level panel data allowing me to exploit within-individual variation in exposure to specific rules-based welfare reforms as well as broader measures of political preferences. The results suggest that the EU referendum could have resulted in a Remain victory had it not been for a range of austerity-induced welfare reforms. These reforms activated existing economic grievances. Further, auxiliary results suggest that the underlying economic grievances have broader origins than what the current literature on Brexit suggests. Up until 2010, the UK's welfare state evened out growing income differences across the skill divide through transfer payments. This pattern markedly stops from 2010 onwards as austerity started to bite.

**Keywords**: Political Economy, Austerity, Globalization, Voting, EU
**JEL Classification**: H2,H3,H5, P16, D72

*University of Warwick and CAGE, Department of Economics, Coventry CV4 7AL, United Kingdom, t.fetzer@warwick.ac.uk. Section 3 of this paper draws on material from an earlier (retired) working paper entitled "Why an EU referendum? Why in 2016" which is joint with Sascha O. Becker. I would like to thank Chris Anderson, Sascha O. Becker, Jon de Quidt, Stephan Heblich, Robert Gold, Sergei Guriev, James Fenske, David Latin, Massimo Morelli, Dennis Novy, Kevin O'Rourke, Debraj Ray, Dani Rodrik, Chris Roth, Katia Zhuravskaya and seminar audiences at Copenhagen Business School, University of Warwick and the Ifo Institute as well as participants of the CESifo workshop on Globalisation and Populism: Past and Present for valuable comments. Ivan Yotzov and Vlad Petcovici provided excellent research assistance. The UK Data Service assisted in making data available under the project "Austerity and political polarization".

# 1 Introduction

Much of the recent rise of populism in the west has been attributed to a political backlash against globalization with a host of papers suggesting that the distributional effects of globalization may causally explain the electoral success of populists (Autor et al., 2016; Colantone and Stanig, 2018; Dippel et al., 2015). Other factors, such as immigration and, in particular, the free movement of labor within the European Union (EU), may have similar distributional effects (Ottaviano and Peri, 2012; Dustmann et al., 2013), and equally feature prominently in the populist rhetoric. Globalization, by creating winners and losers, puts specific emphasis on the role of the welfare state (Stolper and Samuelson, 1941; Rodrik, 2000; Stiglitz, 2002). While a functioning welfare state can compensate the globalization losers (Antras et al., 2016), welfare cuts may do the opposite. This paper provides ample evidence that, at least in the context of the UK, the austerity-induced withdrawal of the welfare state since 2010 is a key driver to understand both, how pressures to hold an EU referendum built up, and why the Leave side won.

I proceed in two steps. Using novel data on the universe of all elections held in the UK between 2000-2015, I present a set of stylized facts which highlight how the political landscape changed in the UK within a few years between 2010 and 2015. I focus on the electoral performance of the UK Independence Party (UKIP). UKIP, since the late 1990s, has established itself as a populist single issue party, being the UK's only party with the explicit goal of leaving the EU. Due to the tight correlation between UKIP vote shares and an area's support for Leave in the EU referendum (see Becker et al., 2017 and Figure 1), UKIP vote shares are an important window into understanding the build up of anti-EU sentiment over time. Exploiting high frequency annual election data, I show that the EU referendum was precipitated by a significant expansion in electoral support for UKIP in places with weak socio-economic fundamentals. For instance, regions with a larger baseline share of residents in 'routine jobs', with a larger share of 'low-educated', and with higher baseline employment shares in retail and manufacturing all see an increase in support for UKIP, *yet only after 2010*.

Why did UKIP gain electoral support in these areas after 2010? Working with district level data, I present evidence suggesting that austerity-induced welfare reforms initiated in late 2010, many of which came into effect in early 2013, caused the upheavals in the UK's political landscape. The fiscal contraction brought about by the Conservative-led coalition government starting 2010 was sizable: aggregate real government spending on welfare and social protection decreased by around 16% per capita. At the district-level, which administer most welfare programs, spending per person fell by 23.4% in real terms between 2010 and 2015, varying dramatically across districts, ranging from 46.3% to 6.2% with the sharpest cuts in the poorest areas (Innes and Tetlow, 2015). Using data from government estimates on the simulated intensity of specific welfare cuts across districts, I show that support for UKIP started to grow in areas with significant exposure to specific benefit cuts, after these became effective. As further plausibility check, I use the austerity shock to estimate multiplier effects on local GDP, yielding very reasonable estimates compared to the literature (Ilzetzki et al., 2013).

The austerity-induced increase in support for UKIP is sizable and suggests that the tight 2016 EU referendum result (Leave won by a margin of 3.5 percentage points) could have well resulted in a victory for Remain, had it not been for austerity. The point estimates suggest that in districts that received the average austerity shock, UKIP vote shares were, on average, 3.58 percentage points higher in the 2014 European elections or even 11.62 percentage points higher in the most recent local elections prior to the referendum. Due to the tight link between UKIP vote shares and an area's support for Leave, simple back of the envelope calculations suggest that Leave support in 2016 could have been up to 9.51 percentage points lower and thus, could have swung the referendum in favor of Remain.

In the second step, I turn to individual level data constructing a rich panel using the 40,000 household strong Understanding Society study (USOC) covering the period between 2009-2015. This data allows me to address many plausible concerns with the earlier exercises by exploiting within individual variation in both, political preferences as well as exposure to specific benefit cuts. The results suggest that

individuals exposed to various welfare reforms saw distinct, sizable and precisely estimated increases in their tendency to express support for UKIP. Further, they increasingly perceive that their vote does not make a difference, that they do "not have a say in government policy" or that "public officials do not care". The timing of the effects occurs when individual reforms become effective for the affected populations (for example, households living in social rented housing judged to have a "spare bedroom"). For a set of benefit reforms, I can document auxiliary effects directly along margins relevant to the reforms (for example, households living in social rented housing with a "spare bedroom" avoiding benefit cuts by moving to smaller accommodation). While UKIP gains among those exposed to cuts, support for the Conservative party, which lead the coalition government responsible for the welfare cuts, goes down. This suggests that there are political cost to fiscal contractions, a notion for which there is limited evidence in the existing literature (Arias and Stasavage, 2016; Alesina et al., 2011, 1998). Exploiting the most recent wave of the USOC data which asked the EU referendum question, I further show that exposure to the welfare reforms studied also increases direct measures of support to Leave the EU.

Lastly, while an in-depth exploration of the underlying economic reasons of who (and why) individuals becomes reliant on the welfare state (and thus exposed to austerity post 2010) goes beyond this paper, I provide some suggestive evidence indicating that shocks and economic pressures that contribute to the human-capital or skill divide in labor markets are likely particularly important. Combining data from the much smaller British Household Panel Study (BHPS), the precursor of the USOC survey, with the latter data allows me to explore longer running trends exploiting again, only within individual variation. I document that, along the human capital divide, labor incomes diverged in a secular fashion, decreasing continuously for those with low qualifications relative to the rest of the population, and diverging, in particular relative to those with university degrees over the last 15 years. This suggests that inequality in labor incomes increased along the skill-divide (Card and DiNardo, 2002; Lemieux, 2006). Linking back to the main

findings, I show that the welfare state was responsive, providing transfers to those who, in relative terms, became economically worse-off. This trend-growth in transfers to those at the lower ends of the labor income distribution comes to a halt from 2010 onwards, as the austerity-induced welfare reforms started to bite. While there are a host of economic mechanisms which may contribute to the growing skill-bias in the economy[1], the patterns are very consistent with the central argument of this paper suggesting that austerity was key to *activating these grievances*, converting them into political dissatisfaction culminating in Brexit.

This paper is related to several strands in the literature. There is a growing literature studying the recent rise of populism affecting most of the Western world. Autor et al. (2016); Che et al. (2017); Colantone and Stanig (2018); Dippel et al. (2015) each point to the effect of trade-integration with low income countries on political preferences or election outcomes. Aksoy et al. (2018) document strong pro-incumbent political preferences for (export) trade integration among the high skilled. Guiso et al. (2018) study the demand- and supply of populism more generally, with a specific focus on the role of turn out, while Piketty (2018) documents patterns of how inequality has changed the structure of politics using repeated survey data for France, the UK and the US.[2]

Another related literature links the recent rise in populism to various forms of immigration. While the effects may depend on the underlying type of immigration (e.g. illegal immigration), the literature broadly documents that support for right wing platforms increases in areas affected by (low skill) migration (see Mayda et al., 2016 for the US, Barone et al., 2016 in Italy, Dustmann et al., 2018 in Denmark and Halla et al., 2017 in Austria). Steinmayr (2016)'s suggests that contact of natives with refugees in Austria *decreased* support for the far-right. Co-

[1]For example trade integration and offshoring (Autor et al., 2013; Scheve and Slaughter, 2004; Grossman and Rossi-Hansberg, 2008), structural transformation (Rogerson, 2008; Rodrik, 2016), the rise of automation (Caprettini and Voth, 2015; Graetz and Michaels, 2015), skill-biased technological change more broadly (Acemoglu, 1998; Autor et al., 1998, 2003) or possibly migration affecting wages at the lower end of the wage distribution (Becker and Fetzer, 2018; Dustmann et al., 2013).

[2]This builds on a rich literature in economics documenting that globalization has distributional effects (Krugman and Venables, 1995; Revenga, 1992; Autor et al., 2013; Grossman and Rossi-Hansberg, 2008; Scheve and Slaughter, 2001b).

lussi et al. (2017) highlight the impact of salience of migration of muslims in the public perception on political extremism more broadly in Germany. Rather than focusing on the receiving country, Barsbai and Rapoport (2017), show that areas experiencing significant outmigration of the revolutionary 1848er generation see larger support for the Nazi party seventy years later.[3]

This paper points to a different and previously unexplored explanation of the very recent shifts in the UK's political landscape culminating in Brexit. I provide ample evidence suggesting that reforms and cuts to the welfare state is a central factor. This relates to a growing literature studying the interactions between political preferences and austerity, or fiscal policy more broadly (Alesina et al., 2011, 1998). A paper closely related to this work is Galofré-Vilà et al. (2017), who link the rise of the Nazi party in the early 1930s to the exposure of austerity at the county level. Similarly, Voigtländer and Voth (2017) suggest that, in time of mass unemployment, increased public spending on highly visible highway construction helped Hitler capture and retain power. Ponticelli and Voth (2017) relates, as they study austerity and popular unrest more broadly. Arias and Stasavage (2016), similar to the findings of Alesina et al. (2011), find no evidence of a political cost to austerity.[4] This paper is able to tackle many of the plausible identification concerns that arise when working with aggregate and low frequency election data, by turning to rich high frequency individual level panel data. Similarly, I am able to present evidence on a host of additional adjustment margins, indicating that welfare reforms did contribute to some grievances. Hence, my results indicate that there *are political cost to austerity* at least in the UK context.

Lastly, the paper naturally relates to a growing literature on Brexit. Most of

[3] Scheve and Slaughter (2001a), in the context of the US, study immigration, labor market competition and preferences over immigration policy, thus linking political effects of immigration to its underlying economic effects. Similarly, Hainmueller and Hopkins (2014) study public attitudes towards immigration. A rich literature studies the economic effects of migration: Ottaviano and Peri (2012) finds immigration to have, on average, positive effects on wages turning negative for those with low human capital. Similar findings are presented by Borjas (2003) in the context of the US and by Dustmann et al. (2013); Becker and Fetzer (2018) for the UK.

[4] Other papers document a link between economic distress more broadly and support for right wing party platforms (Arzheimer, 2009; Dehdari, 2017; Inglehart and Norris, 2016).

this work is purely cross sectional, making this paper the first one to comprehensively add a time dimension.[5] Colantone and Stanig (2018) shed light on the economic origins of Brexit, using the cross-sectional support for Leave in the EU referendum together with Autor et al. (2013)-style import competition shocks, they find compelling evidence indicating that trade integration with China may have been an important driver of leave voting. This paper qualifies these finding: while trade integration may be associated with a built up of economic grievances, I argue that austerity policies after 2010 activated these grievances. Further, the auxiliary results presented in this paper suggest that the underlying origins of the grievances go beyond what can be explained by trade-integration and the ensuing manufacturing-sector decline alone. Turning to the consequences of Brexit, Born et al. (2018), using a synthetic control approach, estimate a cumulative output loss of GBP 19.3 billion due to Brexit accrued between the EU referendum and the end of the 2017 calendar year. Given that the fiscal savings of the austerity measures studied in this paper were projected to be around GBP 18.9 billion per year, this suggests that the economic cost of Brexit are likely already higher compared to the austerity-induced fiscal savings that this paper argues significantly contributed to Brexit. More broadly, Dhingra et al. (2017) study the cost (and benefits) of the UK leaving the EU, while Breinlich et al. (2017) explore the welfare cost of inflation due to the Brexit-induced drop in the pound.[6]

The rest of the paper proceeds as follows: section 2, discusses the context and the main data. Section 3 provides motivating evidence, section 4 presents studies the impact of austerity on UKIP support at the district level. Section 5 turns to individual level data, with section 6 discusses the findings within the literature pointing to the relevance of longer running economic trends. Section 7 concludes.

[5] A rich descriptive literature emerged since the Leave vote (see Hobolt, 2016; Goodwin and Heath, 2016; Becker et al., 2017), while (populist) campaigning and social media around the EU referendum are studied in a few papers (Gorodnichenko et al., 2016; Goodwin et al., 2018).

[6] Political scientists have long studied popular support for EU membership (see e.g. Anderson and Reichert, 1995; Gabel, 1998; Hobolt and de Vries, 2016). Alesina et al. (2000) provide a formal link between economic integration and political disintegration, Rodrik (2000)'s trilemma is particularly relevant for the EU, while Spolaore (2013) provides a guide to understanding the EU.

# 2 Context and data

## 2.1 UK Politics, the EU and the EU referendum

The UK joined the European Economic Community (EEC), the precursor of the EU in 1973 and already saw its first "in- or out" referendum in June 1975 after Labour pledged in 1974, to renegotiate the terms of British membership of the EEC, and to consult the public in a referendum on whether Britain should stay in the EEC on the new terms. The referendum on 5 June 1975 asked the electorate: "Do you think that the United Kingdom should stay in the European Community (the Common Market)?". The referendum resulted in a decisive victory for Remain with a victory margin of 34.5%. Since the 1975 Referendum, the European Economic Area has evolved into the central pillar of what became the EU with the Maastricht Treaty of 1993. Further steps to European integration were formalized through the treaties of Amsterdam in 1997, Nice in 2001 and Lisbon in 2009.

In parallel to the growing institutionalization of the EU, opposition to further integration grew in the UK. The UK opted out of joining the single Euro currency and the border free Schengen travel area. Following the Maastricht Treaty in 1993, the UK Independence Party (UKIP) formed out of the Anti-Federalist League, adopting a wider right-wing platform, with the UK's exit from the EU as the explicit party goal, making it the only significant party in the UK's political system with the explicit goal of leaving the EU (Lynch and Whitaker, 2013).

While not being able to secure a single seat outright in the Westminster parliament due to the first-past-the-post electoral system, UKIP gained significant traction in local elections and in European Parliamentary (EP) elections, which are conducted using a system of proportional representation. In 2004, UKIP came in as third largest party in the EP elections with a vote share of 15.6%. In 2009, they came in second, while it won the 2014 EP election with a vote share of 26.6%.[7] Meanwhile, UKIP increasingly started contesting local elections and attracted de-

[7] In European Parliament elections, UKIP might have benefited from closed-list (instead of open-list) competition (Blumenau et al., 2017).

fectors from the Conservative party. Earlier cross-sectional work suggests that UKIP drew its supporters from two pools of voters: more affluent and middle-class "strategic defectors" from the Conservative party who identify with UKIP's Euroskeptic platform, while later also attracting economically struggling, working-class voters from traditional Labour backgrounds (see Ford et al., 2012). For the latter, Ford et al. (2012) document that economic concerns and general measures of Euroskepticism are closely correlated. The observation that UKIP was eroding popular support for the Conservatives suggests that the risk of splitting voters between UKIP and the Conservatives could give rise to electoral gains for Labour in contested constituencies was manifested in the 2014 EP elections, which UKIP won ahead of Labour, leaving the Conservatives in the third place.

Electoral pressures from UKIP induced the Conservatives to adopt anti-EU stances: in March 2009, the Conservatives left the centre-right block in the European Parliament to join a group of right wing parties, while the 2010 Conservative manifesto set out 'to bring back key powers over legal rights, criminal justice and social and employment legislation to the UK.' Despite the Conservative party's adoption of Euroskeptic tones, UKIP continued expanding its electoral support.

In January 2013, David Cameron announced that he would seek to renegotiate the terms of the UK's EU membership to be followed by an in-out referendum in case of a Conservative victory in the 2015 general election.[8] In the run-up to the 2015 general election, David Cameron pledged to hold an EU referendum by the end of 2017. After winning the 2015 election, he set out to renegotiate the UK's relationship with the EU. In February 2016, after a round of negotations with the EU, David Cameron called for a Referendum and campaigned for remain. The Leave side won the Referendum on 23 June 2016 with a narrow margin of 3.5%.

[8]In appendix C.2, I show that UKIP's ascent came mostly at the expense of the Conservative party (and later also from Labour), starting already prior to the 2013 EU referendum announcement in areas with weak socio-economic fundamentals and continued all the way up to 2015.

## 2.2 Measuring anti-EU sentiment

Throughout this paper, the electoral performance or expressions of support for UKIP is one central outcome variable.[9] Throughout the sample period, the political supply-side was rather static: UKIP was well-established prior to 2010 and was consistently lead by Nigel Farage from 2006-2016 (with the exception of a 11 month period). While the core of this paper draws on detailed individual level panel data capturing political preferences at the individual level, together with broader measures of political dissatisfaction, I also draw on data on the electoral performance of UKIP, which I describe next.

**Election data** In particular, I leverage data from the population of electoral contests between 2000 to 2015, drawing in data from Westminster-, European- and Local Council Elections. Westminster elections are high stakes, as they ultimately decide who is in charge of the executive branch of the UK government. Yet, the fact that they are conducted using a first-past-the-post electoral system with changing constituency boundaries poses several challenges. First, small parties will find it difficult to gain a footing as voters cast votes strategically favoring large parties; further, small parties may not choose to field candidates in each constituency and lastly, given that constituency boundaries are changing, it is difficult to infer consistent measures of an area's population's political preferences. Nevertheless, with these caveats in mind, I harmonize the constiuency level election results (results are not reported at a finer level) to the 2001 constituency boundaries using detailed Ward level shapefiles together with 2001 population figures. The resulting data set is a balanced panel of 570 harmonized constiuencies where I measure UKIP's vote share, replacing it with a zero in case they did not field a candidate in an area.

Given the challenges with Westminster elections, I also leverage data from the European Parliamentary (EP) Elections held in 2004, 2009 and 2014. These results

[9] As I show in Appendix B.1, using cross-sectional data from the cross-sectional British Election study (BES), support for UKIP is the most relevant outcome measure for this paper, as support for UKIP is strongly correlated with support for leaving the EU and views suggesting that EU integration is a threat to UK sovereignty, along with strong anti-immigration sentiments.

are reported at the local authority district level.[10] This has several advantages compared to Westminster elections as they are held using a system of proportional representation to allocate the British seats in the European Parliament. The comparison of Westminster to EP elections brings the differential degree of representation that a proportional representation system delivers relative to a first-past-the-post system into sharp relief. For example, despite coming out first with an overall 26.6% vote share in the EP elections in 2014, UKIP had never won a single seat outright in the Westminster elections.[11] The extent of and the spatial distribution of UKIP support base has changed dramatically between 2004 and 2014. This is illustrated in Figure 2, which presents the UKIP vote share in the 2004 and the 2014 EP elections across the roughly 380 districts. Since 2004, UKIP has gained significant support increasing its vote share from 15.6% of the vote to 26.6% in 2014, particularly in the coastal regions, Wales and parts of the old industrial heart-land of the Midlands. The last panel presents the Leave vote share across districts from the 2016 EU referendum. A comparison between panel B and panel C shows a tight relationship between UKIP vote shares and support for the Leave already illustrated earlier. While EP elections use proportional representation, and are thus able to pick up protest voting particularly well, EP elections are seen as low stakes, with usually quite low turnout. Further, EP and Westminster elections happen only infrequently, which may limit the statistical power of analysis exploiting time-varying shocks.

To navigate the issue of low frequency nature of EP and Westminster elections, I make use of local council election data for England and Wales since 2000, collated at the district level. Local elections have the appealing feature that, rather than happening uniformly across the UK every four years, there are local council elections held in any given year across the UK due to the rotating fashion by which councillors get elected.[12] While local elections employ a first-past-the-post system

[10]Going forward, I simply use the term "district" for this administrative subdivision. Broadly speaking, a local authority district can be thought of as comparable to a US county.

[11]The only UKIP seat in Parliament came from a defector from the Conservatives, who won his re-election in 2015 as a UKIP candidate, before leaving UKIP again in March 2017.

[12]There exist a lot of variation across the UK in how local elections are conducted. The usual

and UKIP is not contesting each of the seats up for election, the relatively high frequency at which they happen make them particularly suitable to study the evolution of political sentiment over time. The main outcome measure is UKIP's vote share, replacing it with a zero in case UKIP does not field a single candidate.[13]

**Individual level panel** The most important data source for this paper, however, is a newly constructed individual level panel, making use of the USOC panel study with approximately 40,000 households contributing across the United Kingdom. Households recruited at the first round of data collection are visited, on average, every two years to collect information on changes to their household and individual circumstances. Interviews are carried out face-to face in respondents' homes by trained interviewers or through a self-completion online survey. The data for each wave is collected over a two year window and using quite consistent survey instruments. As the other data, respondents are coded based on the residence at the district level. The first seven waves of the USOC panel cover the years 2009 to 2015. Given the gradual data collection, I can exploit the reporting of the interview date to construct *quarterly level data*, which allow me to estimate high frequency event studies.

The survey instruments used across waves are quite harmonized. In particular, each survey waves includes an instrument eliciting respondents' and household's sources of income, their employment status along with a module to elicit political preferences in a broad fashion, asking respondents 'whether they see themselves a supporter of a specific political party', 'whether they are close to a political party'. If neither of these questions is successful in eliciting a response of a party name, the remainder of the respondents get asked which party they would vote for if there was an election tomorrow. This implies that for a significant set of respondents, around 59%, preferences are elicited without any framing such a question around an election; further, the way questions are asked reduces concerns about

term of a councillor lasts for four years. Only a few councils across the UK are elected wholly every four years, while many more are elected by 'thirds', whereby a third of the councillors get elected each year, with one year with no elections. Further details are provided in appendix B.2.

[13]The results are robust to restricting the analysis to a balanced panel of districts in which they almost continuously fielded candidates.

responses being tainted by individuals' turnout decision (Bursztyn et al., 2017; Guiso et al., 2018).[14] In addition to these questions, the survey waves 2, 3 and 6 included an additional relevant questions, eliciting the extent by which respondents like or dislike the Conservative or the Labor party. Further, the module asks about the respondents perceived political influence (whether they think their vote makes a difference) and the extent to which respondents think that 'public officials do not care' or that they have 'no say in what government does'. I use these measures as further outcome variables capturing broader discontent. Further, as will be discussed further below, the data allows me to provide further evidence on adjustment margins and allows me to rule out a host of alternative explanations. Lastly, the most recent USOC wave actually asks the EU referendum question, providing a further immediately relevant outcome measure.

I next present a range of stylized facts used to motivate the subsequent analysis.

# 3 Where (and when) did UKIP start to grow?

I first show a range of stylized facts, which show how support for UKIP distinctly grew in areas with weak socio-economic fundamentals, but only after 2010.

## 3.1 Empirical specification

Using data from the Local, Westminster and EP elections, I estimate the following non-parametric difference-in-differences design:

$$y_{i,r,t} = \alpha_i + \beta_{r,t} + \sum_{t \neq 2010} \eta_t \times Year_t \times X_{i,baseline} + \epsilon_{i,r,t} \quad (1)$$

where $y_{irt}$ denotes UKIP vote shares in Council, Westminster and EP elections. The fixed effect $\alpha_i$ absorbs any time-invariant differences in political preferences or sentiment across districts.[15] Region-by-time fixed effects $\beta_{rt}$ capture non-linear time trends specific to each of the eleven NUTS1 regions across the UK. The main

[14] More details on the data are provided in appendix B.3.

[15] Local Council election results, similar to EP elections, are reported at the district level; the Westminster election results data is presented at the harmonized 2001 constituency level.

coefficients of interest are the interaction effects between (fixed) baseline socio-economic characteristic $X_{i,baseline}$ interacted with a set of year fixed effects. I plot out the estimated coefficients $\hat{\gamma}_t$ over time relative to 2010 as the reference year (2009 for the EP elections) to capture how UKIP differentially gained support over time as a function of $X_{i,baseline}$. Throughout, standard errors are clustered at the district level (constituency level for the Westminster election analysis).

I focus on four main area characteristics $X_{i,baseline}$: the share of the 2001 resident population with no formal qualifications, the share working in routine jobs, and the working-age resident population shares working in the manufacturing and retail sectors (results from other measures are presented in Appendix C.1).

## 3.2 Results

I discuss results for the local elections presented in Figure 3 in more detail.[16]

**Human capital** Panel A of Figure 3 focuses on a baseline proxy measure of area's population's *human capital*. The results suggests that support for UKIP gradually trends up as a function of the share of the resident population with low educational attainment. The correlation between support for UKIP and the measure of low human capital only becomes sharply stronger *after 2010*. Looking at magnitudes, for example, the year 2015 coefficient for the interaction with the No Qualification measure is 0.675, suggesting that the average district with 28.5% of the resident population having no qualifications saw an increase in UKIP's vote share in local elections by 19.2 percentage points.

**Routine jobs** In Panel B of Figure 3, I present results when studying how the degree of correlation between support for UKIP in local elections and the share of an area's working age population working inroutine jobs as per the Census *socio-economic status* classification. Support for UKIP is not statistically associated with the share working in routine jobs, prior to 2010. Since 2010, this correlation

[16] Appendix Figure C1 and Figure C2 highlight that I obtain very similar results studying UKIP's performance in EP and Westminster elections. This is important since, while, on average, UKIP vote shares in Local and Westminster elections are mechanically lower (as not all seats are contested), UKIPs performance in EP elections 2004, 2009 and 2014 stands out consistently realizing more than 15.6% of the vote.

becomes sharply stronger.

**Economic structure** Lastly, Panel C and D of Figure 3 zoom in on measures of a district's *local economic structure*, focusing on employment shares in retail- and manufacturing sectors. The latter is of particular interest due to the manufacturing sector's exposure to trade integration. The retail sector is represented all across the country and is, for the bulk of jobs, not directly subject to global trade exposure; yet, it provides relatively low quality jobs and is affected by the trend towards electronic commerce. Areas with larger employment shares in Retail, and Manufacturing saw significant increases in electoral support for UKIP *after 2010*. To get a sense of the magnitude, for the Manufacturing sector (ca. 15.4% of employment in 2001), the point estimate of 0.53 in 2015 suggests that the average area saw an expansion in support for UKIP by 2015 by 8.1 percentage points.

The fact that UKIP votes also respond, *after 2010*, to the baseline *retail* employment share suggests that the underlying causal drivers behind the EU referendum vote may go *beyond* an area's exposure to import competition from low income countries. To further support this interpretation, in Appendix Figure C8, I partial out the non-linear time trend specific to the baseline manufacturing share – a crucial input for the construction of Autor et al. (2013) style import shocks – from the other variables. Throughout, the patterns remain intact, suggesting that, even after accounting flexibly for UKIP's growth in areas with a significant manufacturing base, the underlying trends of UKIP gaining support after 2010 in areas with low skilled, working in routine jobs or the retail sector remain intact.

In Appendix C.1, I present a host of robustness checks to address some basic concerns. In particular, trends are very similar when studying EP and Westminster elections, they are robust to alternative fixed effects, different sample cuts and broader or more refined baseline measures.

## 3.3 Discussion

The previous analysis suggests that the UKs electoral landscape changed dramatically, with UKIP gaining support in areas with weak socio-economic funda-

mentals, but only strongly so after 2010 across Local, Westminster and European elections. In further analysis in appendix C.2, I document that the growth of UKIP in areas with weak economic fundamentals is mostly at the cost of the Conservative party. This is not surprising, as Conservative councillors defected to UKIP quite regularly (Webb and Bale, 2014).[17] This suggests (and is substantiated later), that UKIP was a threat for the Conservative party, which matches the qualitative evidence on the perception that UKIP is competing with the Conservatives.

Yet, relating the stylized facts with the existing literature on Brexit suggests an important disconnect. In particular, if globalization induced grievances had already been present well before 2010, the question that emerges is why they did not translate into markable shifts in the political landscape already before 2010? In particular, areas that are historically reliant on manufacturing sector employment should be particularly exposed to import competition already well before 2010. Importantly, throughout the sample period, UKIP was an active political party mostly under the same leadership, campaigning on a similar anti-immigration and anti-EU platforms since the late 1990s. Yet, as the above trends suggest, patterns of UKIP's electoral support only shifted dramatically from 2010 onwards. The next sections presents evidence on how austerity is the likely causal factor explaining these trends, starting with aggregate district-level evidence in Section 4 and then moving to evidence from individual level panel data in section 5.

# 4 Austerity as activating factor?

I next present evidence from aggregate data suggesting that austerity measures are likely factors behind the shift towards UKIP.

## 4.1 Aggregate trends in fiscal spending

In the wake of the financial crisis, the UK's debt to GDP ratio grew significantly from 36.4% in 2007/2008 to 60.0% in 2010/2011. The Conservative-led coalition government that came to power after the May 2010 General Election brought for-

[17] For example, of the total stock of 77 defectors switching parties to join UKIP, the vast majority (56 councillors) defected from the Conservative party. See https://goo.gl/wpFW9a.

ward wide-ranging austerity measures to reign in public sector deficits by cutting spending across all levels of government. Figure 4 suggests that, starting 2011, spending for welfare and protection had dropped significantly, declining by 16% in real terms reaching levels last seen in the early 2000s. Spending on healthcare, being spared direct cuts, flatlined. Yet, the ageing population profile of the population increased demand for the health care services. Further, spending on education contracted by 19% in real terms, while expenses for pensions steadily increased, suggesting a significant shift in the composition of government spending.

The Conservative-led government used three methods to cut spending. First, the initial wave taking immediate effect with the annoucement of the autumn budget in 2010 saw budget cuts for day-to-day spending across most Westminster departments.[18] Local government funding has been reduced significantly, putting pressures on local councils to provide services in an overall environment of increasing demand due to population growth (Innes and Tetlow, 2015). In the later empirical designs exploiting individual level data, I will flexibly control for district specific time effects, to account for these district specific shocks and focus on individual level exposure to a specific subset of welfare reforms. A second significant component contributing to the cuts in government spending were nominal freezes. Public sector employees earning more than GBP 21,000 saw, from 2011-2013, a freeze of their salaries, while wage growth was capped at 1% since 2014. Similar freezes were introduced for most welfare benefits, resulting in real term cuts as inflation rates averaged between 2-4 % throughout this period. In this paper, I focus on the third, and most important component of austerity – the reform of the Welfare State – was set in motion through the Welfare Reform Act 2012.

## 4.2 Exposure of welfare cuts at the district level

I draw on data from Beatty and Fothergill (2013), who, using detailed data on the distribution of beneficiary claimants across these different types of benefits at baseline prior to reforms becoming effective, simulate the incidence and distri-

[18]The only departments sheltered from cuts were the Department for International Development and the Department for Health, which funds the National Health Service (NHS).

bution of the welfare cuts at the district level. The estimates of the incidence of these reforms are "deeply rooted in official statistics" drawing in "data from the Treasury's own estimates of the projected savings, the government's impact assessments, and benefit claimant data". The exposure of an area to specific reforms is measured as the financial loss per working age adult in a region and year.

Overall, Beatty and Fothergill (2013) consider ten different welfare-reform measures, which, taken together, were expected to yield fiscal savings of up to GBP 18.9 billion per year to be realized by 2015. This aggregate figure masks wide range of variation in the intensity of treatment of individual areas. The overall projected financial loss per working adult varied between GBP 914 in Blackpool and GBP 177 in the City of London. The geographic variation in an areas intensity of exposure to the welfare cuts is presented in Figure 5.

Some welfare reform measures are more suitable for econometric analysis then others, as they define a clear target population due to a rules-based withdrawal. Fiscally, the measures with the largest effect were the reform of (child) tax credits, changes to child benefit and the capping of inflation indexing of all benefits to 1% per year, instead of the inflation rate. Tax credits are a means-tested transfer to households with children with low or middle incomes, while child benefit is an unconditional benefit paid out to families. The reform of tax credits essentially involved a faster withdrawal of the transfer payment, in addition to a host of changes of eligibility requirements together, making it difficult to identify the affected group in the population of recipients sharply as exposure depends on a range of household characteristics; in the case of child benefit, the main measure was effectively cutting the transfer to households in which there was at least one earner with an annual pre-tax income in excess of GBP 50,000. Here, the affected population is well-defined, but is quite affluent. According to the estimates from the Department of Works and Pensions, these three measures alone were expected to generate around GBP 10 billion in savings per year by 2015, or, roughly 53% of the overall projected savings. It is estimated that changes to tax credits and child benefit affected between 4.135 to 6.980 million households, or roughly between 15-

25% of the 27.2 million UK households. It is not inconceivable, that these specific measures, while having small effects on individual households, had sizable effects on the local economy due to general equilibrium effects.

For the purpose of the individual level analysis to come later, I will focus on three smaller welfare reforms – the abolishment of council tax benefit, the so-called 'bedroom-tax' and the introduction of Personal Independence Payments replacing Disability Living allowance – for which I provide more detail in the next section. I next estimate the impact of austerity on voting outcomes at the district level.

## 4.3 Empirical strategy

I perform three related exercises. I estimate simple pooled difference-in-difference regressions to densely present the results obtained from comparing Local, European and Westminster election data. In addition, I explore a similar event study specification as in 1, except that I am replacing the baseline characteristics $X_{i,baseline}$ with time-invariant measures of the simulated impact of welfare reform $j$ in area $i$, $\text{Austerity}_{i,j}$. Lastly, I also study a specification allowing me to estimate multipliers.

The estimating specification for the pooled difference-in-difference takes the following form:

$$y_{i,r,t} = \alpha_i + \beta_{r,t} + \gamma \times \mathbb{1}(\text{Year} > 2010) \times \text{Austerity}_{i,j} + \epsilon_{i,r,t} \tag{2}$$

The only difference compared to the earlier *event studies* specification in 1 is that the treatment periods are pooled together. As we will see when studying the event studies as second exercise, this is likely to underestimate the specific impacts of some benefit cuts that only became effective starting 2013.

For the third exercise, the estimation of local multipliers as in (Moretti, 2010), I obtained data from the Office of National Statistics (ONS) on local area gross value added.[19] In addition to the pooled difference-in-difference, I will also estimate an event-study, which will highlight that contractions in district GDP are happening after 2010, when the austerity started taking effect. The analysis of local multipliers

[19]The data is available from the ONS at https://goo.gl/eJgiLf, accessed 15.06.2018.

will suggest that there are *indirect effects* of austerity, affecting incomes of individuals not directly affected by the welfare cuts, through general equilibrium effects. This will motivate the shift of focus to individual level data in the subsequent parts of the paper.

## 4.4 Results

I first discuss the pooled difference-in-difference results, before turning to the event-studies and the estimates of the implicit multipliers.

**Pooled difference-in-difference** The results form the pooled difference-in-differences are presented in Table 1. The rows explore UKIP's electoral performance in Local, European and Westminster elections, while the columns look at different independent variables $\text{Austerity}_{i,j}$ measuring the impact of different reforms $j$ as studied by Beatty and Fothergill (2013).

Column 1 studies the impact of the overall estimated impact of the reforms. On average, the average financial loss of the reform measures per working age adult is GBP 447.1. Given that the median household disposable income in the UK stands at just around GBP 27,300, this is non-negligible amount for many households. The point estimate in panel A indicates that, in areas that saw the average austerity exposure, UKIP's electoral performance increased by 4.47 percentage points. This suggests a 100% increase relative to the baseline. This partly reflects the fact that UKIP did not consistently field candidates. In Panel B, I look at the impact of UKIP's performance in European Parliamentary elections. These elections are particularly suitable to study UKIP's electoral performance, as they are held using proportional representation. UKIP has consistently performed well in these elections, securing 15.6% of the vote as early as 2004. Despite this, the point estimate in Panel B is not substantially smaller compared to Panel A. For districts receiving the average austerity exposure, UKIP vote shares increase by 3.58 percentage points. The absolute changes in vote shares are non-negligible, and in relative terms, the figures stand even taller.

Columns 2-6 zoom in to a set of specific benefit cuts, in particular, changes to

tax credit (TC) and child benefit (CB). For the former, we find sizable and meaningful effects on support for UKIP, while for the latter the results are much more mixed, which is due to the nature of the child benefit cut, which only affected relatively well-off households. The abolishment of centrally funded council tax benefit (CTB), the reform of disability living allowance (DLA) and the bedroom tax (BTX), on the other hand, were mostly affecting low income households. For these benefit cuts, I have reasonably sharp timings and eligibility rules that I can trace out in the individual level data. Across most of these specific reforms, the aggregate election data suggests similar sized effects across Panels A - C.

At the bottom of Table 1, I provide some summary statistics on the size and distribution of the cuts. For example, the bedroom tax explored in column (6) expected to yield fiscal savings of just GBP 10.81 per working age adult; yet, the measure was much more concentrated, affecting an estimated 660,000 households. Further, I also provide the correlations of the share of working age households affected with the main baseline measures capturing the population shares with low human capital, working in routine jobs or working in Retail or Manufacturing sector in the non-parametric analysis in section 3. This highlights non-negligible cross-correlations with these baseline measures and an areas exposure to austerity, indicating that indeed, benefit cuts were particularly concentrated in areas with significant resident shares with low qualifications or significant working age adult populations working in routine jobs.

**Event studies** The pooled difference-in-difference, by averaging the coefficient estimates after 2010, may underestimate the effect of austerity. Welfare cut measures, such as freezing of benefits or changes in inflation indexing, compound over time, while others, only became fully effective at a later date. This only affects the local election results, because for Westminster- and EP elections only a single election occurred in the time window between 2010 and 2015 before the referendum; nevertheless, looking at Westminster- and EP elections is still useful in terms of whether support for UKIP, in areas more exposed to austerity were following similar trends prior to reforms becoming effective.

While the vast majority of benefit cuts were introduced as part of the Welfare Reform Act 2012 and became effective with the start of the financial year in 2013, some measures, such as reforms to Tax Credits became effective already in 2011. In the event studies presented in Figure 6, I focus on the overall austerity exposure measure in Panel A as well as three individual policies further detailed in the next section. Throughout, there is no evidence of systematic divergence before 2011 in a fashion that is correlated with exposure to austerity. Markedly, the timing is also quite consistent with the specific measures, with first first effects appearing in 2012 for the overall austerity measures in Panel A, which is significantly carried by the tax credit reforms starting to take effect as early as April 2011. The estimated coefficient for the year 2015 is, not surprisingly, larger compared to the pooled difference-in-difference point estimate averaging the post 2010 estimates: the point estimate suggests that areas across England and Wales with an average austerity shock saw an increase in support for UKIP by 11.62 percentage points.

Panel B - D focus on three reforms further detailed in the next section – the abolishment of council tax benefit, the so-called 'bedroom-tax' and the introduction of Personal Independence Payments replacing Disability Living allowance – for each of these reforms there is no evidence of diverging pre-trends and the timing of effects is quite consistent with individual measures becoming effective.[20]

**Local multipliers** As a further plausibility check, I estimate local spending multipliers. The average local authority district was expected to loose GBP 447.1 per working age adult in transfer income. This is a sizable reduction and should manifest itself in contractions of local incomes through indirect effects. I estimate these multiplier effects using data on local area gross value added from the ONS. The only difference to the main estimating equation is that the dependent variable now is the log value added per working age adult by sector, while the independent variable is the overall austerity exposure measure.

[20] Appendix Figure A1 presents the same figures for Westminster elections, while Appendix Figure A2 looks at European elections. For Westminster elections the lack of pre-trends is obvious, for EP elections, since there are only three time points, it is more difficult to tell. Further, the results are robust to linear time trends as I show in Appendix Table A1.

The results are presented in Table 2. Overall the point estimate in column (1) suggests that there is a significant and negative relationship between austerity and local incomes. The regressions suggest a fiscal multiplier of 2.51, implying that for every pound contraction in transfer income to working age adults, overall gross value added or local incomes contract by 2.51 pounds. The multiplier effects are broadly carried by contractions in the Distribution and Retail sectors, as well as by the Manufacturing sector. The magnitude of the multipliers and the distribution across sectors is quite consistent with those estimated when studying shocks to household disposable income (Ilzetzki et al., 2013).

In the bottom rows of Table 2, I also provide an IV estimate just to highlight that the variation in local incomes that we can attribute to the austerity measures start biting after 2010 can also be linked to rising support for UKIP in local elections. The estimate from column (1) suggests that a one percentage point austerity-induced reduction in local area gross value added, is associated with an increase in UKIP vote shares in local elections by 1.75 percentage points. Appendix Figure A3 shows that there are no diverging pre-trends in local area gross value added across districts and that the contraction is tightly related with the onset of austerity after 2010.

**Discussion** The previous results suggests that austerity, at the aggregate level, is consistently and significantly associated with the steep rise in support for UKIP after individual austerity measures started to take effect. This effect can be documented across Local, European- and Westminster elections, which use various institutional electoral rules and happen at different points in time.

Despite concerns that support for UKIP is only a proxy measure and may underestimate the true extent of anti-EU preferences, the estimated effects are sizable and substantially meaningful. In particular, *a victory for Remain* in the 2016 EU referendum would have been much more likely, had it not been for the austerity measures. If we interpret the results thus far causally, the estimates of the impact of austerity on the EP elections in Panel B of Table 1 suggests that UKIPs vote share, due to austerity increased by, on average, 3.58 percentage points with a 95%

confidence band ranging from 2.09 - 5.29 percentage points. Given that UKIPs EP vote share in 2014 is correlated with an area's support for Leave in the 2016 in a near one to one fashion as evidenced in Figure 1, this suggests that *a victory for Remain* in the EU referendum – where Leave won with a margin of 3.8 percentage points – lies well within the confidence bands.

A similar analysis for the local election results suggests an even stronger effect: in the event study for 2015 presented in Panel A of Figure 6 suggests that districts exposed to the average austerity shock saw an increase in support for UKIP of 11.62 percentage points. Again, given the tight relationship between UKIP voting and support for Leave, this suggests that the support for Leave vote in these areas exposed to the average austerity shock could have been up to 9.51 percentage points lower (with a confidence band ranging from 8.11 - 10.92 percentage points), had it not been for austerity.[21]

Despite the results being very consistent e.g. when considering the timing of individual reforms, there are still a range of concerns that make it difficult to interpret the results in a causal fashion. In particular, selection into benefit receipt could be endogenous to an area's subsequent exposure to austerity. In addition, austerity may affect political preferences, and in particular preferences for continued EU membership more broadly – not necessarily operating through increasing support for UKIP, but through more broad dissatisfaction. Further, the observed changes in the election results could also simply reflect changing compositions of those who turn out to vote (Guiso et al., 2018). To tackle these concerns, I next turn to an individual level panel, which will allow me to get cleaner identification tracking pools of individuals affected by specific welfare reforms over time.

[21]The back-of-the-envelope calculations linking UKIP voting with the EU referendum are based on simple univariate regressions between the UKIP vote shares and the Leave vote share in the 2016 EU referendum. For the 2014 EP UKIP vote share, the coefficient is around 1 with an intercept of 15 percentage points. For local elections, using the most recent UKIP vote share in a local election prior to the EU referendum, the linear fit has a point estimate of 0.82 and an intercept of 44.7.

# 5 Turning to individual level evidence

To overcome the issues highlighted when studying aggregate data, I next turn to *individual level panel data* constructed from the USOC study starting in 2009. The USOC panel study absorbs and is much larger than then older British Household Panel Study (BHPS), which, I study in the last part of this paper.

## 5.1 Capturing individual exposure to welfare cuts

The main advantage to using individual level data is that, in addition to providing a multitude of reasonable outcome measures capturing facets of political preferences discussed in section 2.2, I can construct much more refined measures of an individual's exposure to specific benefit cuts. The USOC survey module contains a detailed "Unearned Income and State Benefits module Use", which asks the respondent detailed questions about their receipt of welfare and benefit incomes. This allows the construction and identification of reasonably clean subsets of individuals who received benefits of certain types and were thus, exposed to austerity.

The substantive empirical concern for causal identification here is *selection*. Individuals can be exposed to austerity in three different direct ways. First, individuals who have received benefits prior to the reform, may loose benefits altogether as a result of the reforms. The main challenge here is to separate those individuals who loose benefits as a result of welfare reforms vis-a-vis, those whose do not need benefits anymore, as their personal economic situation improves for reasons unrelated to the welfare cuts. Second, and with very similar concerns, individuals who were not receiving benefits, due to a host of reasons (possibly related to austerity), select into receiving benefits from a now less generous welfare state. Third, individuals' who had already and continuously received the same benefit prior to a reform becoming effective could, either see a reduction in the value or a change in the quality of the benefit. I will focus on a subset of welfare reforms that clearly delineate a set of individuals for which selection concerns are limited.

## 5.2 Zooming in on individual benefit reforms

I focus on three welfare reforms which, taken together, affected between 2 - 3 million of households, roughly 10% of all UK households. I discuss these in a bit more detail, before presenting the empirical strategy.

**Council tax benefit abolishment (CTB)** Council tax is a tax levied by local councils used to pay for some local government expenditures and services. Up until April 2013, people on low incomes could be exempted from paying council tax or received a significant rebate. Up until April 2013, the central government financed this benefit, but it was canceled without replacement starting with the new fiscal year. As a result, an estimated 2.4 million households across the UK were asked to pay the full council tax for the first time starting April 2013.[22] The extent of the council tax varies across the UK from local council to local council, but is usually at least around GBP 1,000 per year; the system is known to be among the most regressive taxes, imposing a significantly lower tax burden on high income earners relative to low income earners.[23] I identify the population of individual households affected by this reform based on whether they consistently received council tax benefit *at all the times* they were surveyed prior to April 2013. This identifies a set of participants for which it is quite certain, that they would be affected by the abolishment of the council tax benefit and not conflated by selection.

For the estimating equation to be explored in detail further below, I define a subset of treated individuals as:

$$T_{i,CTB} = \begin{cases} 1 & \text{received council tax benefit prior to April 2013} \\ 0 & \text{else} \end{cases}$$

[22] Some district councils introduced own support schemes. I can take that fully into account controlling for district specific time fixed effects. Further, councils were constrained in their ability to raise council tax rates to offset funding cuts (increases of more than 2 percent trigger a referendum).

[23] Technically, council tax demands are anchored on property values of houses/flats measured in 1991. This results in skewed council tax bills: in the city of York, studio apartments command a council tax bill of GBP 852 per year, while the bill for large villas or mansions is capped at GBP 3,067 per year. With median household disposable income in the UK being GBP 27,300, these are not trivial amounts.

In addition, the USOC survey instrument consistently asked respondents whether they are "behind with their council tax payments", allowing me to provide evidence on a direct impact margin.

**Disability Living Allowance (DLA)** Disability Living Allowance (DLA) is a social security benefit paid to individuals to help cover the cost of a personal care and/or mobility needs as a result of a mental or physical disability. It is tax-free and non-means-tested and non-contributory. Prior to 2013 it could be claimed by UK residents aged under sixty five years. Since its inception, the benefit became more and more complex with more claimants. In May 2012, there were an estimated 3.2 million claimants across the UK.

The Welfare Reform Act of 2012 lead to the replacement of DLA with a new system of benefits called Personal Independence Payments (PIP). PIP could be claimed by working age (16 to 64) claimants and continues to be non-means tested but involves now a significantly tougher face-to-face assessment of the individual's disability to evaluate how the impairment affects the claimants ability to live an everyday life, and their ability to carry out a broad range of everyday activities.

The transfer to the new system caused significant public outcry. While only a relatively small share of DLA claimants saw their benefit withdrawn following the reassessment, a non-negligible share of the 73% that were transitioned to PIP, saw a change in the quality of their award, such as additions of conditionality of requiring regular health checks.[24]

The PIP roll out started from the 28th of October, 2013 and gradually, existing beneficiaries from DLA were converted to PIP. Unfortunately, I do not have information about when individuals started their conversion process from DLA to PIP, since in the benefit income data, these two classes of benefit are lumped together. I focus on the subset of claimants who had a so-called indefinite award of DLA and, prior to the introduction of PIP, were not required to regularly reapply for the benefit to be extended. I code these lifetime recipients as treated from the fourth

[24]Department of Works and Pensions, "Personal Independence Payment: Official Statistics, October 2017", https://goo.gl/M46Tj6, accessed 23.06.2018.

quarter 2013, when the roll out of PIP started. For the empirical design, this set of affected individuals is identified as follows:

$$T_{i,DLA} = \begin{cases} 1 & \text{always received either DLA or PIP} \\ 0 & \text{else} \end{cases}$$

Technically, all DLA recipients with a lifetime award should receive a similar monetary award through PIP, yet, the process and the requirement for regular assessment is said to have caused significant grievances.[25]

**Bedroom tax (BTX)** Housing benefit is a benefit paid to individuals on low income living in social rented housing. From April 2013 all current and future working age tenants renting from a local authority, housing association or other registered social landlord no longer receive help towards the costs of a spare room. This provision was also dubbed the "bedroom tax" in the popular press as it implied that a lot of working age parents, whose children had moved out, found themselves living in accommodation with an extra spare bedroom. The benefit allows for one bedroom for each adult couple, for each single person over 16, for each 2 children of the same sex under 16 and for each 2 children of either sex under 10. Individuals on low incomes claiming housing benefit who were found to have a spare room as per these definitions saw a significant cut in the financial support to pay rent by 14% when found to have one spare bedroom and 25% for those with two or more spare bedrooms.

I identify individuals who were most likely affected by the "bedroom tax" as follows. They must *continuously live in social rented housing* (roughly 16.4% of the sample) and, they must have a spare bedroom as per the governments definition the most recent time they were surveyed before April 2013.[26] This defines a simple

[25]There were also significant concerns about the qualification of the staff tasked with the reassessments, which were outsourced to two private firms. Anecdotes in media are rife with e.g. wheelchair-bound claimants being asked to attend a reassessment appointment in a non-accessible facilities, or claimants with down syndrome being asked when they "caught it", see The Independent, "Disability benefit assessors failing to meet Government's quality standards", https://goo.gl/uX4yD5, accessed 23.06.2018.

[26]The requirement of living continuously in social rented housing is a conservative sample cut

treatment indicator used in the various difference-in-difference estimations.

$$T_{i,BTX} = \begin{cases} 1 & \text{lives in social housing with excess bedroom(s) prior April 2013} \\ 0 & \text{else} \end{cases}$$

The bedroom tax was widely debated in the popular press as it affected more than 660,000 households across the country. The Department of Works and Pensions encouraged households to take in lodgers or to "move to accommodation which better reflects the size and composition of their household."[27] I can directly measure two impact margins relevant to this benefit cut: the number of bedrooms in the respondent's accommodation after April 2013, and further, whether individual's are reporting to be "behind with their rent".

**Combined treatment** In addition to these three groups defining exposure to treatment $T_{i,j}$ with $j \in \{\text{CTB,DLA,BTX}\}$ I also construct a combined dummy $T_{i,\text{ANY}}$ that takes on a value of 1, if a respondent household belongs to either of these groups. In total, 10% of my USOC sample are affected by either of these three treatments, which is similar when comparing to the aggregate estimate from Beatty and Fothergill (2013), suggesting that between 2 - 3 million households (around 10% of UK households) were affected by these three measures. I next discuss the empirical strategy used.

## 5.3 Empirical strategy

As before, I will present results from pooled difference-in-difference designs as well as event studies.

**Pooled difference-in-difference** I begin by estimating simple pooled difference-in-differences, across a range of specifications that include more demanding sets

as some households attempting to avoid the bedroom tax may have moved to the private rented sector due to limited availability of social housing. The spare bedroom indicator is constructed using the information on the household composition and the age distribution of children allowing a near replication of the governments eligibility criteria.

[27] DWP Impact Assessment Housing Benefit: under-occupation of social housing, June 2012, https://goo.gl/xFWDqW.

of fixed-effects. The least demanding specification will be the equivalent to the empirical specifications estimated in the previous sections, controlling for district- and region specific non-linear time effects, but exploiting the individual level data. The most demanding specification takes the following form:

$$y_{i,d,w,t} = \alpha_i + \beta_{d,w,t} + \gamma \times Post_{i,j,t} \times T_{i,j} + \epsilon_{i,d,w,t} \tag{3}$$

In the above specification $i$ indexes an individual respondent, so the inclusion of individual level fixed effects $\alpha_i$ imply that I exploit only *within individual variation*. The time fixed effects, $\alpha_{d,w,t}$ are specific to each of the 378 districts $d$, survey wave $w$ and time $t$ measured in quarters. The specification fully absorbs time varying district specific shocks affecting outcomes of respondents living in the same district $d$ commonly at time $t$, thus absorbing any changes in district level policies that affect all individuals living in the same district.[28] Importantly, these district specific time effects also quite richly control for the indirect exposure to austerity due to general equilibrium effects that the analysis of the local multipliers suggested. Making the time effects specific to the survey wave $w$ further controls for any survey wave specific idiosyncratic differences.

The main coefficient of interest is $\gamma$, which captures changes in the outcome variables $y_{i,d,w,t}$ after a benefit cut $j$ became effective on the subpopulation indicated by $T_{i,j}$. The main outcome variable studied $y_{i,d,w,t}$ is a dummy variable indicating whether respondents reveal a preference towards UKIP. In addition, I study a range of reform specific auxiliary outcome measures that are either immediately relevant to the welfare cuts, or capture political perceptions more broadly.

**Event studies** I also estimate a range of event studies for the specific benefit cuts, using less demanding specifications, but exploiting fully frequency of the survey data that arises due to the staggered data collection for the USOC waves.

The estimation specification is as follows:

[28] Such broader changes, e.g. closures of libraries or parks may also be a direct result of austerity.

$$y_{i,d,r,w,t} = \alpha_d + \beta_{r,w,t} + \sum_{t=2010q1}^{2015q4} \gamma_t \times Time_t \times \mathrm{T}_{i,j} + \epsilon_{i,r,w,t} \tag{4}$$

This specification is almost identical to the specification studied when using aggregate data with two differences. The time fixed effects $\beta_{r,w,t}$ are resolved at the quarterly level specific to the survey wave $w$. I estimate a full set of quarter time-effects $\gamma_t$, allowing me to draw event studies plots showing how the outcome variables $y_{i,d,r,w,t}$ evolved over time relative to the timing specific to a reform $j$.

## 5.4 Results

I first discuss the results from the pooled difference-in-difference exercise, before turning to the event studies.

**Pooled difference-in-difference** The pooled difference-in-difference results are presented in Table 3. The dependent variable in this table is a dummy indicating whether an individual expressed support for UKIP. Columns 2-4 provide estimates for the three different welfare reforms affecting different subpopulations, while column 1 combines these into a single treatment indicator that gets switched on after April 2013. The different Panels A - C employ different sets of fixed effects for the estimation. Panel A employs simply district- and region by survey wave by time fixed effects. This is the empirical design that comes closest to what was estimated in the previous sections, exploiting district level variation. Throughout the different welfare reforms, the population likely exposed to specific welfare reforms is significantly more likely to express support for UKIP after these reforms became effective. The point estimates are economically sizable, indicating that the treated population sees an increase in the propensity to support UKIP by between 2.5 - 4.7 percentage points. In relative terms, the increase in the propensity to support UKIP by between 53 - 100% (relative to the mean of the dependent variable which stands at 4.7%). While the mean of the dependent variable appears low, suggesting that the effects are driven by a small subpopulation, they should be seen relative to other political parties. The Liberal Democrats, the UK's third biggest party, sees expressed support in the USOC population averaging at just 8.2%; hence, the UKIP

figures are not dramatically lower. Nevertheless, in the next section, I will explore a set of broader outcome measures to allay some concerns about the validity of the outcome measure.

Panel B only exploits within district variation, controlling for district by survey wave by time fixed effects. This effectively controls for any idiosyncratic and time varying shocks affecting all residents in a specific area. Such common shocks could, e.g. be capturing the indirect economic effects of austerity affecting the wider local economy or other local shocks. Throughout, the results remain very similar across the different measures.

In Panel C finally, I only exploit within individual variation within districts, controlling, in addition to the district by survey wave by time fixed effects, also for individual level fixed effects. This comes at the cost of losing some statistical power, yet, the results remain precisely estimated throughout.

**Event studies** I next turn to the event studies for the three different welfare reforms. I will use this also to provide some auxiliary evidence capturing effects along margins immediately relevant to the individual welfare reforms.

I begin by studying the abolishment of council tax benefit. The results are presented visually in Figure 7. The left panel presents the average support for UKIP among those individuals who have consistently received council tax benefit at all times prior to its abolishment. The vertical line marks the date from which the council tax benefit was abolished. The propensity of support for UKIP is consistently higher, on average, after the benefit was abolished in this subpopulation. Panel B presents evidence suggesting that the abolishment of council tax benefit lead to increased economic pressures among those who received the benefit in the past. The share of individuals in this group that states that they are in arrears with their council tax payments rises sharply and in a very timely fashion.

Next, I turn to study the conversion of lifetime DLA claimants to PIP. This result is presented in Figure 8. Again, with the reform becoming effective, the set of likely lifetime claimants of disability living allowance see a marked increase in their likelihood to support UKIP. There is no evidence that this particular benefit

increased direct economic grievances, but, this set of respondents is particularly likely to state that they perceive that "government officials do not care", suggesting that the grievances were not direct economic but relate to the perceived treatment by the welfare system.

Lastly, I turn to study the effects of the bedroom tax, which affected households on low incomes living in social rented housing. The results are presented in Figure 9. The left panel presents the effects on support for UKIP among the group of individuals affected by the bedroom tax. While the pattern is a bit more noisy, there is a consistent increase in support for UKIP among this subpopulation. The central panel explores an economic margin directly relevant to those individuals who, likely, saw a cut to the housing benefit payment: they are significantly more likely to be in arrears with their rent, suggesting that the cut to housing benefit due to the spare bedroom increased rent arrears. Lastly, the right panel studies the number of bedrooms as a response variable. This is immediately relevant as the "bedroom tax" could be avoided if households moved to smaller accommodation. The pattern is quite consistent, suggesting that households did indeed move to smaller accommodation, thus avoiding some of the direct economic grievances.

Together, these results provide compelling evidence in support of the underlying common trends assumption inherent to the previously presented difference-in-difference estimates. Furthermore, for a few of the benefit cuts, I am able to show adjustment margins immediately relevant to specific welfare reforms, highlighting that the exposure to these reforms is likely to have created some grievances relevant to inform political preferences. I next turn to study broader outcomes.

## 5.5 Broader outcome measures

Expressing political support for UKIP may only be one specific outcome measure, but the political responses to austerity could be much broader, such as support for the other political parties, general likes- or dislikes, or broader perceptions of disenfranchisement or feeling treated badly and without political voice (which in turn, are strong correlates of support for Leave as I will show).

I turn to two sets of other outcome measures.

**Support and like or dislike for other parties** I first present results capturing shifts in expressions of support for other political parties. These are presented in Table 4. Panel A suggests that there is a statistically significant and sizable reduction in the support for the Conservative party. The underlying effect size is similar in magnitude to the increase in support for UKIP that was observed. There is more mixed evidence for the other political parties when studying specific welfare reform measures in column (2) - (4). The results in the combined treatment group in column (1) suggests that support for the left-leaning political parties Labour and the Liberal Democrats increase among those affected by either of the three welfare reforms. On the other hand, there is a reduction in those reporting that they would not vote for any party if there was an election tomorrow (and are neither a supporter, nor feel closer to any specific party) in Panel D. The latter could suggest that some of the increase in support for UKIP may be drawn out of this pool of potential voters, yet, in the Appendix I show this is not the case (rather, Labour wins from this pool).[29]

In Appendix Table A3, I present results drawing on measures of the intensity of like or dislikes of the three established political parties (the Conservatives, Labour and the Liberal Democrats) on a 10 point Likert scale. The results suggest that, respondents affected by the combined *any welfare reform* measure are much more likely to express a scores indicating a strong dislikes for the Conservative party.

**Perception of politics more broadly** In Table 5, I present evidence for three additional survey questions, asking whether individuals perceive that "Public officials do not care", that they "Don't have a say in what government does" and that "your vote is unlikely to make a difference" when asked about the perceptions of the relevance of the respondents vote in affecting general election outcomes in their

[29]This analysis is presented in Appendix Table A2. I construct a measure of the initial political party preference the first instance respondents appear in the USOC data and estimate a heterogenous effect version, capturing how exposure to the combined *any welfare reform* treatment affects an individual's stated support for any political party as a function of the baseline political preferences. The results suggest that those who become UKIP supporters, are mostly original supporters of the Conservatives, the Liberal Democrats and a few other parties and not drawn from individuals who, the first time they were surveyed, reported that they support no political party.

constituency. The perception of having no political voice is something that was prominently leveraged in the EU referendum campaign, with voters being suggested that voting against EU membership is a vote against the status quo (Ford and Goodwin, 2017). Throughout each of these measures that governs the perception of individuals of the public sector, the institution of voting or the feeling of having no voice strongly and significantly increases in the population (likely) affected by either of these three welfare reforms studies. This is consistent with the idea that austerity contributed to a feeling of disenfranchisement or disconnect from the established political parties and institutions, and encouraging voters to support more extreme policy positions or engage in protest voting (Myatt, 2017).

I next show that exposure to welfare reforms – as per our above definitions – not only increased propensity to support UKIP and increased perceived marginalization – but is further, strongly linked to supporting Leave in the EU referendum.

## 5.6 Welfare reform exposure and support for Leave

The most recent wave of the USOC survey asks the EU referendum question. In that data, Remain has a clear majority with only 43% of the respondents expressing support for Leave. While the data for the this survey wave is still being collected and not publicly released, a pre-release version has been made available to a selected set of researchers working on Brexit topics.[30] Appendix Figure A4 suggests that, among the USOC respondents that express support for UKIP the most recent time they were surveyed, 87% would support Leave, which non-surprisingly suggests that the revealed expressions of support for UKIP are a good (time-varying) proxy variable that picks up pro-Leave political preferences.

I estimate how the individual propensity to support Leave differs among individuals (likely) exposed to the specific welfare reforms, contrasting with other individuals living in the same local authority districts, yet (likely) not exposed

[30]The data is expected to be released towards the end of 2018. I would like to thank Nicole Martin for her support and sharing details of the data. Alabrese et al. (2018) use the data to perform a horse race to assess the predictive power of individual versus aggregate level socio-economic variables in explaining leave voting tendencies.

to the austerity induced welfare-reforms.[31] I estimate versions of the following cross-sectional regression:

$$y_{i,d} = \beta' X_{i,d} + \gamma \times T_{i,j} + \epsilon_{i,d} \tag{5}$$

The above specification exploits variation in Leave-preferences between individuals $i$ within a district $d$. I add iteratively richer sets of controls $X_{i,d}$ and present the estimated differential in leave support between individuals (likely) exposed to the welfare reforms and those not.

The results are presented in Table 6. Moving across different columns, I iteratively add more demanding sets of control variables. In column (1), only include district fixed effects are included. In column (2), I add the qualification group fixed effects, column (3) adds age fixed effects allowing a different level of support for Leave for respondents at each different age, column (4) adds employment status fixed effects (in total ten different categories such as employed, unemployed, student,..), column (5) adds gross household income decile fixed effects, column (6) includes the industry of employment fixed effect across 19 different sectors (this subsets the sample including only respondents in employment), column (7) controls for socio-economic status group of the occupation (across eight categories), while column (8) controls a set of dummy variables capturing whether individuals, in the most recent survey, reported any of 17 different health conditions.[32]

The remarkable observation throughout is that the differential degree of support for Leave among individuals (likely) exposed to any of the three welfare reforms studied in the previous sections is sizably and robustly larger. The set of control variables that I add successively are particularly important, as they further speak to the robustness of the results. In the motivating evidence presented in section 3, I show that areas with significant shares of the local population having low

[31] The actual EU referendum results were not collected at a level finer than the district, which served as official counting areas. Hence, the USOC data is the only way to capture cross-sectional measures of support for Leave, while controlling for district fixed effects.

[32] These health conditions include, among others, Asthma, Arthritis, Cancer or Malignant tumors, Diabetes, Depression, High Blood Pressure.

qualifications, being employed in retail- or manufacturing sector jobs or working in routine jobs saw a significant uptick in electoral support for UKIP. In the results in Table 6, I control for these characteristics measured at the individual level, and observe that individuals likely exposed to any of the three welfare reforms see, on average, about a 7 percentage points higher level of support for Leave.

Appendix Table A4 further shows that the additional outcome margins explored in the previous sections are also strong correlates of support for Leave over and above what is captured by whether individuals report supporting UKIP, suggesting that support for UKIP is a proxy that quite likely understates the extent to which exposure to the welfare reforms may have contributed to the built up of anti-EU political preferences culminating in the Leave vote.

In the last section, I shed some more light on longer running economic trends and how the austerity-induced welfare reforms feature in that context, linking back the findings to the existing literature.

# 6 Welfare cuts in context of longer running trends

The extent to which the welfare state is functioning, cushioning out economic shocks, is an important ingredient to maintain political support for globalization or immigration. In this section, I link back to provide an understanding of the broader economic context into which austerity, and the subsequent vote to leave the EU falls. In order to be able to say something substantive about longer running economic trends, I combine data from the earlier British Household Panel Study (BHPS) and the later, Understanding Society survey data that I used in the previous sections. The BHPS is a much smaller study and was first launched in the early 1990s. From 2001, it became a UK wide study.

Some of the roughly 8,000 BHPS participants continue to contribute to the USOC panel study, since the BHPS was discontinued in 2008/2009. The USOC and the BHPS data can be harmonized and combined on some central questions, such as benefit-, labor- and gross income as well as basic measures of human capital, employment status and sector of employment. This allows a further view of

the data, in particular, to shed light on the relative evolution of different types of incomes, particularly, along the human capital divide. The consistent and recurring feature of cross-sectional analysis of populist voting suggest that support is significantly concentrated in population strata with relatively low human capital. These are also the areas, that typically also most reliant on the welfare state.

**Estimating robust trends** Combining the data from the BHPS survey rounds 11-18 and the USOC data, I can exploit a representative panel over this 15 year period, exploiting only *within individual variation*.

In particular, I estimate

$$y_{i,d,r,w,t} = \alpha_i + \beta_{d,w,t} + \sum_{t=2001}^{2015} \gamma_t \times Time_t \times \mathrm{X}_{i,t} + \epsilon_{i,r,w,t} \tag{6}$$

The dependent variable $y_{i,d,r,w,t}$ measures either the individual level monthly labor-, benefit- and gross incomes over time. This specification controls for individual respondent fixed effects $\alpha_i$, exploiting the fact that both the USOC and the BHPS are panels, where some of the BHPS respondents continue to contribute to USOC. Further, I control flexibly for local authority district by survey wave and year fixed effects, controlling in a very parsimonious fashion for district specific economic development. The coefficients of interests are the point estimates on $\gamma_t$, capturing the extent to which an individual $i$'s educational attainment correlates with the evolution of individual income (by source) over time, exploiting only individual level variation between residents living in the same district.[33]

**Results** The results are visually presented in Figure 10. Panel A presents the trends pertaining to respondents with low human capital, that is, no formal qualifications and no secondary school leaving certificate. The results suggest that throughout the last 15 years, monthly labor incomes for those with low human capital has, in relative terms, evolved negatively. Relative to the rest of the population, low human capital individuals had a slight labor income premium at the onset, but this has been gradually eroded over time, turning negative, indicat-

[33]Individual survey participants may move across the UK between different census rounds. The patterns presented here are robust to removing movers from the estimating sample.

ing that relative to the rest of the population, labor incomes have fallen short. The central panel in Panel A presents the evolution of monthly benefit income. While that stays flat for the early years in the 2000s, from around 2005 onwards, there is a steady growth in benefit incomes to individuals with low human capital. This trend growth comes to an abrupt halt from 2011 onwards. The last column presents gross income, that includes labor-, and benefit income. For most of the earlier 2000's gross income for individuals with low educational attainment is trending downwards, this trend is flattened out for the period between 2008 to 2012, as benefit income is evening out the relative income losses. From 2014 onwards, there are marked drops in gross income.

Panel B studies the trends pertaining to respondents with high human capital, having completed at least an undergraduate university degree. Labor income for this group of individuals has trended up significantly over time in an uninterrupted fashion. Benefit income, which for those groups of individuals are most likely the non non-means tested child benefit, which only became means tested from 2013 onwards, is trending down and flattens out as well post 2011. This suggests that both, high income as well as low income earners were affected by austerity. Yet, while gross incomes fell in relative terms for those with low human capital, it continued to grow for individuals with a university degree.

This suggests three things: first, while labor income for individuals at the lower end of the skill divide saw significant downward trends over time, it markedly increased in relative terms for those at the top end of the human capital divide, suggesting significant increase in the skill-divide (Card and DiNardo, 2002; Lemieux, 2006). Second, the welfare state was responsive, evening out these growing inequalities, yet this came to an abrupt halt as the Conservative-led coalition government's austerity measures took effect. Third, gross income inequality is likely to have increased since 2010, as the positive trend growth in labor and gross income for those with university degrees continues.

**Discussion** Linking back to the existing literature, in particular, the seminal work by Autor et al., 2013 which documents how trade integration with China lead to

job losses and economic grievances in the context of the US. The patterns presented here suggest that the welfare state in the UK was quite responsive, and may have helped cushioning the political cost of trade integration. Nevertheless, as shown in Appendix Figure A5, the patterns presented here are robust to only including individuals that have never reported to have worked in either manufacturing, agriculture or mining. These sectors are the ones that are typically considered to be directly affected by the economic pressures of trade integration in this literature. This evidence, in addition to the previous results suggests that the economic grievances and the secular relative decline in labor incomes for those with low human capital, can not be explained studying trade integration alone. Other factors, such as general structural transformation (Rogerson, 2008; Rodrik, 2016), the rise of automation (Caprettini and Voth, 2015; Graetz and Michaels, 2015), skill-biased technological change more broadly (Acemoglu, 1998; Autor et al., 1998, 2003), the rise of the gig economy or possibly migration affecting wages at the lower end of the wage distribution (Becker and Fetzer, 2018; Dustmann et al., 2013) are likely to feature among additional important explanations behind these trends.

What combines these developments is that an *active welfare state* can help even out the distributional effects caused by the underlying trends and may thus help to maintain popular support e.g. for continued trade integration or migration.[34] This paper suggests that, reforms to the welfare state, likely also creating losers, may cause a significant political backlash.

# 7 Conclusion

The UK's decision to leave the EU is a watershed moment in European history, marking an end to a seventy year process of continued economic and political integration. Understanding the underlying causes for why the UK's electorate voted to Leave the EU is of utmost importance – not only for the UK as it disentangles itself from the European project – but for many other European countries, that see a

[34] Hassler et al. (2003) provide a formal argument suggesting that skill-biased technical change may undermine the viability of the welfare state.

growth in support for political parties campaigning on anti-EU political platforms.

This paper presents novel and comprehensive evidence suggesting that austerity-induced welfare reforms brought about by the Conservative-led coalition government from late 2010 onwards are key to understanding Brexit. Austerity-induced welfare reforms are a strong driving factor behind the growing support for the populist UKIP party in the wake of the EU referendum, contributed to the development of broader anti-establishment preferences and are strongly associated with popular support for Leave. The results suggest that the EU referendum either may not have taken place, or, as a back of the envelope calculations suggests, could have resulted in a victory for Remain, had it not been for austerity. By combining evidence from the population of all electoral contests in the UK since 2000, together with a wealth of evidence stemming from individual level panel data, this paper is among the more comprehensive studies of the UK's political landscape around the EU referendum thus far.

While exposure to austerity-induced welfare reforms is a key activating factor, contributing to the build up of anti-EU preferences and support for populist parties, the underlying economic causes that lie behind the growing reliance and exposure of (especially low skilled) individuals on the welfare state is of key relevance to the broader public and political debate. This paper provides some suggestive auxiliary evidence indicating that factors contributing to the growing skill-divide in labor markets are likely to go beyond trade-integration alone, which is a key driver explored in an important growing literature.

Important future work is needed to systematically take stock to quantify the relative contribution of the range of factors contributing to the development of (relative) economic grievances along key socio-economic fault lines. This can help inform political decision making and contribute to the design of welfare-systems ready for the 21st century.

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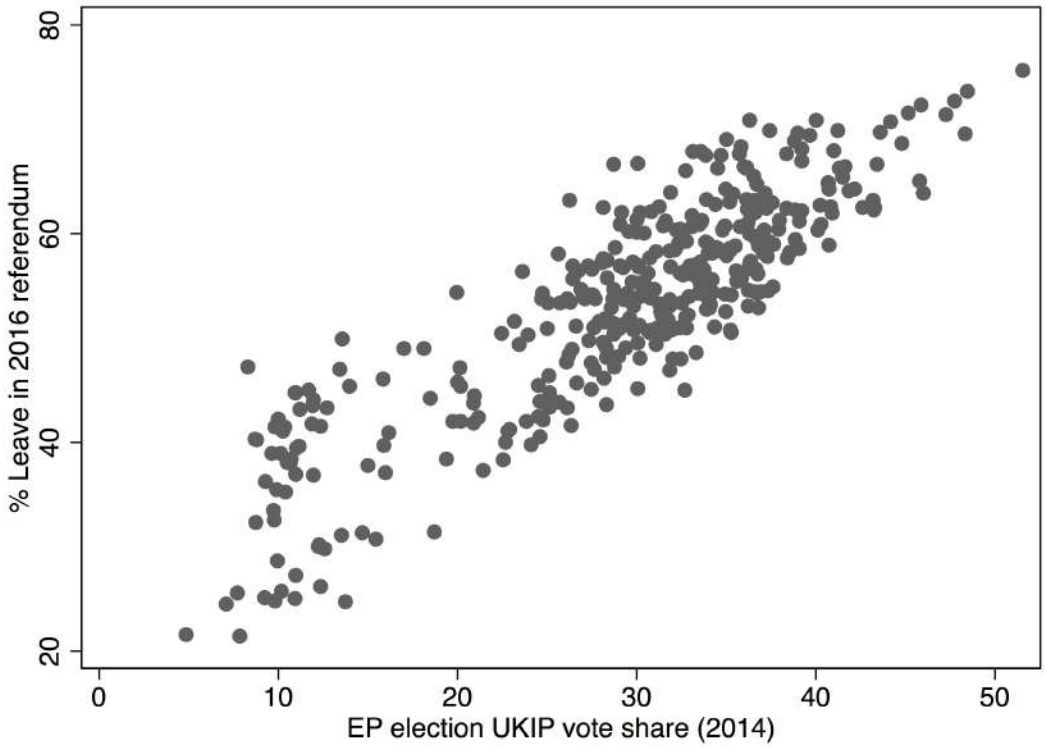
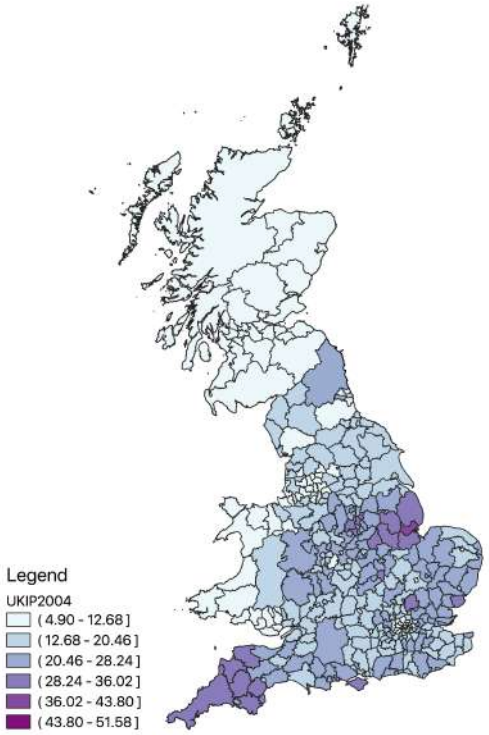
Figure 1: UKIP Election Result in 2014 EP elections and EU referendum vote leave.



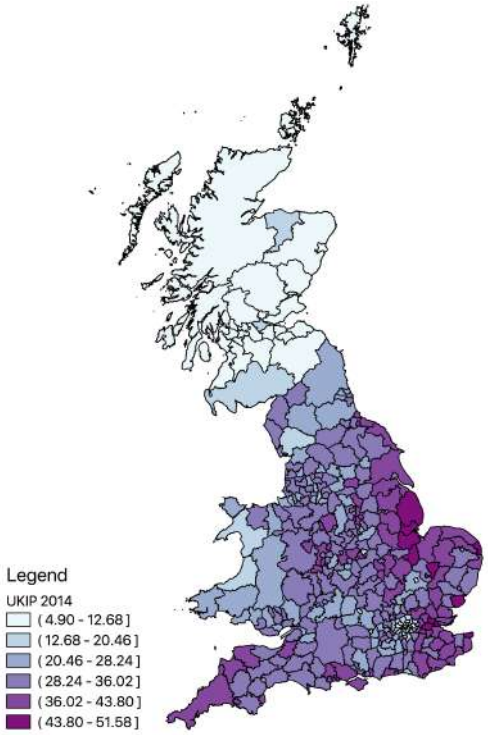

**Notes:** The R-squared of a univariate cross-sectional regression of support for Leave and UKIP vote share in the 2014 elections is 75%, and the point estimate is a near straight line with an intercept of 15 percentage points, suggesting that UKIP EP vote share plus 15% does a reasonably good job predicting the EU referendum vote share for Leave.

Figure 2: UKIP vote share in the EP elections in 2004, 2014 and the Leave share in the 2016 EU referendum

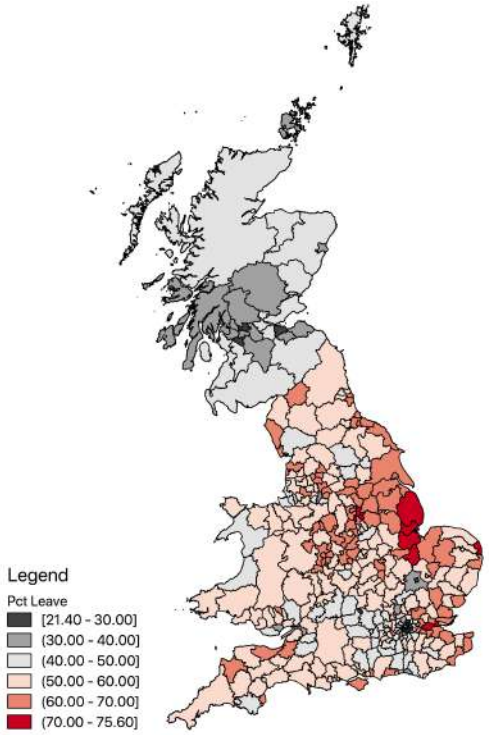
Panel A: UKIP vote in 2004




Panel B: UKIP Vote in 2014



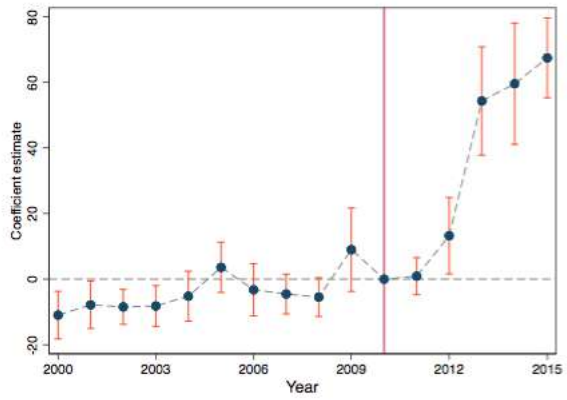

Panel C: Leave share



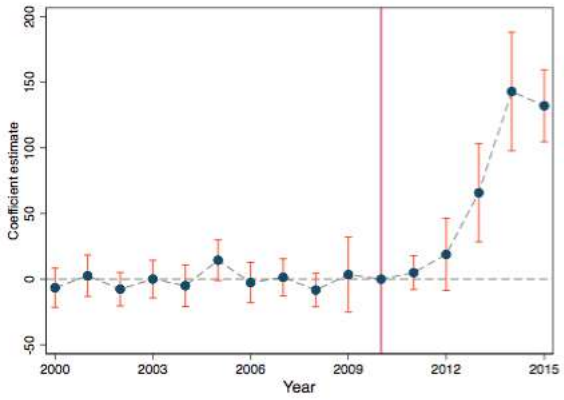

**Notes:** This map displays the UKIP vote share in the European Parliamentary elections in 2004 and 2014 in Panel A and B, and the share of the electorate that voted leave in the 2016 EU referendum across local authority districts in Panel C.

Figure 3: Non-parametric effect of educational qualification, socio-economic status, and sectoral employment of the resident population as of 2001 on support for UKIP over time

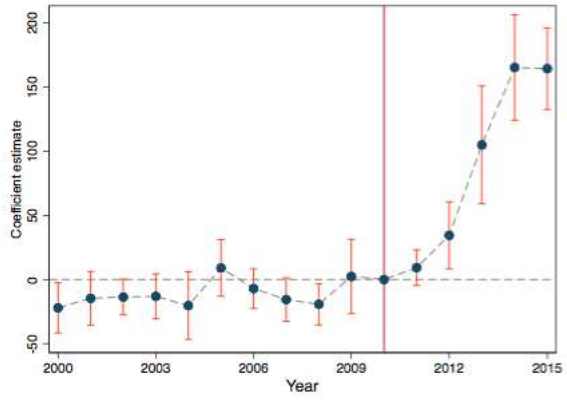
Panel A: No qualifications



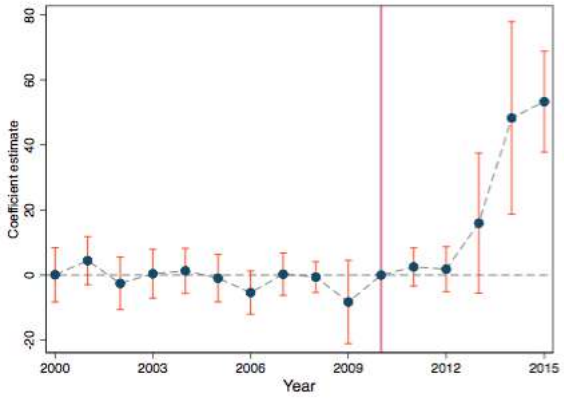

Panel B: Routine jobs




Panel C: Retail

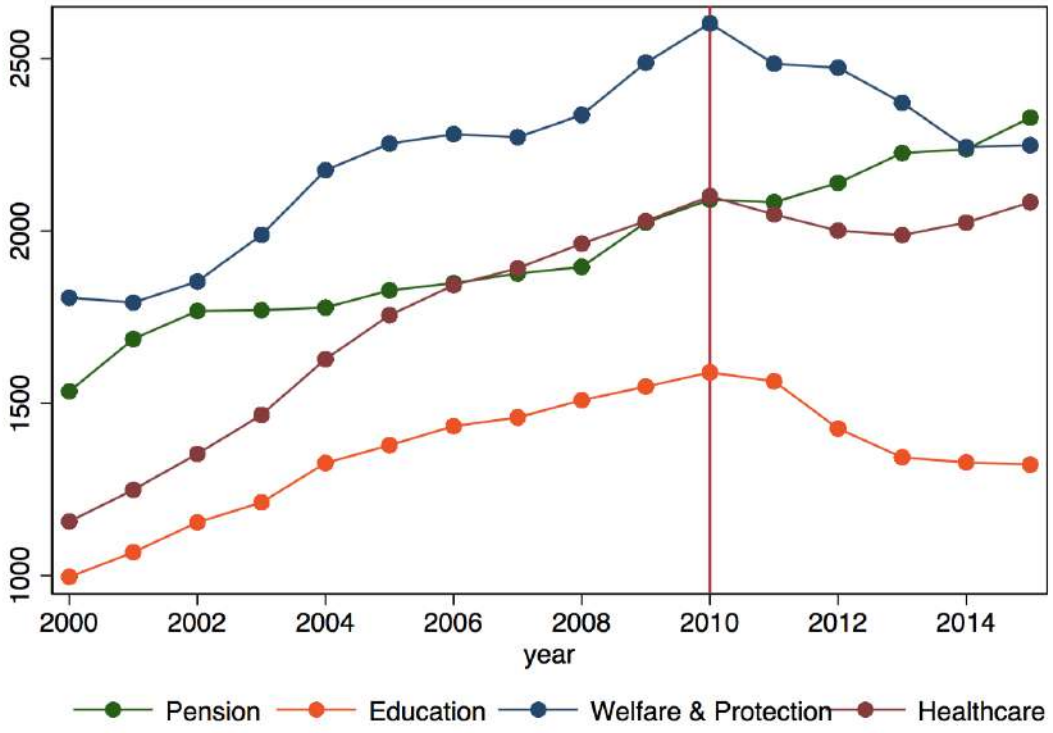



Panel D: Manufacturing



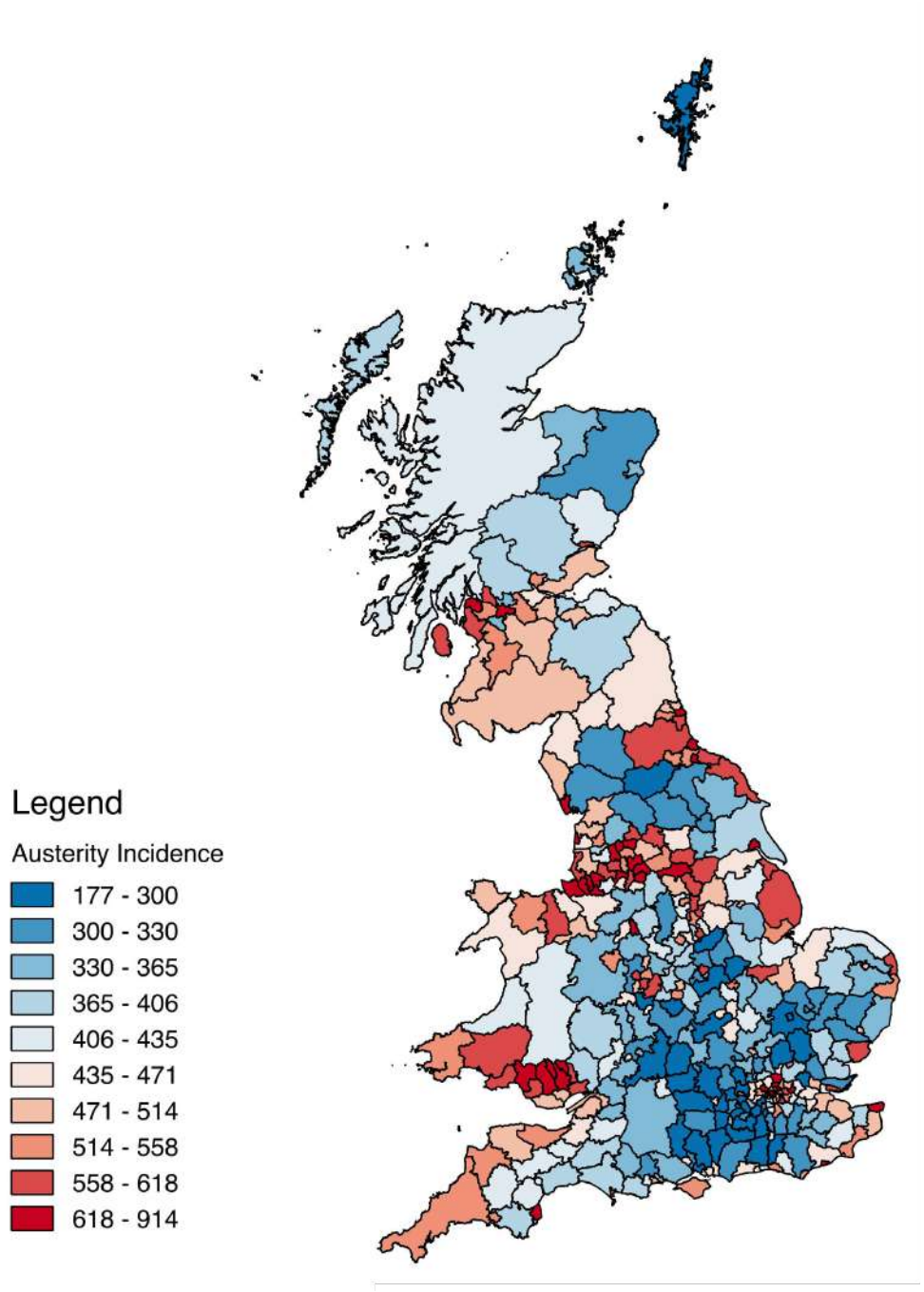

**Notes:** The dependent variable is the percentage of votes for UKIP in local council elections. Panel A uses the share of the resident population with no formal qualifications as of 2001. Panel B uses the share of the resident population in Routine jobs as per the National Socio-Economic Classification of Occupations as of 2001. Panel C uses the share of the resident working age population employed in the Retail sector, while panel D uses the share of the resident working age population employed in Manufacturing. The graph plots point estimates of the interaction between these cross sectional measures and a set of year fixed effects. All regression include local authority district fixed effects and NUTS1 region by year fixed effects. Standard errors are clustered at the district level with 90% confidence bands indicated.

Figure 4: Aggregate real government spending per capita over time across three broad spending categories across the different tiers of government




**Notes:** Figure plots real aggregate spending per capita using data from HMRC for the years between 2000-2015. Aggregate totals are divided by total population from the National Office of Statistics and the annual CPI with 2015 being the base year. The four series account for – on average – account for 68% of government spending over the sample period.

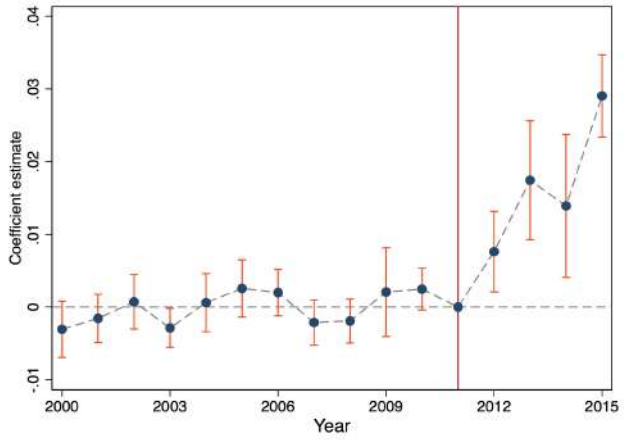
Figure 5: Distribution of austerity shock across local authority districts across the UK



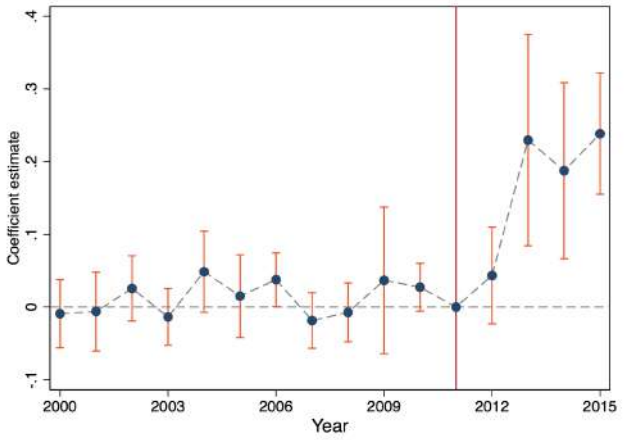

**Notes:** This map displays the spatial distribution of the Austerity shock across local authority areas in the UK. The size of the shock is measured as the anticipated losses in benefit income per working age individual and year from Beatty and Fothergill (2013)..

Figure 6: Non-parametric effect of austerity on support for UKIP overall and by individual measures.

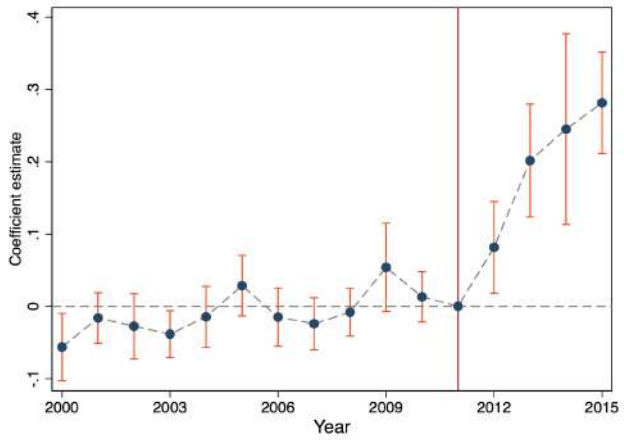
Panel A: Overall austerity shock



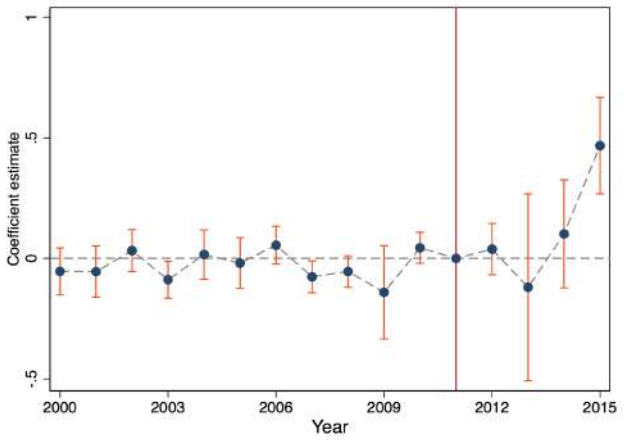

Panel B: Council Tax Benefit




Panel C: Disability Living Allowance

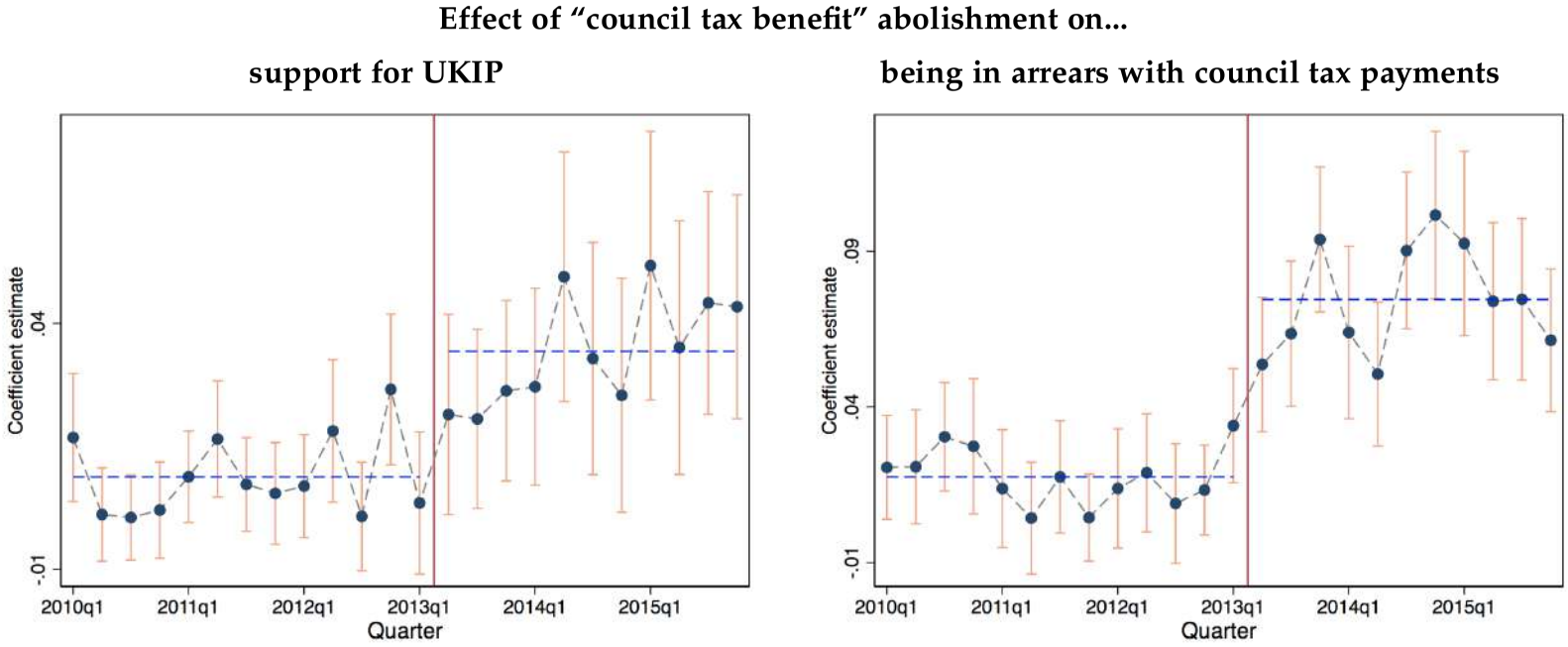



Panel D: Bedroom Tax



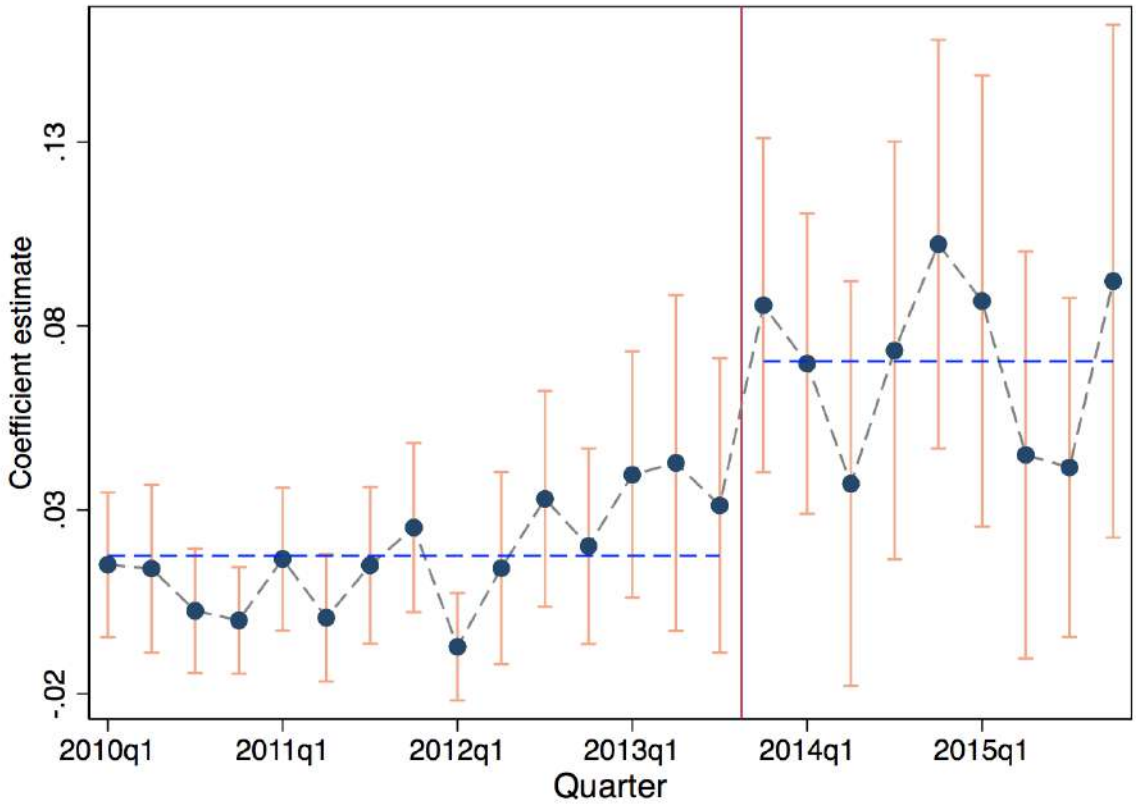

**Notes:** The dependent variable is the percentage of votes for UKIP in English and Welsh local council elections from 2000-2015. The graph plots point estimates of the interaction between these simulated incidence of the austerity measures and a set of year fixed effects. All regression include local authority district fixed effects and NUTS1 region by year fixed effects. Standard errors are clustered at the district level with 90% confidence bands indicated.

Figure 7: Impact of abolishment of national council tax benefit system effective April 2013 on support for UKIP and being behind on council tax payments



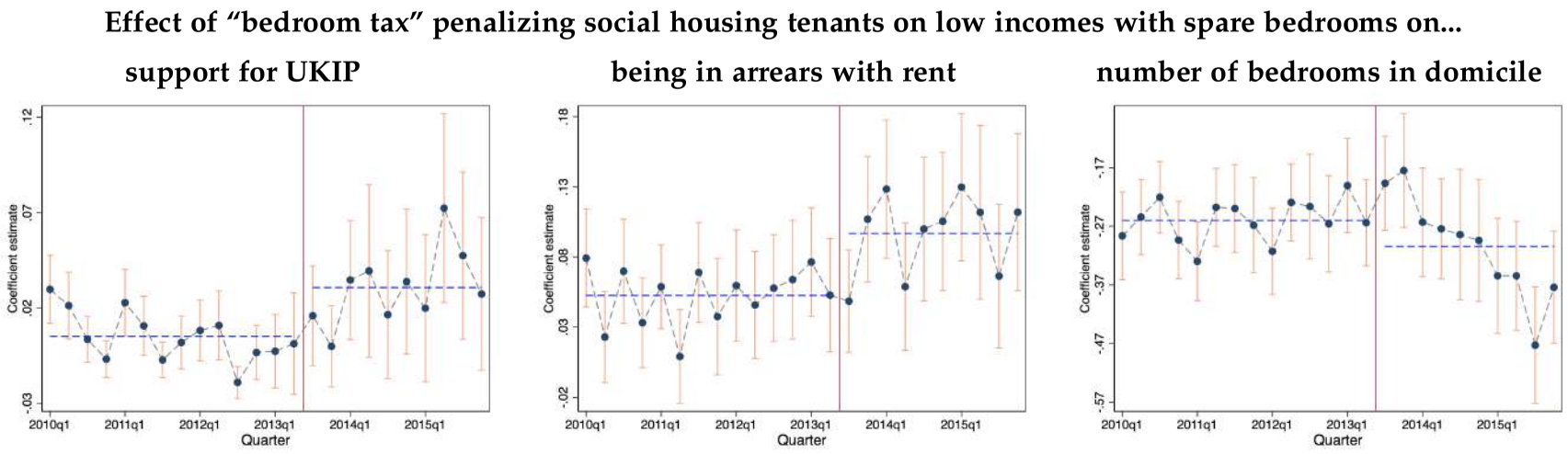

**Notes:** Figure plots event studies studying the impact of the abolishment of council tax benefit on previous recipients. The dependent variable in the left panel is a dummy variable indicating whether the respondent revealed a political preference in support of UKIP. The dependent panel in the right hand side is an indicator variable indicating whether the respondent is behind with his or her council tax payments. The regressions control for counil by survey wave by time fixed effects. The graph plots point estimates of the interaction between an indicator variable indicating whether the individual respondents received council tax benefit at each point in time in the three years prior to the reform in which they were observed in the sample interacted with an indicator for the survey quarter. Standard errors are clustered at the district level with 95% confidence bands indicated.

Figure 8: Impact of "disability living allowance" conversion starting October 28 2013 on support for UKIP




**Notes:** Figure plots event studies studying the impact of the abolishment of council tax benefit on previous recipients. The dependent variable in the left panel is a dummy variable indicating whether the respondent revealed a political preference in support of UKIP. The dependent panel in the right hand side is an indicator variable indicating whether the respondent is behind with his or her council tax payments. The regressions control for counil by survey wave by time fixed effects. The graph plots point estimates of the interaction between an indicator variable indicating whether the individual respondents received council tax benefit at each point in time in the three years prior to the reform in which they were observed in the sample interacted with an indicator for the survey quarter. Standard errors are clustered at the district level with 95% confidence bands indicated.

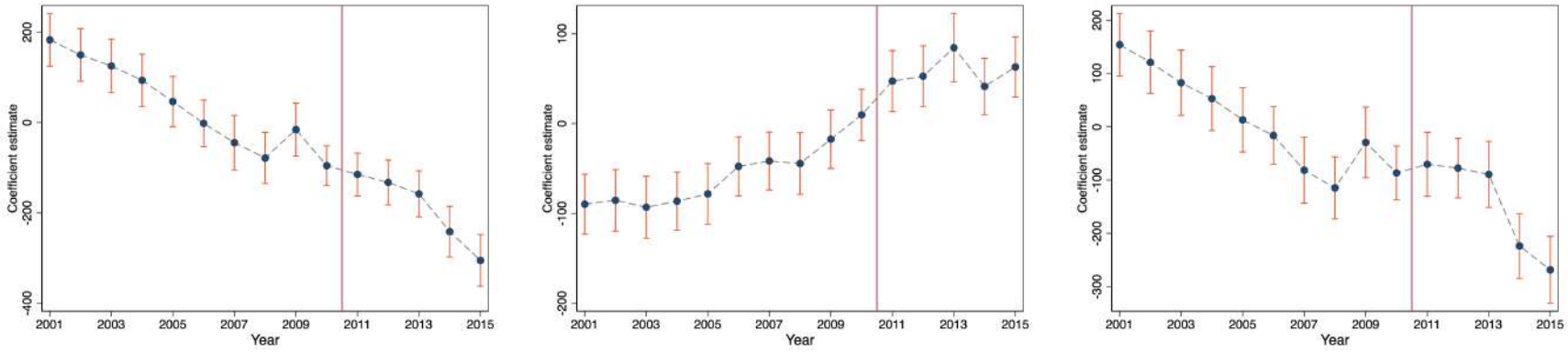
Figure 9: Impact of "bedroom tax" effective April 2013




**Notes:** Figure plots event studies studying the impact of the bedroom tax penalizing households receiving housing benefit living in social housing and are judged to have a spare bedroom. The dependent variable in the left panel is a dummy variable indicating whether the respondent revealed a political preference in support of UKIP. The dependent panel in the center column is an indicator whether respondents state that they are in arrears with their rent, while the outcome variable in the right panel is the number of bedrooms in the dwelling that a respondent lives in. The regressions control for council by survey wave by time fixed effects. The graph plots point estimates of the interaction between an indicator variable indicating whether the individual respondents are living in social rented housing at each point in time observed in the data and are judged to have an extra bedroom at the most recent time they were surveyed relative to the reform becoming effective in April 2013. Standard errors are clustered at the district level with 95% confidence bands indicated.

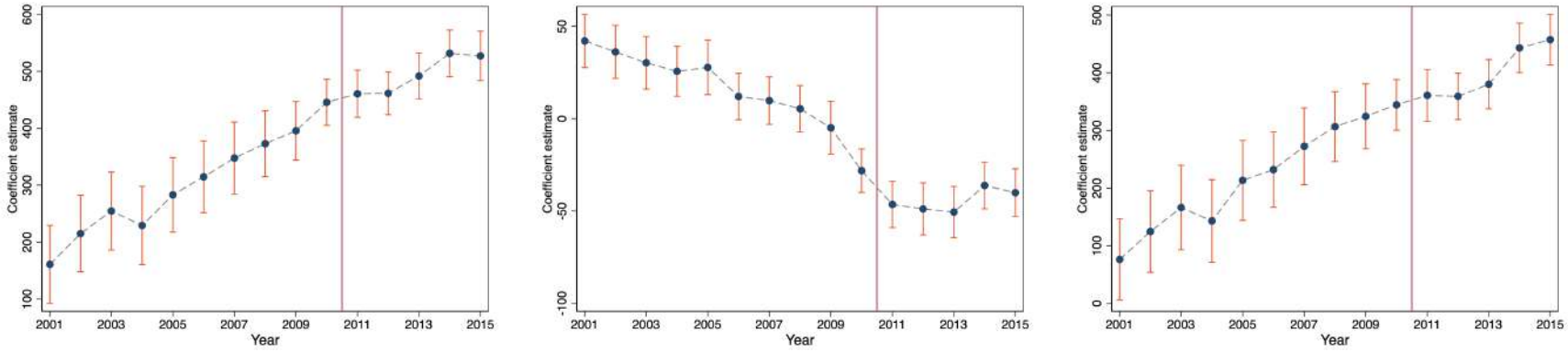
Figure 10: Non-parametric estimates capturing the evolution of labor and benefit income *within individuals* over time for respondents with low- and high levels of educational attainment

***Panel A:* Evolution of benefit and labor income for individuals with no qualifications**




Labor income | Benefit income | Gross income

***Panel B:* Evolution of benefit and labor income for individuals with university degree**




Labor income | Benefit income | Gross income

**Notes:** The dependent variable is the monthly gross labor income on the left, and the monthly benefit income on the right. The population is restricted to the sample of BHPS and USOC respondents that are not retired. The BHPS survey waves 11-18 start in 2001 and end in 2009, while the larger USOC survey starts in 2009 and includes some, but not all of the former BHPS respondents. The graph plots point estimates of the interaction between the qualification status of respondents (having no qualifications in top row, versus having a university degree in bottom row) on monthly labor or benefit income. All regression include individual respondent fixed effects and local authority by survey wave by time fixed effects. Standard errors are clustered at the district level with 90% confidence bands indicated.

Table 1: The Impact of different austerity measures on support for UKIP across Local, European and Westminster elections

| | (1) Overall | (2) TC | (3) CB | (4) CTB | (5) DLA | (6) BTX |
|---|---|---|---|---|---|---|
| *Panel A:* Local | | | | | | |
| $\mathbb{1}$(Year>2010) × Austerity | 0.014*** | 0.081*** | 0.036 | 0.128*** | 0.166*** | 0.162* |
| | (0.003) | (0.013) | (0.044) | (0.036) | (0.031) | (0.086) |
| Mean of DV | 4.49 | 4.49 | 4.49 | 4.49 | 4.49 | 4.49 |
| Local authority districts | 345 | 346 | 346 | 346 | 346 | 346 |
| Observations | 3260 | 3263 | 3263 | 3263 | 3263 | 3263 |
| *Panel B:* European | | | | | | |
| $\mathbb{1}$(Year>2010) × Austerity | 0.008*** | 0.049*** | 0.054* | 0.060** | 0.128*** | 0.001 |
| | (0.002) | (0.009) | (0.028) | (0.028) | (0.018) | (0.047) |
| Mean of DV | 21.1 | 21.1 | 21.1 | 21.1 | 21.1 | 21.1 |
| Local authority districts | 378 | 379 | 379 | 379 | 379 | 379 |
| Observations | 1134 | 1137 | 1137 | 1137 | 1137 | 1137 |
| *Panel C:* Westminster | | | | | | |
| $\mathbb{1}$(Year>2010) × Austerity | 0.008*** | 0.076*** | -0.025 | 0.064 | 0.178*** | 0.043 |
| | (0.002) | (0.009) | (0.025) | (0.041) | (0.021) | (0.030) |
| Mean of DV | 6.03 | 6.03 | 6.03 | 6.03 | 6.03 | 6.03 |
| Harmonized Constituencies | 566 | 566 | 566 | 566 | 566 | 566 |
| Observations | 2047 | 2047 | 2047 | 2047 | 2047 | 2047 |
| Avg Loss per working age adult | 447.1 | 87.97 | 71.52 | 7.21 | 36.57 | 10.81 |
| Affected HH. in 1000s | | 4507 | 7601 | 2436 | 499 | 660 |
| *Correlation with...* | | | | | | |
| No qualification share | | .75 | .17 | .51 | .77 | .58 |
| Routine job share | | .6 | .12 | .27 | .62 | .43 |
| Retail sector share | | .35 | .28 | .02 | .21 | .08 |
| Manufacturing sector share | | .3 | .11 | -.03 | .37 | .24 |

Notes: Table reports results from a panel OLS regressions with the dependent variable being UKIP's vote share in English and Welsh Local Elections from 2000 to 2015 in Panel A, European Elections in Panel B and Westminster Elections in Panel C. The regressions control for local authority district fixed effects in Panels A and B, and harmonized constituency level in panel C as well as NUTS1 region by year fixed effects throughout. Standard errors clustered at the Local Government Authority District Level in Panel A and B and at the Harmonized Constituency level in Panel C, with standard errors presented in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: The Impact of different austerity on local area gross value added by sector with spending multiplier estimates

| Sector | (1) Overall | (2) Retail & Distr. | (3) Public admin | (4) Manuf. | (5) Business Serv. | (6) Construction | (7) Financial Serv. |
|---|---|---|---|---|---|---|---|
| $\mathbb{1}$(Year>2010) $\times$ Total Austerity Impact | -0.008** | -0.010** | 0.004 | -0.032*** | -0.006 | -0.010 | -0.010 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Sector GVA | 33440 | 6338 | 5936 | 4051 | 3692 | 2226 | 2031 |
| Implied multiplier effect | -2.51 | -.62 | .23 | -1.29 | -.23 | -.22 | -.2 |
| UKIP vote share IV estimate | -175.55** | -137.82** | 1862.58 | -40.74*** | -239.12 | -177.51 | -75.14 |
| | (73.65) | (58.22) | (9747.29) | (13.42) | (369.69) | (169) | (58.08) |
| Local election districts | 345 | 345 | 345 | 345 | 345 | 345 | 345 |
| Observations | 5520 | 5520 | 5520 | 5520 | 5520 | 5520 | 5520 |

Notes: Table reports results from a panel OLS regressions with local authority area and region by year fixed effects. The dependent variable is the log value of the sector specific gross value added per working age adult in a local authority area between 2000 to 2015. The multiplier effect is the size of the contraction in gross value added due to a one pound contraction in benefit payments due to austerity. The IV estimate presents the link between the contractions in gross value added due to austerity after 2010 to the increasing support for UKIP. A negative coefficient suggests that areas with high incomes due to little austerity exposure see no growth in support for UKIP in local elections. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: The Impact of different austerity measures on support for UKIP: exploiting individual level data

| | (1) Any | (2) CTB | (3) DLA | (3) BTX |
|---|---|---|---|---|
| *Panel A:* | | | | |
| Post × Benefit cut | 0.026*** | 0.026*** | 0.047*** | 0.024*** |
| | (0.005) | (0.005) | (0.012) | (0.008) |
| Mean of DV | .0472 | .0472 | .0472 | .0469 |
| Local election districts | 379 | 379 | 379 | 379 |
| Observations | 252642 | 252642 | 252642 | 245352 |
| District FE & Region x Wave x Time FE | x | x | x | x |
| *Panel B:* | | | | |
| Post × Benefit cut | 0.024*** | 0.025*** | 0.038*** | 0.021** |
| | (0.005) | (0.005) | (0.012) | (0.009) |
| Mean of DV | .0472 | .0472 | .0472 | .0469 |
| Local election districts | 379 | 379 | 379 | 379 |
| Observations | 252642 | 252642 | 252642 | 245352 |
| District x Wave x Time FE | x | x | x | x |
| *Panel C:* | | | | |
| Post × Benefit cut | 0.017*** | 0.019*** | 0.029** | 0.011 |
| | (0.005) | (0.006) | (0.014) | (0.008) |
| Mean of DV | .0472 | .0472 | .0472 | .0469 |
| Local election districts | 379 | 379 | 379 | 379 |
| Observations | 252642 | 252642 | 252642 | 245352 |
| Individual FE & District x Wave x Time FE | x | x | x | x |

Notes: Table reports results from a panel OLS. The dependent variable is a dummy variable taking the value 1 in case a respondent expresses support for UKIP. The columns indicate the different welfare reforms we study. Panel A controls for district by NUTS 1 Region x Wave x Time fixed effects, thus exploiting between district and between individual variation. Panel B controls for District x Wave x Time Fixed effects, thus only exploiting between individual variation within a district. Panel C controls for Respondent fixed effects and District x Wave x Time Fixed Effects, exploiting only within individual- and within district variation. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: The Impact of different austerity measures on support for other parties: Exploiting individual level data

| | (1) Any | (2) CTB | (3) DLA | (4) BTX |
|---|---|---|---|---|
| *Panel A:* Support for Conservatives | | | | |
| Post × Benefit cut | -0.023*** | -0.018*** | -0.022** | -0.030*** |
| | (0.005) | (0.005) | (0.011) | (0.007) |
| Mean of DV | .259 | .259 | .259 | .261 |
| Local election districts | 379 | 379 | 379 | 379 |
| Observations | 251310 | 251310 | 251310 | 244068 |
| *Panel B:* Support for Labour | | | | |
| Post × Benefit cut | 0.016*** | 0.017** | 0.002 | 0.022* |
| | (0.006) | (0.007) | (0.014) | (0.011) |
| Mean of DV | .351 | .351 | .351 | .348 |
| Local election districts | 379 | 379 | 379 | 379 |
| Observations | 251310 | 251310 | 251310 | 244068 |
| *Panel C:* Support for Liberal Democrats | | | | |
| Post × Benefit cut | 0.008** | 0.003 | -0.003 | 0.018*** |
| | (0.003) | (0.004) | (0.009) | (0.005) |
| Mean of DV | .0815 | .0815 | .0815 | .0828 |
| Local election districts | 379 | 379 | 379 | 379 |
| Observations | 251310 | 251310 | 251310 | 244068 |
| *Panel D:* Support for No party | | | | |
| Post × Benefit cut | -0.013** | -0.015** | 0.005 | -0.017 |
| | (0.006) | (0.007) | (0.013) | (0.012) |
| Mean of DV | .193 | .193 | .193 | .193 |
| Local election districts | 379 | 379 | 379 | 379 |
| Observations | 251310 | 251310 | 251310 | 244068 |
| Individual FE | x | x | x | x |
| District x Wave x Time FE | x | x | x | x |

Notes: Table reports results from a panel OLS regressions. The dependent variable is a dummy indicating individual USOC respondent's support for the Conservatives (panel A), the Labour party (panel B) and the Liberal Democratic party (panel C). The regressions include various different levels of fixed effects indicated at the bottom of the table. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Wider measures of perceptions of disenfranchisement: included only in Wave 2,3 and 6 of USOC study

| | (1) | (2) | (3) |
|---|---|---|---|
| *Panel A:* Public officials dont care | | | |
| Post × Benefit cut | 0.068*** | 0.062*** | 0.053 |
| | (0.021) | (0.023) | (0.041) |
| Mean of DV | 3.37 | 3.37 | 3.37 |
| Local election districts | 378 | 378 | 378 |
| Observations | 75547 | 75547 | 75547 |
| *Panel B:* Don't have say in what govt does | | | |
| Post × Benefit cut | 0.088*** | 0.078*** | 0.071* |
| | (0.020) | (0.022) | (0.042) |
| Mean of DV | 3.34 | 3.34 | 3.34 |
| Local election districts | 378 | 378 | 378 |
| Observations | 75897 | 75897 | 75897 |
| *Panel C:* Your vote is unlikely to make a difference | | | |
| Post × Benefit cut | 0.035*** | 0.038*** | 0.043** |
| | (0.011) | (0.012) | (0.021) |
| Mean of DV | .563 | .563 | .563 |
| Local election districts | 378 | 378 | 378 |
| Observations | 74947 | 74947 | 74947 |
| District FE | x | | |
| Region x Wave x Time FE | x | | |
| District x Wave x Time FE | | x | x |
| Individual FE | | | x |

Notes: Table reports results from a panel OLS regressions. The dependent variable in Panel A and B is a score on a 5 point likert scale (strongly disagree - strongly agree). In Panel C it is a dummy variable equal to 1 if respondents indicate that they think it is unlikely that their vote makes a difference. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Support for Leave among individuals exposed to any of the three welfare reform measures

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Any Reform | 0.144*** | 0.084*** | 0.063*** | 0.053*** | 0.041*** | 0.063*** | 0.070*** | 0.080*** |
| | (0.015) | (0.014) | (0.014) | (0.014) | (0.014) | (0.021) | (0.025) | (0.030) |
| Mean of DV | .431 | .431 | .431 | .431 | .435 | .404 | .39 | .383 |
| Local authority districts | 377 | 377 | 377 | 377 | 376 | 376 | 372 | 359 |
| Observations | 17106 | 17041 | 17037 | 17033 | 16613 | 12058 | 9438 | 6132 |
| District FE | x | x | x | x | x | x | x | x |
| Qualifications FE | | x | x | x | x | x | x | x |
| Age FE | | | x | x | x | x | x | x |
| Employment Status FE | | | | x | x | x | x | x |
| Income Decile FE | | | | | x | x | x | x |
| Industry of Employment FE | | | | | | x | x | x |
| Socio-economic status group FE | | | | | | | x | x |
| Health conditions | | | | | | | | x |

Notes: Table reports results from a cross-sectional OLS regressions. The dependent variable is a dummy indicating whether respondents stated that they support Leaving the EU. The sample gets successively smaller as more control variables get added that are not available across the full sample. In case a variable is not reported on in the wave asking the Referendum question I use the value recorded in the most recent time this variable was observed for an individual to maximize the sample size. Standard errors clustered at the Local Government Authority District Level are presented in parentheses, stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.