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ORIGINAL ARTICLE

Responsiveness and the macro-origins of immigration opinions: Evidence from Belgium, France and the UK

Steven M. Van Hauwaert[1] · Patrick English[2]

Abstract Throughout recent decades, social science studies have systematically reported that citizens respond to their macro-social environments. While this is typically true in highly visible and salient policy domains, scholarship remains ambiguous about which macro-environmental factors are at the origins of citizens' opinions on immigration. We contribute to this debate by theorising three factors that have the potential to move immigration opinions and subsequently testing their empirical relevance. We most notably emphasise the role of immigration itself and ask whether and how increasing immigration levels affect immigration opinions. We then examine to what extent the regional power structure and economic hardship interplay with this relationship. Through the dyadic ratios algorithm, we estimate a unique set of immigration opinion measures across regions in Belgium, France and the UK between 1990 and 2015. When modelling these measures, our findings are threefold. First, citizens are responsive to their environments, and specifically to immigration. Second, citizens become more favourable towards immigrants when immigration levels increase. Third, we find evidence that decentralisation (regional power) conditions this empirical relationship, while there is little to no indication that economic conditions affect immigration opinions, either directly or indirectly.

✉ Steven M. Van Hauwaert
vanhauwaert@politik.uni-mainz.de

[1] Department of Political Science, Johannes Gutenberg University Mainz, Mainz, Germany

[2] Department of Politics, University of Manchester, Manchester, UK

Introduction

Throughout recent decades, social science studies have systematically reported that citizens are responsive to their macro-social environments (Page and Shapiro 1992; Durr 1993; Stevenson 2001; Erikson et al. 2002). While most literature examines the economic environment, select studies also find that immigration plays a vital role in opinion formation, particularly about immigration itself (Givens and Luedtke 2004; Lahav 2004; Ford et al. 2015). At the same time, there remains quite some ambiguity regarding what role immigration levels exactly play and what other factors affect immigration opinions.[1] With that in mind, this study asks three important and interrelated questions, namely (i) to what extent do citizens, and particularly their immigration opinions, respond to immigration levels (an independent effect), (ii) do publics respond positively or negatively to increasing immigration levels (the direction of the effect), and (iii) how—if at all—do decentralisation and economic hardship condition this responsive relationship (a conditional effect).

We complement existing research and add to current debates by combining temporal and cross-sectional elements. Most notably, this study examines citizen responsiveness in three European democracies that are typically seen as 'host countries' of immigration, namely Belgium, France and the UK. We more specifically stipulate the region as the primary level of analysis. This allows for a comprehensive analysis of the differentiated patterns of responsiveness that might follow from the broad range of regional power setting and economic conditions within and between regions.

We begin our study with a brief review of the most important theoretical approaches concerning citizens' reactions to immigration, to then formulate why and how we can expect immigration opinions to respond to increasing immigration. Building on this, we also theorise the extent to which regional power setting and economic conditions interplay with this relationship. We subsequently draw from the Global Public Opinions Project data set and use the dyadic ratios algorithm to design a unique set of regional-level immigration opinion measures. Finally, we model the origins of these opinion measures in 22 regions between 1990 and 2015. We find that increasing rates of immigration render citizens more favourable to immigration, mainly through time and within regions. Decentralisation—and surprisingly not economic hardship—further moderates this relationship. That is, we find evidence that regional power settings promote responsiveness, while there is little to no evidence of immigration opinions reacting to immigration levels (or economic conditions) in their absence. These non-obvious but parsimonious findings have important theoretical and societal implications beyond our study, as we identify effective and ineffective avenues for policy-makers to influence immigration opinions.

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[1] Throughout this study, the term 'immigration opinions' refers to an opinion spectrum that ranges from left (low values, indicating more open immigration positions) to right (high values, favouring more restrictive positions). While we realise the label 'anti-immigrant' might be preferred by many, we explicitly choose not to use an 'anti' label for the phenomenon under analysis.

The role of immigration: Divergent approaches and competing results

At the centre of our study are two distinct approaches that relate the complexities of immigration opinions to immigration levels, namely group threat and (inter-group) contact. Both approaches have produced a body of literature that is too vast to review in detail here, so we only provide (i) a concise overview of the theoretical underpinnings of each perspective, and (ii) illustrative evidence of their aggregate applications across Europe. Furthermore, we must acknowledge that not all academic studies perfectly fit one or the other tradition. Some scholars work across or independently of these theoretical approaches, interpreting them as complementary rather than competing, and embracing opinion formation in its full complexity.

The group threat perspective centres upon the idea that conflict between majority in-groups and minority out-groups increases as more out-group members arrive in a given area (Blalock 1957; Blumer 1958). The overall argument asserts that majority-group populations perceive societal conditions as zero-sum games and will increasingly view the presence of out-group members or newcomers (e.g. immigrants) as threatening their material and social interests or increasing their competition for scarce resources (Green et al. 1998; Putnam 2007). In line with cultural marginality theory, or the so-called clash of civilisations (Huntington 1997), most literature finds that an identity-based interpretation of conflict (rather than an economic one) provides most explanatory value (Fetzer 2000; Sniderman et al. 2004; Sides and Citrin 2007; Manevska and Achterberg 2013). A larger immigrant population would thus add to the perception of (cultural) conflict and increase social tension between minority and majority groups, thereby negatively affecting immigration opinions.

Empirical evidence in support of group threat is abundant.[2] Quillian (1995), for example, uses cross-national data to demonstrate that European citizens become increasingly anti-immigrant and opinions turn more negative as immigrant population sizes increase (e.g. also Coenders and Scheepers 2008; Schlueter and Scheepers 2010; Davidov and Meuleman 2012). Markaki and Longhi (2013) further highlight that regional differences in immigration opinions tend to be related to the local context, and specifically the (non-EU) immigrant populations themselves. Scheepers et al. (2002) suggest that the increasing presence of legal immigrants in Dutch municipalities contributes to a so-called ethnic threat, which in turn leads to public opposition to these same immigrants. Similarly, Hjerm (2009) also finds that higher immigrant populations into poorer Swedish municipalities relate to increased anti-immigrant feelings. Semyonov et al. (2004) find that perceived inflows correlate with increased negativity towards foreigners in German federal states. Combined, these authors all find empirical support for a similar argument; namely, higher inflows of minority-group members into a given context contribute to increasing opposition to these same minority groups.

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[2] For a meta-analysis of a group threat approach, we refer to Riek et al. (2006). At the same time, several studies that test group threat do not find empirical support for its rationale (e.g. Hainmueller and Hiscox 2007, 2010; Hjerm 2007; Sides and Citrin 2007).

An alternative perspective argues that, even though urbanisation and globalisation have weakened traditional social cohesion, modern societies and the corresponding heterogeneity bring about new opportunities for cooperation and integration. The increased contact that stems from diversity can help improve relationships and reduce intergroup conflict (Sherif and Sherif 1953; Allport 1954). That is, more opportunities for social and economic interaction with members of minority groups can reduce feelings of threat, fear and negativity amongst majority-group members (McLaren and Johnson 2007; Stolle et al. 2008; Laurence 2014). A larger immigrant population would thereby promote tolerance and reduce prejudice.

Numerous studies demonstrate empirically that lower levels of prejudice and perceived threat amongst majority-group members follow increasing immigration (Schneider 2008; Schlueter and Scheepers 2010; Christ et al. 2014).[3] While most studies find such evidence on the individual level, some notable studies also examine the contact hypothesis at a more aggregate, yet sub-national level. For example, Wagner et al. (2003, 2006) find support for the contact perspective when explaining differences between East and West Germany, with the more immigration-exposed Western half of the country consistently displaying more positive immigration opinions than the East. Hjerm (2009) also concludes that in Swedish municipalities with higher densities of the 'most visible' immigrant groups, immigration views were generally more positive. These studies show that an increasing immigrant population—regardless of actual rates of contact—can stimulate favourable immigration opinions.

These distinct approaches thus allow us to formulate two expectations. From the initial group threat theorisation, we would predict increasing opposition to immigration in the face of higher immigration levels. From the contact theorisation, we would expect increasing immigration to result in more favourable immigration opinions. While these expectations oppose one another regarding the direction, they are not necessarily conflicting, and both approaches can be at work simultaneously (e.g. Schlueter and Wagner 2008).

The intervening role of economic conditions

Existing studies typically argue that economic hardship plays an indispensable role in motivating political expressions because it impedes social progress, creates social injustice stimulates failing community values and beliefs systems, incapacitates governments, etc. (Gurr 1970; Walker and Pettigrew 1984). While this typically refers to more active expressions, like political action, we find similar observations in the public opinion literature. Sluggish economic development and an unfavourable business climate usually relate to demands for less distribution and more conservative policy preferences (Durr 1993; Stevenson 2001). In line with this, we expect the

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[3] For a meta-analysis of the contact perspective, we refer to Pettigrew et al. (2011). At the same time, some studies that test the contact hypothesis find no evidence for it (e.g. Rustenbach 2010) or find evidence in support of group threat (e.g. Schlueter and Scheepers 2010).

kind of increased risk exposure that stems from economic hardship to also relate to more restrictive immigration opinions (Hjerm 2009; Yoxon et al. 2017).

In addition to being important predictors of immigration opinions, we also find indications throughout the literature that economic conditions are an essential component of the differentiation of immigrant opinions and, more generally, how immigration levels relate to immigration opinions (e.g. Citrin et al. 1997). In addition to an independent effect, the literature suggests that economic conditions, and especially economic hardship, are likely to influence citizen responsiveness to immigration. We expect economic hardship to *adversely* affect how immigration opinions respond to the immigration environment, meaning it either amplifies threat-inspired responsiveness, or curtails contact-inspired responsiveness. This allows us to assert two complementary expectations.

In line with our threat-informed expectation, economic hardship can strengthen the perceived threat that comes with increased immigration. This can be directly related to the interpretation of the competition for resources as a zero-sum game. In communities where economic challenges are substantial, and thus resources are more limited, increased immigration will typically amplify competition and create a more tangible threat of immigration (see, for example, Coenders and Scheepers 2008; Semyonov et al. 2008; Hjerm 2009). This subsequently translates into increased opposition to immigration. Alternatively, in line with our contact-informed expectation, economic hardship can also cripple expected levels of increased contact. In less prosperous contexts, the conditions under which contact can be expected to lead to growing support for immigration may be hampered or removed altogether, as well as increase the perception of competition and 'unwanted' contact and interaction (see, for example, Coenders and Scheepers 1998). Therefore, economic adversity could immobilise or disrupt the positive impact of increased immigration on immigration opinions.

In sum, following the literature, we do not expect economic hardship and immigration to operate as two independent explanatory mechanisms of immigration opinions, but rather that economic hardship conditions the extent to which publics respond to immigration. Concretely, when comparing two contexts with similar immigration levels, we expect there to be a difference in immigration opinions between them, depending on their respective levels of prosperity. That is, the average marginal effect of immigration levels on immigration opinions changes with increasing levels of economic hardship.

Regions as political power structures

There is a vast literature, without a real consensus, which examines whether and how individuals react to increasing levels of immigration. In this study, however, we are not interested in differences between people. Our primary focus is on aggregated opinions, how they respond to immigration and any contextual differences in this responsiveness.

While we are not directly testing the validity of group threat and contact theory, we are using their underlying rationales to explain—on a larger scale—the

relationship between immigration levels and opinions. We find indications these explanatory mechanisms can also be at play at aggregate levels of analysis (Weber 2015), as long as the level of aggregation satisfies three necessary criteria. First, our level of analysis must have sociopolitical implications, meaning opinion formation (and immigration) must make analytical sense. Second, our level of analysis must include some form of aggregation, as immigration opinions refer to a collective, not an individual concept. Third, the unit of analysis must remain appropriate (i.e. theoretically sensible) to examine our explanatory mechanisms.

The choice of the regional level as the level of analysis satisfies all three of these criteria. First, the region is the only sub-national economic, social and cultural entity that has political relevance, at least from a comparative perspective. Second, the region is a large enough community to be coherently considered to represent 'a public'. It would make less sense to talk about public opinion at say a local or municipality level. Regions have unique and distinguishable sociopolitical characteristics that allow us to formulate opinion measures at this level (Marks et al. 2008). Furthermore, considering immigration rates can differ significantly between regions, it is also fair to assume there will be variation in regional immigration opinions. Third, and most importantly, we must assess immigration opinions at a level where we can reasonably expect the majority of individuals to *perceive* immigration and thereby impact our aggregated opinion measure. Seeing how spatial distributions of immigrants differ within countries, Eger and Bohman (2016) argue the visibility of immigration may vary by region. In sum, for this study, the regional level provides an optimal compromise to test the theoretical mechanisms at aggregate, yet subnational levels. It is remote enough from the people to talk about 'publics' and close enough to the people to test our proposed mechanisms and for citizen responsiveness to immigration to be realistically detected.

We focus on the regions in three countries: Belgium, France and the UK. These three countries are typically known as 'host countries' of immigration, but with entirely different public opinion and integration traditions, even at the regional level (e.g. Chabanet et al. 2018; Van Hauwaert et al. 2018). This indicates essential patterns of variance, and thus opportunities for analysis, within and between regions concerning how citizens respond to their immigration environment.

These three countries also provide a comprehensive spectrum of regional power settings and territorial decentralisation (Dandoy and Schakel 2013). Being a federalised country, Belgium has relatively powerful regions. France, as a centralised country, has a relatively ineffective regional power structure. The UK includes both regions with and without relative power. Considering this variance, we can additionally examine how—if at all—regional power settings can affect the interrelationship between immigration levels and opinions. We argue that more decentralised contexts enhance responsiveness simply because citizens are more motivated to adjust their opinions and send a signal when institutions are available, and change is possible (De Vries 2000). That is, we expect responsiveness to be more substantial when regions are more powerful (decentralisation) than when regions lack effectiveness (centralisation).

Our operationalisation of regions largely corresponds to the Nomenclature of Statistical Units classification Scheme (NUTS) designed by the European Statistical

Office (see also, Schlueter and Wagner 2008; Rustenbach 2010; Markaki and Longhi 2013). This scheme classifies European regions according to their socio-economic, cultural and historical characteristics, thereby compartmentalising countries in 'similar' units of analysis and allowing for the analysis of within-country variation. We rely on the largest-scale regional subdivisions (NUTS 1) for two practical reasons: (i) individuals are most commonly categorised by this classification in both national and cross-national surveys, and (ii) relevant regional-level statistics use NUTS 1 regions as categories. Accordingly, we include the following 23 regions:[4]

1. Belgium (3): Bruxelles/Brussel, Vlaanderen, Wallonie.
2. France (8): Bassin Parisien, Centre-Est, Est, Île-de-France, Méditerranée, Nord, Ouest, Sud-Ouest.
3. UK (12): East of England, East Midlands, London, North East, Northern Ireland, North West, Scotland, South East, South West, Wales, West Midlands, Yorkshire and the Humber.

Data, instrument and method

The analysis of 23 distinct regions across three countries promotes cross-sectional insights. At the same time, we examine our regions from 1990 to 2015 (or longer when possible), thereby enabling us to make within-region claims as well. Combined, such a time-series cross-sectional design (TSCS) has distinct advantages. Not only does the over-time, aggregate-level analyses cancel out random variance at the individual level, thereby leaving only a 'real signal' for analysis (Kelly and Enns 2010), it also allows for an improved and more detailed contextual interpretation. The combination of these components (cross-sectional, temporal and sub-national) presents a blueprint for future research.

Instrument

We rely on data collected as part of the Global Public Opinions Project (Van Hauwaert 2018) to estimate separate measures of immigration opinions for each region. The data set provides a comprehensive collection of marginals from a wide variety of national and international surveys.[5] We include the weighted marginals of immigration-related items that were repeated at least twice (three iterations) throughout

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[4] When public opinion data are available, the representativeness of samples collected in Corsica (part of the Méditerranée region) is questionable. Therefore, we exclude Corsica from our estimation of the immigration opinions in the Méditerranée region.

[5] For the Belgian regions, we rely on surveys from the BNES, ESS and EVS. For Flanders and Wallonia, we also include the SCV and BSW, respectively. For France, we use the BPF, DEM, DREES, DYNA-MOB, ESS, EVS, FES, FF, ISSP, LW, OIP, PEF and WVS surveys. For the UK, we rely on the BES, BSA, ESS, EVS, LW and WVS surveys. We refer to Table A.1 in the Appendix for bibliographic details.

our timeframe under analysis.[6] With this rationale, we expand the scope, standards and focus of previous research into immigration opinions (cf. Ford et al. 2015).

We aggregate individual-level information into a single opinion measure for each of the 23 regions by employing a dyadic ratios algorithm.[7] This particular technique allows us to estimate an over-time measure of the public's support (low values) or opposition (high values) to immigration. While this method is conventional in macro-polity research (Stimson et al. 1995; Erikson et al. 2002; Bartle et al. 2011, 2018), its issue-specific applications remain much more limited (for immigration, see Jennings 2009).[8]

The dyadic ratios algorithm presupposes that to the extent a particular time series of a single item can be considered a valid indicator of public opinion about immigration, the change between any two values within that time series (a dyad ratio) is a relative indicator of immigration opinions over time. Repeated at each point in time for every time series, the algorithm then estimates the covariance between the dyadic ratios of each item. From this covariance, it then calculates validity measures for the different dyad ratio series and uses these to estimate the best possible latent measure of immigration opinion. The algorithm then uses these estimates (the dyad ratio series combined and adjusted according to their covariance) to construct immigration opinion values at each available user-defined interval (in our case *per year*). Further exponential smoothing increases the estimation's accuracy by accounting for potential sampling error and bias. We then repeat this estimation procedure of immigration opinions for each region in our study.[9]

We construct a unique data set of annual estimations of immigration opinions for the 23 regions. Higher values of the estimates indicate more 'right-wing' or restrictive immigration opinions. While the actual number of input series varies between regions—from 17 in Bruxelles/Brussel to 26 in each of the British regions—the estimation relies on more than 3200 survey marginals to form 526 distinct series that indicate immigration opinions. We find that one unique dimension, which we

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[6] The items we select concern all questions with reference to positions towards immigration or immigrants, positions towards government policy regarding immigration, positions towards immigrants or other general non-native minorities, economic or cultural implications of immigrants or immigration, xenophobia and prejudice. We exclude items that inquire about racism, Muslims, refugees, asylum seekers and illegals. For more details regarding the individual items we included, the question wording, the years of measurement and the degree of repetition, we refer to the online Appendix.

[7] For the Belgian regions, measures go from 1990 to 2015. (We initially included the 1980s as well, but estimations are not sufficiently reliable.) For French regions, measures go from 1988 to 2017. For UK regions, measures go from 1983 to 2015. Data are limited for Northern Ireland. We are only able to estimate a reliable measure from 2003 onwards. Following the limited number of data points, we exclude the latter region from inferential analyses.

[8] Existing studies use this method to construct measures of presidential approval (Carlin et al. 2015a, b), European integration (Guinaudeau and Schnatterer 2017), environmental concerns (Brulle et al. 2012), support for nuclear energy (Brouard and Guinaudeau 2015), gender equality (Koch and Thomsen 2017; Tapia Velázquez and Van Hauwaert 2018) and redistributive preferences (Romero and Van Hauwaert 2018).

[9] For a more extensive and in-depth discussion of the model's formal estimation procedure, we refer to Stimson (1991, 2018) and McGann (2014).

theorise as immigration opinions, accounts for an average of around 46% of the variance across our measurement models.[10]

Predictors

To assess how immigration opinions respond to their environment, we primarily focus on the role of immigration. To obtain objective information on the actual immigrant population size per region, we include the annual percentage of foreign-born individuals within the region.[11] We neither can nor look to distinguish between nationalities or citizenship, as we want to know the effect of overall out-group presence, rather than public reactions to one particular out-group. In line with extant scholarship, we use foreign-born populations as a proxy measure for immigration (e.g. Semyonov et al. 2004, 2006; Hjerm 2007, 2009; Finseraas et al. 2016).

We are somewhat restricted in the range of other possible predictors we can include. That is, the available regional-level data are more limited than individual- and macro-level data. We are, however, able to account for some alternative mechanisms, relying on the OECD Regional Database. An economic hardship indicator, namely the unemployment rate (1999–2015), allows us to test the proposed interaction term and provides a more accurate indicator of immediate economic conditions than, for example, GDP or inflation.[12] We additionally control for population size (1990–2015), geographical size of the region (1990–2015), life expectancy at birth (1990–2013), share of elderly (65+) population (1999–2015) and proportion of the labour force with tertiary education (1999–2015).[13] We also account for a region's political power by including the regional authority index (RAI) (1990–2015).[14]

Method

While most studies that use the dyad ratios algorithm examine the resulting opinion measure *an sich*, recent studies have also inserted these measures into a more inferential context (Kelly and Enns 2010; Bartle et al. 2011, 2018). Most studies use error correction models, mainly because that allows for the short- and long-term

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[10] The item loadings and descriptive variable information for all regions are available from the lead author.

[11] For France, we use CENSUS data (1990, 1999, 2006 and 2011) to estimate annual regional foreign-born population. For the UK, we use CENSUS data (1991, 2001 and 2011) and the International Migration Database (2004–2014) by the Office of National Statistics to estimate annual regional foreign-born population. For Belgium, we constructed our own yearly and regional database, drawing mostly from data provided by the Ministry of Economic Affairs.

[12] This is the percentage of unemployed (15+) over the labour force (15+).

[13] We rely on linear multinomial imputation, using the 'predict' function in R's *stats* package, to complete some of the missing values on our predictors. Existing research indicates this is appropriate and accurate for our particular purpose, namely to predict few estimates over a short range of time within a more extensive longitudinal series (King et al. 2001).

[14] We include descriptive statistics in Table A.2 of the Appendix. For more information, see the OECD Statistics website (http://stats.oecd.org/Index.aspx?DataSetCode=REGION_DEMOGR).

analysis of the effect of—for example—public opinion on government policy. However, the application of such a model in a cross-sectional—and not strictly time-series—context, with multiple observations for each year, renders estimations quite complicated.

Instead, drawing from previous regional-level research (see Schakel 2013), we use a more holistic combination of five inferential methods. As regions (23) are nested within countries (3), we first use a fixed effects general least squares model (GLS).[15] We include a transformation to control for first-order autocorrelation (AR1) within regions. We then estimate a Prais–Winsten and Cochrane–Orcutt regression, which controls for the first-order autocorrelation. While this focuses on the cross-time (and within-region) levels of variation, it leaves much of the region- and country-level variance unexplained. Typically, this would result in an underestimation of the effect of some of the more stable (control) variables. To further account for this, we then calculate a linear TSCS model with panel-corrected standard errors (PCSEs) and a panel-specific AR1 transformation (see Beck and Katz 1995). We also provide boot-strapped statistics from 1000 randomly drawn samples to take into account potential outliers and confirm the robustness of our findings. In a final model, we account for dynamics by using the log of immigration opinions as the dependent variable.

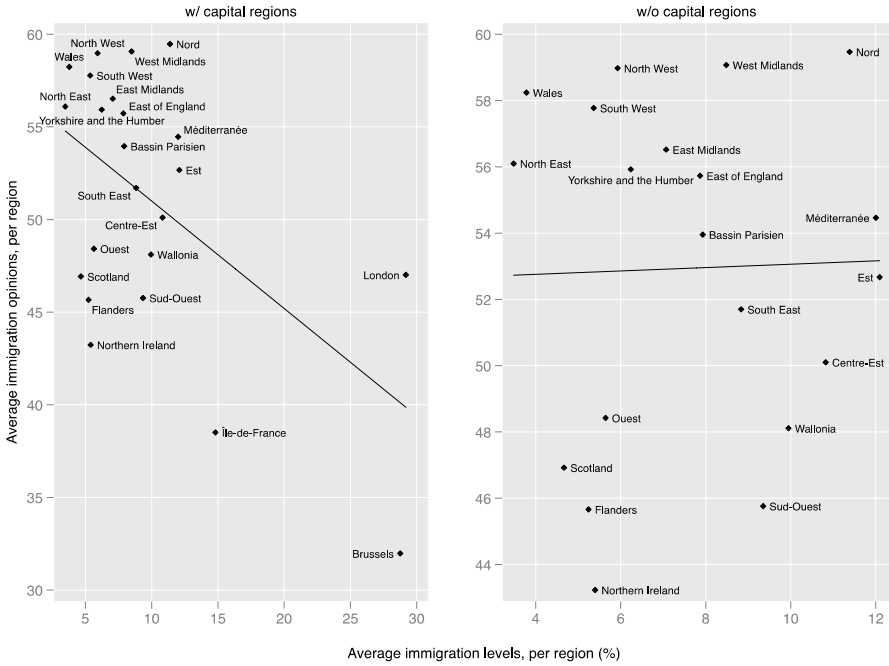## Immigration opinions across regions

Figure 1 displays the average immigration opinions for each region and plots this against the average immigration levels in each region. The left-hand panel includes all regions, and the right-hand panel excludes the capital regions. While this only allows us to explore how immigration opinions and levels might relate barring any time components, it provides some preliminary insights into the relationship between the two variables. The downward slope of the fitted line in the left-hand panel suggests that citizens are typically more supportive of immigration when immigration levels are higher. The near-constant fitted line in the right-hand panel supports Eger and Bohman's (2016) cross-national findings and specifically indicates the absence of a strong (linear) link between immigration opinions and levels when examining non-capital regions only.

On the right-hand side of Fig. 1, we notice that both non-capital Belgian regions are below the fitted line and most UK regions are above it. (French regions are more dispersed.) That is, for similar average immigration levels, the corresponding anti-immigrant opinions are typically higher in UK regions than in the Belgian counterparts. In that regard, we wonder to what degree the variance can be explained within, rather than across the contexts. While Fig. 1 provides an initial account of the geographical dispersion of immigration opinions and illustrates the unique nature of capital regions in this regard, we do not want to leave within-region dynamics

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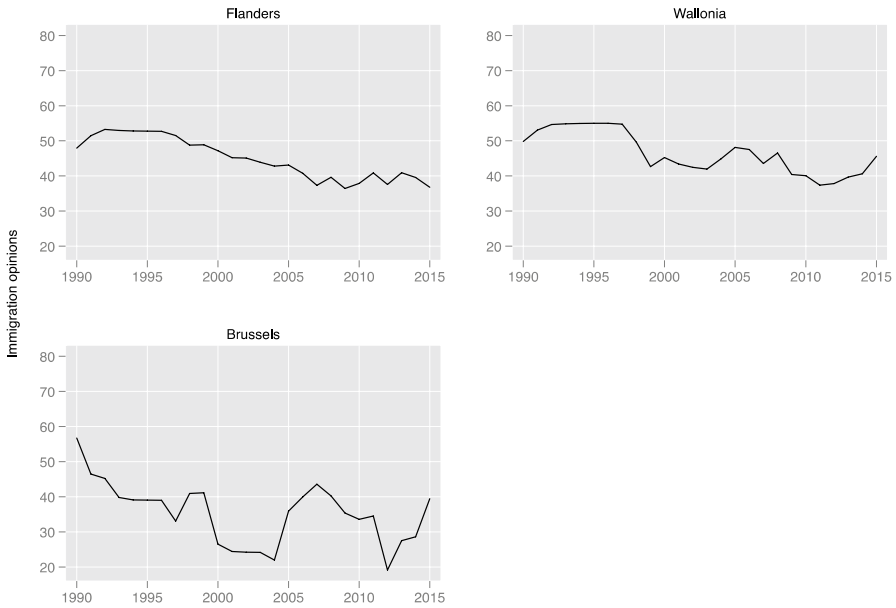[15] We use a GLS instead of an OLS model because the residuals of the OLS model show signs of autocorrelation.

Fig. 1 Average immigration opinions across regions. *Note*: Higher values on the *Y*-axis indicate more restrictive immigration opinions
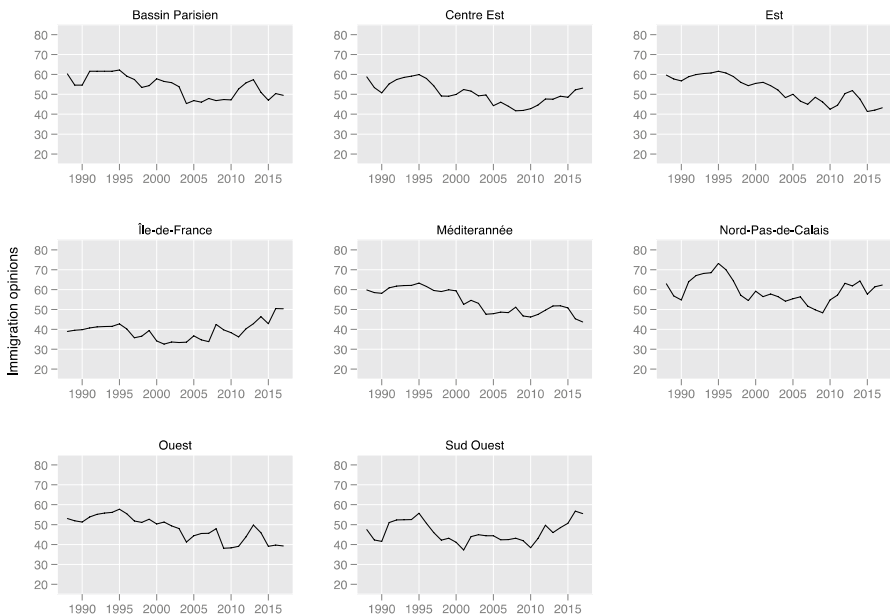

Fig. 2 Regional immigration opinions—Belgium (1990–2015). *Note*: Higher values on the *Y*-axis indicate more restrictive immigration opinions

unexplored. Therefore, we bring time back into the analysis. Figures 2, 3 and 4 illustrate immigration opinions for the full range of available data in each region.

In all three Belgian regions, the evolution is quite clear: since the 1990s, citizens have generally become less opposed and more favourable to immigration. We notice a gradual trend in Flanders and Wallonia, with immigration opinions in the 1990s almost systematically being more restrictive than in the final decade of the series. Remarkably, immigrant opinions in both regions not only closely relate, but they also co-integrate, at least to a certain degree (pairwise correlation = 0.83). The evolution in Brussels is much more erratic, with a relevant return to more anti-immigrant opinions in the mid-2000s. We also observe that immigration opinions in the capital region are typically more favourable than in Flanders and Wallonia, thereby providing some credence to the common belief that capital regions are focal points of multicultural and poly-ethnic politics (Jacobs 2000; Van Hauwaert et al. 2018).

In France, we observe a similar trend. Regional publics have become more favourable to immigration, particularly since the mid-1990s. Even more, opinions were almost systematically most favourable to immigration in the late 2000s. This is in line with the national-level evolution of immigration opinions (Chabanet et al. 2018) and suggests a certain degree of parallelism when disaggregating to the regions. Since 2010, we notice a cross-regional trend of more opposition to immigration. For the Île-de-France, this trend even started in the mid-2000s. Similar to observations in Belgium, immigration opinions are almost systematically more favourable in the capital region than in other French regions.

Fig. 3 Regional immigration opinions—France (1988–2017). *Note*: Higher values on the *Y*-axis indicate more restrictive immigration opinions
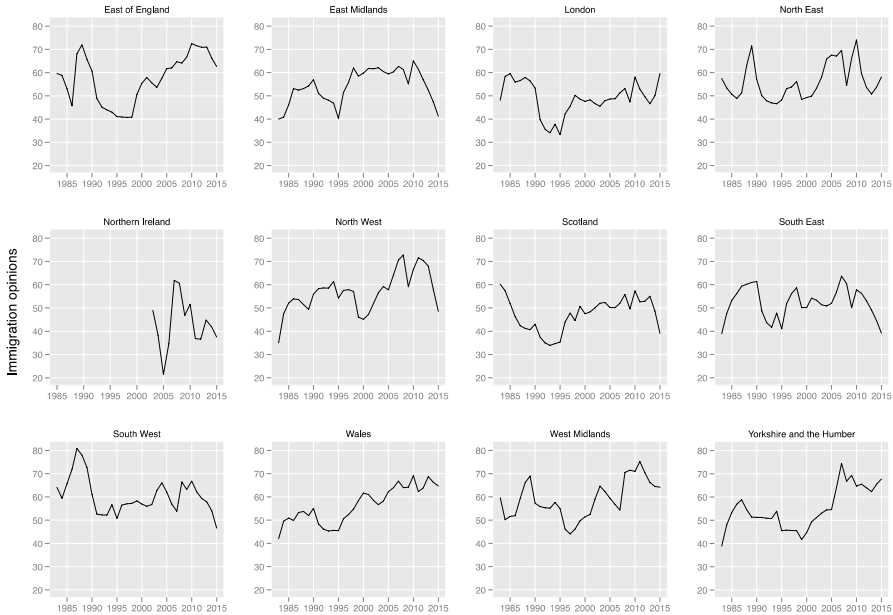
Fig. 4 Regional immigration opinions—the UK (1983–2015). *Note*: Higher values on the *Y*-axis indicate more restrictive immigration opinions

Immigration opinions are much more erratic in the UK regions, showing little to no parallelism with the national level (see, Jennings 2009; Ford et al. 2015). There is quite some movement across the regions, but two trajectories are somewhat apparent. In certain regions, citizens have generally become more opposed to immigration since the mid- to late 1990s (e.g. East of England, Wales). In other regions, immigrations opinions oscillate within a constant range throughout the period under analysis (e.g. East Midlands, South East). Unlike the other capital regions, we notice that immigration opinions in London remain relatively constant. This is not surprising, seeing how Fig. 1 indicates London mainly stands out based on its immigration levels, not its immigration opinions. Altogether, the regional heterogeneity supports the claim that the UK is very much a 'nation divided' when it comes to immigration opinions (Ford and Heath 2014).

Explaining immigration opinions and exploring patterns of variance

Figures 2, 3 and 4 highlight a diverse set of patterns—similarities and differences—between and within the regions. We further explore this variation and scrutinise immigration opinions and their origins by conducting a multivariate analysis that examines the responsiveness of immigration opinions to their environment, and

Table 1 Regression results for immigration opinions

	Immigration opinions				
	(1) GLS	(2) Prais–Winsten	(3) PCSEs	(4) Bootstrap	(5) Log DV
Immigration (%)	−0.283* (0.144)	−0.584* (0.240)	−0.298* (0.138)	−0.276*** (0.082)	−0.006* (0.003)
Unemployment rate (%)	0.192 (0.197)	0.046 (0.203)	0.272 (0.229)	1.456*** (0.195)	0.006 (0.004)
Observations	550	528	550	550	550
Number of regions	22	22	22	22	22
R-squared		0.055	0.800		

Note: ***$p<0.001$, **$p<0.01$, *$p<0.05$, ^$p<0.1$; standard errors in parentheses; for visualisation purposes, we only include the variables of interest in the table; see Table A.3 in the Appendix for full models with control variables

particularly immigration levels. In what follows, we specify five separate models to explore this hypothesised link.[16]

The invariance of the results throughout the different models in Table 1—both regarding direction and significance—is encouraging. It suggests the data, not issues of model specification, are driving the results. Neither the estimated relationships, nor the substantive inferences drawn from them are affected by different methodological considerations or restrictions, thereby indicating a certain robustness and reliability of the findings.[17]

Table 1 indicates immigration opinions indeed respond to the regional immigration environment. Contrary to studies that relate regional immigration to individual-level attitudes (Semyonov et al. 2004; Rustenbach 2010), we find a significant effect of objective immigration on aggregate immigration opinions. Table 1 suggests we can associate a higher proportion of foreigners amongst the regional populations with more favourable immigration opinions (lower values on the dependent variable). That is, regions with higher rates of immigration display less opposition to immigration. This type of responsiveness to the immigration environment, thus, indicates that increasing opportunities for contact with immigrants contribute to more favourable immigration opinions. It further confirms previous findings by Weber (2015) regarding the underlying mechanics of immigration opinions on the regional level (see also Wagner et al. 2003, 2006; Hjerm 2009).

While the comprehensive data structure of the dependent variable already renders this evidence of responsiveness meaningful, it is worth exploring in more detail. We

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[16] At this point, we exclude Northern Ireland from the analysis due to a limited time series on our dependent variable (data only available from 2003 onwards). We also exclude 2015 from our inferential analysis because the last point of time-series estimations can be difficult to interpret. For full models, we refer to Table A.3 in the Appendix.

[17] We also estimated the impact of immigration rates, rather than the absolute immigration levels we account for in the models. This does not substantively alter the results.
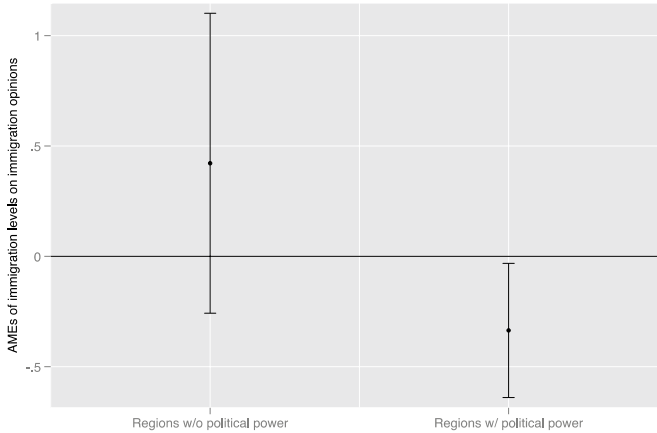
Fig. 5 Average marginal effects of immigration levels on immigration opinions for regions with and without political power. *Note*: We consider Brussels, Flanders, London, Northern Ireland, Scotland, Wales and Wallonia as regions with political power. All other regions can be considered to have limited or no substantial political power. London could also be included in this last group. When doing so, results remain substantively the same

initially expected that two factors could—in different ways—affect the relationship between immigration levels and opinions. First, we expected the effect of immigration levels on opinions to be more prominent in regions with actual political power. To examine this, we use the RAI to distinguish between regions with and without political power (Schakel 2008). We then estimate the same five models, including an interaction between immigration levels and a regional power dummy (0 = no regional power). Figure 5 plots the average marginal effect (AME) of immigration levels on immigration opinions for regions with and without political power.[18]

Figure 5 illustrates that citizens respond to their immigration environments in more decentralised and politically powerful regions. That is, immigration opinions relate to immigration levels in regions with political power. This finding is in line with initial expectations that citizens are more motivated to form, change or express opinions when there is a corresponding power structure to account for and incorporate such opinions (De Vries 2000). The negative AME further indicates that citizens respond favourably to immigration when immigration levels increase in these regions. This is consistent with evidence from Table 1 that rising levels of immigration entail more contact opportunities and can ultimately reduce anti-immigrant sentiment.

In regions without political power, findings are more ambiguous. Here, immigration opinions respond to the immigration environment by becoming more restrictive. That is, citizens feel more threatened by an increasing immigrant population

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[18] We use the GLS model as the foundation of Fig. 5. We refer to Table A.4 in the Appendix for the full set of models.

Table 2 Regression results for immigration opinions, with interaction

	Immigration opinions				
	(1) GLS	(2) Prais–Winsten	(3) PCSEs	(4) Bootstrap	(5) Log DV
Immigration (%)	− 0.390	− 1.450*	0.048	1.229^	− 0.017
	(0.471)	(0.594)	(0.557)	(0.644)	(0.012)
Unemployment rate (%)	0.362	0.130	0.420	1.484*	0.005
	(0.646)	(0.675)	(0.562)	(0.721)	(0.017)
Immigration * unemployment	− 0.006	0.016	− 0.030	− 0.110*	0.001
	(0.033)	(0.034)	(0.036)	(0.049)	(0.001)
Observations	150	144	150	150	150
Number of regions	6	6	6	6	6
R-squared		0.148	0.774		

Note: ***$p<0.001$, **$p<0.01$, *$p<0.05$, ^$p<0.1$; standard errors in parentheses; for visualisation purposes, we only include the variables of interest in the table; see Table A.5 in the Appendix for full models with control variables

in the absence of an accountable and reactive political structure. In these regions, where governing bodies are less independent of the national state structure, citizens may feel less protected by government institutions and experience more threat or competition from the increasing immigrant population. Yet, a lack of clear statistical significance renders findings for regions without political power largely speculative, or uncertain at best.

A second factor we expected to affect immigration opinions and how they respond to the immigration environments was economic hardship. Surprisingly, in the few aggregate-level studies of immigration opinions, this remains unexplored. Table 1 shows that economic conditions are not necessarily at the immediate origins of immigration opinions. While the coefficient is systematically positive, and thus what we would expect, the analysis does not provide sufficient statistical evidence to make an unequivocal claim regarding its impact on immigration opinions. These findings challenge some of the recent literature, which argues that economically more disenfranchised environments further increase competition for resources and thereby negatively affect immigration opinions (Fetzer 2000; Finseraas et al. 2016). When we further examine the models in Table 1, we notice that the UK regions are the primary drivers of the pooled results and there is quite some heterogeneity between contexts.[19] This suggests the independent effect of unemployment on immigration opinions is likely to be context specific, rather than irrelevant across the board.

The question remains whether economic hardship *conditions* how immigration levels affect immigration opinions. That is, does unemployment affect citizen responsiveness? As we previously highlighted, we could foresee the public's

[19] The unemployment coefficient is significant for the Belgian regions ($p<0.05$), approaches statistical significance in France ($p<0.1$) and fails to reach significance in the UK regions.

responsiveness to the immigration environment operating differently depending on the region's economic conditions. Accordingly, for regions with political power, we model this conditional relationship.[20]

Table 2 further highlights the findings from Table 1 regarding the limited (or non-existent) role of economic conditions. In the 22 regions under analysis, we find little to no evidence of the unemployment rate affecting citizen responsiveness. That is, while Table 1 provides no evidence of the expected direct effect between unemployment and immigration opinions, Table 2 additionally suggests there is no overall conditional effect either.[21] In sum, we do not find support for any intervention, either direct or conditional, of economic conditions on immigration opinions. We find no evidence of a cross-national or systematically cross-regional mechanism at work. Contrary to previous research indicating that negative economic conditions are an essential predictor of immigration opinions (Semyonov et al. 2008; Meuleman et al. 2009), we find these are—at best—contextually determined or situational (Sniderman et al. 2004). Even though this opposes recent findings that relate economic hardship to the support for anti-immigrant parties (Kestilä and Söderlund 2007; Ford and Goodwin 2010; Stockemer 2017), these results merely show that public opinion and partisan support are two separate, and not necessarily equivalent, analytical concepts that deserve individual scientific attention.

Discussion and concluding remarks

Policy responsiveness remains one of the most empirically examined principles of representative democracy. Rather than add to this, our study complements such an extensive line of scholarship by taking a step back. Before considering the extent to which and how citizens affect policy-making, we ask how citizens form their opinions. While existing research suggests publics systematically react to their macro-social environments, this study focuses on the development of immigration opinions and particularly the role-specific environmental factors, such as immigration, regional power structures and economic hardship, play throughout the process. While doing so, we contribute to several debates.

First and foremost, rather than discussing the macro-polity or public opinion as a whole, we take a more domain-specific approach and only focus on immigration opinions. Under the auspices of continuous and structurally high levels of immigration, this remains one of the most salient domains across Western democracies. Its reach and potential impact are therefore unprecedented. While such domain-specific interpretations of public opinion are not new, they typically focus on single countries. To our knowledge, this is one of the few comparative works in the field.

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[20] We only examine regions with political power because Fig. 5 suggests there might not be a relationship between immigration levels and opinions in regions without political power. An analysis of all regions, however, confirms results from Table 2. We refer to Table A.5 in the Appendix for full models.

[21] Following Brambor et al. (2006) and Berry et al. (2012), we further explored this conditional effect to potentially account for the clustering of the interaction in specific contexts. While results remain the same across France and the UK, the interaction term returns significantly for the Belgian regions.

Second, we construct a unique set of immigration opinion measures. While there exist many composite scales for immigration opinions, many of the supposed differences between them relate to ambiguous conceptualisations, ad hoc operationalisations, different labelling drawing from the same composites, or even confounded formulations of survey items. We avoid such drawbacks by combining a dyadic ratios technique with a rigorous item selection method (using only high-quality, representative samples from both cross-national and national-level surveys), which allows us to formulate reliable and robust immigration opinion measures.

Third, whereas most public opinion scholarship focuses on the opinion—policy link, we argue it is essential to first examine where opinions come from and how we can explore their origins. Specifically, we consider to what extent immigration levels, regional power and economic hardship can help predict immigration opinions. In doing so, we look at the regions as our primary units of analysis, something that is novel in current scholarship. The region can serve as a useful analytical unit for research into these relationships because we can both reasonably speak of a public (and thus public opinion) and a certain level of shared (or linked) experience of environmental changes by the public (Caughey and Warshaw 2015).

The analysis provides evidence of immigration opinions responding to their environments, indicating that increased levels of immigration into a region reduce the opposition to immigration and render citizens' immigration opinions more favourable. To further specify these findings, the empirical analysis further highlighted the role of decentralisation and economic hardship as intervening factors. First, we find that contact-inspired responsiveness primarily occurs in more decentralised regions, i.e. those with actual political power. Second, we find no evidence to indicate economic conditions move immigration opinions. This, while economic conditions are typically found to be important predictors of public opinion (Durr 1993; Stevenson 2001), and anti-immigrant attitudes more specifically (Citrin et al. 1997; Hjerm 2009). Both these stipulations are original findings that might be intuitive on the individual level, but further specify the macro-level responsiveness of immigration opinions to immigration levels.

We should not ignore the political ramifications of these findings. All too often, the so-called *null findings* are thought of as simply uninteresting or not significant. Yet, the observation that higher levels of immigration could reverse increasing anti-immigrant opinions has in and by itself important implications. Not only does it mean we need to formulate the public and academic debate more carefully, but it suggests governments might have an overlooked tool at their disposal to affect anti-immigrant opinions, namely altering the immigration environment. Improving economic conditions to stimulate pro-immigrant opinions, at least from the evidence brought forward in this study, might not be the most effective approach.

Altogether, the findings do not only offer valuable insights into the responsiveness of immigration opinions, but they provide more evidence that public opinion is

systematically reactive to multiple, wide-ranging contextual variables. We consider this result a significant advancement to concretely understand how publics react to their macro-social environments. We also consider this research to serve a vital step forward in the measurement of comparative public opinions, both in the continued advancement of its operationalisation and in proposing a more regular study of the disaggregated components of public opinion.

Additional research remains necessary to further develop our understanding of responsiveness. Naturally, it is possible to expand the analytical scope of the study by extending the number of countries and regions, mainly by including more variation alongside the immigration (e.g. Scandinavian regions) and economic hardship variables (e.g. South European regions), or by extending the period under analysis (and adding more data sources). Aggregate immigration opinions can be explored in different ways, and while we provide a comprehensive and robust measurement, there are also alternatives to consider. Therefore, additional methodological specifications and substitute operationalisations of both dependent and independent variables can further add to the validity of current findings.

If we want to understand responsiveness to the environment in a more dynamic manner, we also recommend future studies to include more agency-based explanations, such as the political and media climate (Bohman and Hjerm 2016; Eger and Bohman 2016; Homola and Tavits 2017). The presence or absence of anti-immigrant parties can affect political behaviour, either directly or mediated through party support (Arzheimer 2009). This becomes particularly important when assessing the impact of political campaigns or on election day. Further research can expand the number of complementary explanatory mechanisms, particularly on the political side of the equation. Once a broader sample of countries has been analysed, and additional factors accounted for, we also recommend a more detailed analysis of the intervening elements and mechanisms. If responsiveness has contextually unique patterns of variance, this will provide further insights into the empirical study of (representative) democracy.

Appendix

Table A.1 Data overview

Country	Survey	Acronym	Included years
Belgium	Belgian National Election Study	BNES	1991, 1995, 1999, 2003, 2007, 2010
	European Social Survey	ESS	2002–2014 (biannual)
	European Values Study	EVS	1990, 1999, 2009
	Sociaal-Culturele Verschuivingen	SCV	1997, 1998, 2001, 2002, 2004, 2008, 2011, 2013, 2015
	Baromètre Sociale de Wallonie	BSW	2003, 2012, 2013
France	Baromètre Politique Français	BPF	2007 (R1–R4)
	Démocratie 2000	DEM	2000
	DREES opinion survey on health, social welfare and inequalities	DREES	2000–2015 (excl. 2003)
	Dynamiques de mobilisation: Comprendre la formation des choix électoraux	DYNAMOB	2013
	European Social Survey	ESS	2002–2014 (biannual)
	European Values Study	EVS	1990, 1999, 2009
	French Electoral Study	FES	2007, 2012, 2017
	Fractures Françaises	FF	2013–2016
	International Social Survey Programme	ISSP	2003, 2013
	LIVEWHAT survey	LW	2015
	Enquête interrégionale des phénomènes politiques	OIP	1989, 1990, 1991
	Panel électoral Français	PEF	1988, 1995, 1997, 2002, 2007, 2012
	World Values Study	WVS	2005
UK	British Election Study	BES	2001, 2005, 2010
	British Social Attitudes	BSA	1983, 1984, 1986, 1987, 1989, 1990, 1991, 1994, 1995, 1996, 1999, 2001, 2003, 2005, 2008, 2010, 2011, 2013, 2015
	European Social Survey	ESS	2002–2014 (biannual)
	European Values Study	EVS	1990, 1999, 2009
	LIVEWHAT survey	LW	2015
	World Values Study	WVS	1998, 2005

Note: This table lists the formal dates of the survey waves, which—depending on the fieldwork dates—can be different from their dates in the actual data set

Table A.2: Descriptive statistics

Before imputation	n	Mean	SD	Min	Max
Immigration opinions	585	51.36536	9.546342	19.14	75.261
Immigration (%)	259	10.8405	8.325592	2.1	36.5
Unemployment (%)	396	7.960101	3.170175	2.9	19.2
Population (1000s)	585	5775.223	2468.543	948.122	12,073.91
Size (1000s km^2)	585	20.37414	15.19951	0.16	78.132
RAI score	585	10.52222	5.629121	5	24
Elderly population (%)	585	16.36327	2.166918	10.8	21.68
Tertiary education (%)	387	31.76753	7.20826	17.4	56.8
Life expectancy	536	79.05836	1.936511	74.3	83.8
After imputation	n	Mean	SD	Min	Max
Immigration opinions	585	51.36536	9.546342	19.14	75.261
Immigration (%)	585	9.86998	6.874258	1.89201	37.78186
Unemployment (%)	585	7.871837	3.188927	1.967053	19.2
Population (1000s)	585	5775.223	2468.543	948.122	12,073.91
Size (1000s km^2)	585	20.37414	15.19951	0.16	78.132
RAI score	585	10.52222	5.629121	5	24
Elderly population (%)	585	16.36327	2.166918	10.8	21.68
Tertiary education (%)	572	28.00573	8.592034	10.50708	56.8
Life expectancy	585	78.95515	2.143464	72.8233	83.8

Note: We are not able to impute tertiary education data for Northern Ireland because there are no real data available

Table A.3: Full regression models

	Immigration opinions				
	(1) GLS	(2) Prais–Winsten	(3) PCSEs	(4) Bootstrap	(5) Log DV
Immigration (%)	−0.283* (0.144)	−0.584* (0.240)	−0.298* (0.138)	−0.276*** (0.082)	−0.006* (0.003)
Unemployment rate (%)	0.192 (0.197)	0.046 (0.203)	0.272 (0.229)	1.456*** (0.195)	0.006 (0.004)
Population (×1000)	−0.001^ (0.000)	−0.001 (0.001)	−0.001 (0.000)	−0.000 (0.000)	−0.000 (0.000)
Region size (×1000 km^2)	−0.088 (0.075)	−0.066 (0.138)	−0.033 (0.078)	−0.064 (0.040)	−0.002 (0.002)
Regional authority index (RAI)	−0.021 (0.273)	0.0146 (0.495)	−0.131 (0.299)	0.407*** (0.120)	0.001 (0.006)
Elderly population (%)	−0.174 (0.401)	−1.065^ (0.597)	−0.665 (0.491)	−0.604* (0.257)	−0.002 (0.009)
Tertiary education (%)	−0.266* (0.124)	−0.110 (0.141)	−0.249^ (0.148)	−1.000*** (0.111)	−0.006* (0.003)
Life expectancy	0.889^ (0.474)	0.715 (0.567)	1.195^ (0.648)	3.471*** (0.423)	0.019^ (0.010)
France	−5.163* (2.477)	−2.729 (3.734)	−5.264 (3.885)	−18.37*** (1.869)	−0.123* (0.053)
Belgium	−11.95** (4.477)	−16.18* (8.119)	−9.514 (6.265)	−17.07*** (2.128)	−0.271** (0.096)
Intercept	2.908 (32.06)	31.12 (41.44)	−15.47 (43.61)	−186.3*** (28.78)	2.809*** (0.674)
Observations	550	528	550	550	550
Number of regions	22	22	22	22	22
Wald χ^2 (10)	62.71***		35.48***	393.89***	62.75***
AR(1) coefficient	0.776				0.784
R-squared		0.055	0.800		
Adjusted R-squared		0.037			
RMSE		4.065			
Rho		0.863	0.740		
Durbin–Watson statistic		0.395			
F statistic		3.03***			

Note: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ^$p < 0.1$; standard errors in parentheses

Table A.4: Full regression models, with regional power dummy interaction

	Immigration opinions				
	(1) GLS	(2) Prais–Winsten	(3) PCSEs	(4) Bootstrap	(5) Log DV
Immigration (%)	0.422 (0.347)	0.306 (0.522)	0.340 (0.278)	0.298^ (0.177)	0.006 (0.007)
Regional power (0 = no regional power)	5.479 (3.911)	9.353 (7.209)	5.938 (4.181)	8.947*** (2.120)	0.127 (0.083)
Immigration * regional power	−0.758* (0.339)	−1.017^ (0.523)	−0.729** (0.272)	−0.668*** (0.179)	−0.014* (0.007)
Unemployment rate (%)	0.202 (0.196)	0.066 (0.202)	0.238 (0.224)	1.419*** (0.182)	0.006 (0.004)
Population (×1000)	−0.001^ (0.000)	−0.001 (0.001)	−0.001^ (0.000)	−0.000 (0.000)	−0.000 (0.000)
Region size (×1000 km^2)	−0.106 (0.065)	−0.088 (0.119)	−0.093 (0.072)	−0.055 (0.038)	−0.002 (0.001)
Elderly population (%)	0.0205 (0.398)	−0.959 (0.590)	−0.456 (0.494)	−0.371 (0.282)	0.002 (0.008)
Tertiary education (%)	−0.288* (0.123)	−0.137 (0.141)	−0.273^ (0.144)	−0.983*** (0.107)	−0.007** (0.003)
Life expectancy	0.615 (0.491)	0.518 (0.577)	0.841 (0.657)	3.089*** (0.448)	0.015 (0.010)
France	−7.665** (2.616)	−4.956 (3.960)	−6.637^ (3.438)	−18.11*** (1.610)	−0.161** (0.055)
Belgium	−12.22*** (3.111)	−16.61** (5.753)	−12.04* (5.052)	−14.49*** (1.542)	−0.268*** (0.066)
Intercept	17.20 (32.62)	39.80 (41.44)	5.860 (43.48)	−162.3*** (29.74)	3.030*** (0.684)
Observations	550	528	550	550	550
Number of regions	22	22	22	22	22
Wald χ^2 (10)	68.03***		43.94***	436.70***	69.11***
AR(1) coefficient	0.777				0.780
R-squared		0.063	0.786		
Adjusted *R*-squared		0.043			
RMSE		4.054			
Rho		0.862	0.767		
Durbin–Watson statistic		0.399			
F statistic		3.13***			

Note: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ^$p < 0.1$; standard errors in parentheses

Table A.5: Full regression models, with immigration and unemployment interaction

	Immigration opinions				
	(1) GLS	(2) Prais–Winsten	(3) PCSEs	(4) Bootstrap	(5) Log DV
Immigration (%)	−0.390	−1.450*	0.048	1.229^	−0.017
	(0.471)	(0.594)	(0.557)	(0.644)	(0.012)
Unemployment rate (%)	0.362	0.130	0.420	1.484*	0.005
	(0.646)	(0.675)	(0.562)	(0.721)	(0.017)
Immigration * unemployment rate	−0.006	0.016	−0.030	−0.110*	0.001
	(0.033)	(0.034)	(0.036)	(0.049)	(0.001)
Population (×1000)	0.000	0.000	0.000	−0.002	0.000
	(0.001)	(0.002)	(0.001)	(0.002)	(0.000)
Region size (×1000 km^2)	−0.055	−0.103	−0.252	0.088	0.001
	(0.137)	(0.217)	(0.227)	(0.097)	(0.004)
Regional authority index (RAI)	−0.640	−0.947	1.692	0.532	−0.034
	(1.192)	(1.968)	(2.267)	(1.018)	(0.031)
Elderly population (%)	0.121	−2.225	–	−0.508	0.007
	(0.878)	(1.369)		(0.748)	(0.023)
Tertiary education (%)	−0.334	−0.094	−0.394	−1.154***	−0.012^
	(0.249)	(0.266)	(0.313)	(0.273)	(0.006)
Life expectancy	1.252	1.362	1.779^	4.907***	0.038
	(0.904)	(1.045)	(1.042)	(0.827)	(0.023)
Belgium	−6.979	−10.02	−19.03	−9.980	−0.018
	(9.455)	(15.36)	(13.32)	(6.820)	(0.245)
Intercept	−22.40	16.38	−93.27	−299.0***	1.710
	(61.36)	(76.67)	(82.68)	(56.51)	(1.576)
Observations	150	144	150	150	150
Number of regions	6	6	6	6	6
Wald χ^2 (10)	27.74***		72.60***	184.96***	24.55**
AR(1) coefficient	0.770				0.773
R-squared		0.148	0.774		
Adjusted R-squared		0.084			
RMSE		4.024			
Rho		0.853	0.754		
Durbin–Watson statistic		0.471			
F statistic		2.31***			

Note: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ^$p < 0.1$; standard errors in parentheses

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Steven M. Van Hauwaert is an Alexander von Humboldt Fellow at the University of Mainz and the principal investigator of the Global Public Opinions Project (GPOP). His primary research interests are in the fields of comparative political behaviour and public opinion, as well as populism and political extremism. His most recent academic contributions have appeared in *Acta Politica*, *Comparative European Politics*, *Electoral Studies*, the *European Journal of Political Research*, *European Societies* and the *Journal of European Integration*. He is also an associate editor of the ECPR journal Political Research Exchange (PRX).

Patrick English is a PhD researcher at the University of Manchester