

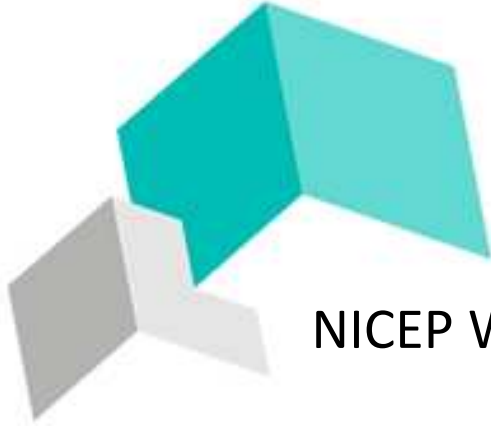


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NICEP Working Paper:2019-01

# Diversity and Perceptions of Immigration: How the Past Influences the Present

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ISSN 2397-9771

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NICEP Working Paper Series 2019-01

June-2019

ISSN 2397-9771

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# **Diversity and Perceptions of Immigration: How the Past Influences the Present<sup>1</sup>**

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16 June 2019

## *Abstract*

Research on the relationship between immigration-related diversity and public attitudes to immigration generally focuses on contemporary levels of (or recent changes in) diversity. Drawing on the political socialization literature, this paper argues that by ignoring the effect of diversity during early socialization years, existing research fails to fully understand long-term trends in attitudes to immigration. Applying a generational change perspective to the British sample of the European Social Survey (2002-2017), along with two innovative approaches to modeling generational differences - generalized additive models (GAMs) and hierarchical age–period–cohort (HAPC) models - we are able to investigate attitudes among groups of birth cohorts socialized between 1935 and 2010. The findings show that younger cohorts are systematically more positive about immigration. These increasingly positive attitudes are related to a macro-context of higher diversity in younger cohorts' early years. This effect may, however, be diminished by a context of high income inequality during the formative years.

*Keywords:* Immigration, political socialization, public opinion, cohort analysis, United Kingdom.

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<sup>1</sup> Earlier versions of this paper were presented at the Annual Conference of the European Political Science Association, Belfast, 20-22 June 2019, the Annual Meeting of the American Political Science Association, Boston, MA, 30 August 30- 2 September 2018, and the Annual Conference of the Elections, Public Opinion and Parties (EPOP) group of the Political Studies Association, University of Nottingham, 8-10 September 2017. The authors thank Anastasia Gorodzeisky, Eric Kaufmann, and Sergi Pardos-Prado as well as APSA and EPOP conference participants for their extremely helpful comments on the paper.

The large-scale movement of people across borders is one of the defining political issues of the twenty-first century. Immigration is dividing western societies (McLaren 2012), disrupting established party systems (Arzheimer and Carter 2006; Golder 2016; Meguid 2005; Pardos-Prado 2015), and producing surprise referendum outcomes like the UK's decision to leave the European Union. We currently face momentous questions about the future prospects for western democracies, most of which appear to be reliant on migrant labor for vital services and the smooth functioning of their economies (Borjas 1995; Lisenkova et al. 2014): Will anti-immigration hostility continue to rise if migration continues to increase? Will this result in further increases in support for anti-immigration parties and leaders? Will the issue of immigration continue to divide western democracies for the foreseeable future, or is it possible that this issue will no longer be of great concern at some point?

Evidence-based answers to these questions are largely elusive, as evidence on the relationship between immigrant numbers and public attitudes to immigration is extremely mixed. On the one hand, as would be argued by classic ethnic threat approaches, increasing numbers of migrants have been shown to be associated with more *negative* attitudes to immigration (McLaren 2003; Quillian 1995; Scheepers et al. 2002; Schneider 2008; Semyonov et al. 2008). On the other hand, increasing numbers have also been shown to have *no impact* (Evans and Need 2002; Sides and Citrin 2007; Strabac and Listhaug 2008), or to produce more *positive* attitudes to immigration (Bubritzki et al. 2017; Hewstone and Schmid 2014; van Heerden and Ruedin 2017; Wagner et al. 2006).<sup>2</sup>

Despite the fact that scholarly research has emphasized the importance of socialization experiences for subsequent attitudes, values and behaviors (Krosnick and Alwin 1989; Neundorf et al. 2013; Sears and Funk 1999; Sears and Valentino 1997), the vast

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<sup>2</sup> See Weber (2019) for a recent review of these discrepancies, including the potential impact of immigration numbers at varying geographical levels. Unfortunately, we are unable to address the latter in this paper but we *are* able to address the issue of changes over time highlighted by Weber (2019) as a crucial yet under-researched piece of the immigration attitudes puzzle.

majority of research on the immigration numbers-attitudes relationship tends to focus on relatively contemporary levels of (or relatively short-term changes in) diversity (see Coenders and Scheepers 1998 for a rare exception; see also, Weber 2018). Thus, much of this existing research has overlooked a crucial factor in understanding how attitudes to immigration are formed (and change) within a population through generational replacement. Replacement of older generations with younger ones implies that trends in immigration attitudes would change substantially if, for example, older generations hold systematically different attitudes to immigration than younger generations. The scarcity of research on this topic is not a minor omission, as understanding generational differences in attitudes to immigration is likely to provide insight into the contradictory findings that have vexed this body of research for more than two decades. It also has significant effects on our ability to provide answers to the sorts of policy-oriented questions raised above.

Until recently, data and modeling limitations made investigating the impact of early-years macro-level socialization experiences extremely difficult. Drawing on advances in modeling cohort effects, this paper uses two innovative approaches - generalized additive models (GAMs) and hierarchical age-period-cohort (HAPC) models - to investigate whether attitudes to immigration are persistently different across birth cohorts and whether this is related to different diversity conditions experienced by each generation. Our model is investigated using the British sample of the European Social Survey, rounds 1-8, conducted between 2002-2017. This dataset allows us to follow groups of birth cohorts that were socialized from 1935 to 2010. We match these individual-level data with early-years diversity using census data, and with other early-years contextual data - in particular, economic data - as well as contemporary contextual data, to analyze the impact of all of these on current

attitudes to immigration.<sup>3</sup> The incorporation of economic data allows us to examine whether the impact of diversity as a socialization effect could be moderated by economic conditions, as emphasized by ethnic threat theories (e.g., Quillian 1995; Golder 2003).

The findings show that even controlling for potentially confounding factors such as aging, changing education levels, and contemporary diversity and economic conditions at the time of each wave of the survey, younger generations are increasingly more positive about immigration, and these generational differences are related to the level of diversity in a cohort's early (impressionable) years.<sup>4</sup> The findings also indicate that one particular economic condition in the early years - level of income inequality - may moderate the positive impact of diversity. As long as income inequality is low, high levels of early-years diversity produce relatively positive attitudes to immigration later in life; the combination of high diversity and high income inequality appears to reduce this positive effect, though.

This paper makes several contributions. First, the paper shifts the analysis of the impact of macro-level diversity from contemporary to past diversity to show how a context of relatively high diversity during an individual's formative years may ultimately produce more positive immigration attitudes later in life. This focus on past diversity is unusual in studies of attitudes to immigration (Coenders and Scheepers 1998). Second, by drawing attention to generational differences in immigration sentiments and attempting to establish empirically (and systematically) whether generations differ in their views towards immigrants, the paper adds to a small but growing body of research on this topic (Coenders and Scheepers 1998; Gorodzeisky and Semyonov 2018; Wilkes and Corrigall-Brown 2011). It must be noted that much of this research is, however, unable to incorporate early-years diversity into their

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<sup>3</sup> Comparative data on diversity from the early post-World-War-II period are not available, and so we limit our analysis to the case of the UK, where we are able to find the data necessary to investigate the impact of diversity on multiple birth cohorts over the last 80 years.

<sup>4</sup> Here we use the terms 'generations' and 'cohorts' inter-changeably. They refer to groups of people who were born around the same time and were impacted by the same political, economic and societal history context (see Neundorf and Niemi 2014 for a more detailed definition).

analyses (but Coenders and Scheepers 1998). Third, while prior studies of the relationship between macro-level contexts and attitudes and values have investigated the importance of economic factors such as GDP per capita and unemployment, our paper is innovative in exploring the possibility that income inequality is among the economic conditions relevant to immigration attitudes. The effect of income inequality and its potential interaction with diversity has been largely over-looked in the literature. Finally, focusing on the drivers of generational differences helps us to make predictions about future trends in attitudes to immigration.

## **Generational Differences in Attitudes to Immigration**

Central to this paper's argument is the idea that birth cohorts are likely to vary in their attitudes to immigration. Birth cohorts are groups of individuals who have shared experiences due to prevailing conditions at the time they were socialized (Neundorf and Niemi 2014). There are several reasons to expect differences in attitudes to immigration across birth cohorts. First, research on the development of individual-level political attitudes and behaviors has long emphasized the impressionable or formative years - the time between childhood and adulthood - in influencing subsequent attitudes and behaviors.<sup>5</sup> Young people (so the argument goes) are not yet set in their ways and are thus more easily influenced by external factors (Alwin and Krosnick 1991; Grasso et al. 2019; Jennings 1989; Sears and Valentino 1977). Particularly if cohorts have faced differing macro-level societal conditions during their early years, they may display dissimilar values, attitudes and behaviors. Inglehart's contention that economic security during individuals' formative years leads to long-lasting post-materialist values is perhaps the most seminal example of the impact of

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<sup>5</sup> For the sake of simplicity, we generally refer to these as 'early years' or 'impressionable years' throughout the paper. Key socialization years are normally thought to be adolescence, at approximately 15-20 years old (see Bartels and Jackman 2014; Neundorf and Soroka 2018). In Appendix 10, we further test the sensitivity of this specification by varying the age of the formative years.

macro-level conditions on values later in life (Inglehart 1971, 1990; Inglehart and Welzel 2005; but see Clarke and Dutt 1991; Duch and Taylor 1993; Davis et al. 1999); other research also confirms that early-years macro-level socialization conditions impact other values and attitudes later in life (Giuliano and Spilimbergo 2014; Malmendier and Nagel 2011; Neundorff and Soroka 2018).

A second reason that we might expect to find cohort differences in attitudes to immigration is that there is strong evidence of the existence of generational differences in values that are related to attitudes to immigration such as authoritarianism, with younger cohorts apparently becoming increasingly less authoritarian (Tilley 2005; Norris and Inglehart 2019). In addition, research on the relationship between age and attitudes to immigration points to the possibility of cohort differences: while some studies show very minimal effects of age (Crepaz and Damron 2008; Scheve and Slaughter 2001; Weldon 2006), many others find that older individuals consistently display less tolerance towards immigrants than younger individuals (Citrin et al. 1990; Coenders and Scheepers 1998, 2008; Espenshade and Calhoun 1993; Ford 2011; Heath and Tilley 2005; Quillian 1995; Semyonov et al. 2006).

The ability of these studies to draw inferences about generational differences is limited by their cross-sectional research designs and inability to account for all potentially confounding factors (e.g., age). However, such findings have led some to conclude that these are not simply aging effects - i.e., individuals becoming more conservative, authoritarian, and/or intolerant as they grow older - but that generational, or cohort, differences are likely (e.g., Ford 2011). Indeed, the limited body of research that systematically investigates this topic (see Coenders and Scheepers 1998; Gorodzeisky and Semyonov 2018; Wilkes and Corrigan-Brown 2011) indicates that significant cohort differences are likely to exist in



various contexts, though most of these studies are unable to analyze the impact of early-years diversity on these differences. Our first hypothesis is, therefore:

*H1: Cohorts display distinct (i.e., significantly different) immigration attitudes, even when controlling for age effects and all other relevant factors.*

### **Early-Years Socialization Conditions and Attitudes to Immigration**

Despite the potential importance of socialization conditions for values and attitudes, scholarly study of attitudes to immigration in European tends to focus on relatively contemporaneous factors that influence contemporary attitudes, or at best, the impact of relatively short-term fluctuations of these (e.g., McLaren et al. 2017; Semyonov et al. 2006). We do not contest the importance of short-term factors in explaining variation in attitudes to immigration - and indeed, we control for these in our models below - but contend that socialization conditions may be crucial and largely overlooked. That is, much of the existing research on the topic of diversity and attitudes to immigration fails to grapple with the prospect that contemporary attitudes to immigration are determined by circumstances that prevailed many years previously and that current conditions may matter far less than these early socialization experiences.

Moreover, within the body of research on generational differences in values and attitudes, including the small number of studies specifically on immigration attitudes, the focus has largely been on early-years *macro-economic* conditions. However, it is potentially equally - if not more - important that birth cohorts in European democracies have faced very different *diversity-related* conditions during their most impressionable years. In most of these

countries, cohorts of individuals who were born in the 1930s, 1940s, and even 1950s would have been socialized at times of relatively low diversity, which then became much higher when these cohorts were already in their 50s, 60s, and 70s. For most of these cohorts, large-scale immigrant-origin diversity would have, therefore, been less prominent in their daily lives (e.g., people they meet in the streets, their friends, celebrities on television and in cinema, to name a few) during their impressionable years compared to cohorts born in the 1970s and beyond. The increased diversity by the time that younger birth cohorts were being socialized would have meant an increased likelihood of experience with immigrant-origin diversity being a daily part of life, either actually (e.g., via friends, schools, and co-workers) or virtually (e.g., via the media).

Levels of diversity in birth cohorts' early years are presumably overlooked in the small body of research on cohort differences in attitudes to immigration because of the difficulty of obtaining indicators of diversity for older cohorts (but see Coenders and Scheepers 1998 for the case of the Netherlands). In order to investigate the impact of early-years diversity on cohorts born in the 1920s, for instance, data on levels of diversity from the 1930s and 1940s would be needed. Our analyses below incorporate such data. However, based on the existing research on the contemporaneous relationship between diversity and attitudes to immigration, expectations about the impact of early-years diversity are not entirely clear. Seminal research on this topic points to the likelihood of diversity prompting a greater sense of threat and thus more negative attitudes to the out-group in question (Blumer 1958; Quillian 1995). The one study that attempts to investigate the impact of early-years diversity (Coenders and Scheepers 1998) finds that this is indeed the case, at least in the Netherlands (though the effect is weak). One might, therefore, hypothesize that:

*H2a: Increased diversity during a birth cohort's formative years leads to more negative immigration attitudes in later life.*

On the other hand, several studies of contemporaneous relationships fail to find any association between immigrant population size and (contemporaneous) attitudes to immigrants (Evans and Need 2002; Hjerm 2007; Rustenbach 2010; Sides and Citrin 2007; Strabac and Listhaug 2008). Still others find that greater immigration-related diversity produces more *positive* attitudes to immigration, which might be more consistent with a 'contact hypothesis': in this case, contemporaneous diversity *on average* has an overall positive effect on attitudes, as the impact of (positive) contact with minorities ultimately outweighs the countervailing trend of threat (see Bubritzki et al. 2017; Hewstone and Schmid 2014; van Heerden and Ruedin 2017; Wagner et al. 2006; Weber 2019). Ford (2011) argues that a similar effect may be occurring as a *socialization* effect in the UK: younger cohorts have been socialized in a climate in which the presence of 'Others' - immigrants and immigrant-origin minorities - is commonplace when compared to previous cohorts. Thus, norms and expectations surrounding the composition of the national population may have changed the way citizens view the issue of immigration. An alternative hypothesis to H2a might, therefore, be:

*H2b: Increased diversity during a cohort's formative years leads to more positive attitudes to immigration in later life.*

Hypotheses 2a and 2b combined reflect the possibility that the macro context during cohorts' formative years may be producing systematic change in perceptions of immigration, but it is unclear as to which (if any) direction.

Finally, given the emphasis on macro-economic conditions found in existing literature on socialization and in research on attitudes to immigration, we incorporate multiple macro-economic indicators into our analysis below. Though this paper emphasizes the potential impact of early-years diversity on later immigration attitudes, research on the effect of contemporaneous macro-level conditions on immigration attitudes has also highlighted the potential threat created by difficult macro-economic conditions (Semyonov et al. 2006). Some have further suggested that difficult economic conditions interact with high levels of diversity to produce a particularly competitive environment in which anti-immigration sentiment develops (Golder 2003; Quillian 1995). We incorporate these ideas as period effects, as well as socialization effects. Our third and fourth hypotheses are, therefore:

*H3: Poor macro-economic conditions during a cohort's formative years lead to more negative attitudes to immigration in later life.*

*H4: Poor macro-economic conditions and high levels of diversity during a cohort's formative years combine (interact) to produce more negative attitudes to immigration in later life.*

There is a range of macro-economic conditions that may be relevant. Research on attitudes to immigration has focused especially on unemployment and GDP per capita (e.g., Golder 2003; Coenders and Scheepers 1998; Mueleman et al. 2019; Quillian 1995); we, therefore, incorporate these. However, we also investigate the potential effect of income

inequality, a factor largely overlooked in existing studies of cross-time changes in attitudes and behaviors despite being argued to be crucial in producing the type of competitive macro-environment in which general distrust and intolerance are likely to thrive (Uslaner 2002).

## **Data**

Our analyses are based on the British sample of eight rounds of the European Social Survey (ESS), conducted biennially between 2002-2017. The analysis is based on 13,661 respondents who themselves as well as their parents were born in the UK.<sup>6</sup>

## **Measuring Immigration Attitudes**

Immigration attitudes are measured using three items that appear in all rounds of the ESS:

- Would you say it is generally bad or good for the UK's economy that people come to live here from other countries? Bad for the economy (0), Good for the economy (10).
- Would you say that the UK's cultural life is generally undermined or enriched by people coming to live here from other countries? Cultural life undermined (0), Cultural life enriched (10).
- Is the UK made a worse or a better place to live by people coming to live here from other countries? Worse place (0), Better place (10).

These items were combined into a single index, with values ranging from 0 to 10, from more negative attitudes to immigration to more positive attitudes to immigration.<sup>7</sup>

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<sup>6</sup> Those who are first or second immigrants (determined by a series of questions in the ESS about citizenship status) are omitted from the analysis, resulting in a loss of 18% of observations. Though these individuals are an important part of the story of how attitudes to immigration may be changing over time (i.e., compositional changes to cohorts), our concern here is with whether there is likely to be attitude change resulting from cohort change amongst the so-called native population (defined here as those who do not self-identify as a first or second generation immigrant).

<sup>7</sup> Inter-item correlations (Pearson's  $r$ ) were all greater than 0.60 and the items load onto a single factor in a Principal Components analysis. The scale reliability coefficient - Cronbach's alpha - is 0.886, indicating a

## Measuring Cohorts

As is standard in APC analysis (Mason and Fienberg 1985: 3), cohorts are grouped into five-year intervals based on birth year: those born between 1920-1924, those born between 1925-1929, and so on, with the youngest cohort being those born in 1995 or later.<sup>8</sup> This produced 15 birth-year cohorts. In order to assess the contextual socialization effect during a cohort's formative years, we add 15 years to each birth group to create 'socialization cohorts', which share the same historical upbringing. This implies that the 1920-24 cohort was in effect socialized in 1935-39, when this cohort was between around 15 years old. We define adolescence as the most formative years according to Bartels and Jackman (2014), who used a Bayesian learning model to estimate the formative years (see the Robustness section for alternative socialization configurations).

## Individual-Level Control Variables

In order to isolate the impact of cohort effects, it is important to account for individual-level alternative explanations as well as isolate the socialization effect from other potential societal changes over time, which affect the composition of subsequent cohorts. Most importantly, our models include individual-level *age*, which is converted from the respondent's birth year. We also control for individual level *education*. Like age, education has been shown to have fairly consistent, powerful effects on attitudes to immigration and related outlooks such as prejudice (Coenders and Scheepers 2003; Espenshade and Calhoun 1993; Hainmueller and Hiscox 2007), and it is possible that any cohort differences in attitudes to immigration are largely a result of differences in levels of education between cohorts (see Wilkes and Corrigan-Brown 2011). Education is measured on a 5-point scale indicating the respondent's

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very high internal consistency of these three items. We further investigated our models on each item separately and the findings are very similar to those presented here. The results are presented in Appendix 9.

<sup>8</sup> We opted for 5-year birth cohorts to ensure that we have enough observations per cohort per ESS wave. See the Robustness section for tests on alternative cohort configurations.

reported highest education completed, ranging from less than lower secondary education (1) to tertiary education completed (5) and has been converted into dummy variables for our analyses below. Other individual-level control variables include *gender*, whether the individual is *unemployed*, and whether they find it difficult to live on their present *income*, where 1 represents financial struggles and 4 living comfortably (see Gorodzeisky and Semyonov 2016; Quillian 1995).<sup>9</sup>

### **Measuring Socialization and Contemporary Immigration-Related Diversity**

In order to test our hypotheses, we need to measure the immigration-related diversity context to which each cohort was exposed to during their formative years, while controlling for current levels of immigration, which will affect all cohorts similarly (period effect). Level of diversity in our analysis is measured by the *percentage of foreign-born* individuals in the country. Contemporary data are available annually from the OECD and so we are able to investigate the potential impact of current levels of diversity (or period effects) using the percent foreign-born in the year of the survey. Though recent cross-national research highlights the potential importance of the share of the population that is of non-European origin (e.g., more visible minorities; see Gorodzeisky and Semyonov 2016, 2018), in the case of the UK, both European and non-European migration are likely to be important, given the dramatic increase in numbers of migrants from other European countries over the timespan of the ESS. We therefore use percent foreign born in the UK in the year of the survey to capture this overall level of diversity.<sup>10</sup>

To test H2 and H4, exposure to more or less immigration-related diversity is also captured as a cohort effect. Measuring the level of diversity during the respondents'

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<sup>9</sup> We refrained from using actual income, as the variable has about 25% missing values. Nevertheless, objective and subjective income are strongly correlated (Pearson's  $r=0.42$ ).

<sup>10</sup> In the Robustness section below, however, we investigate *ethnic diversity* as an alternative measure for contemporaneous diversity-related threat (period effect).

formative years presents challenges regarding how to measure indeterminate periods spanning multiple ages of individuals. An additional challenge is that indicators of level of diversity were available with less regularity than contemporary indicators of percent foreign-born. However, Migration Watch (2014) has produced a report based on historic census data that provides the percent foreign born as reported in each census between 1851-2011. Apart from the World War Two period, censuses were generally conducted every ten years, beginning in 1851.<sup>11</sup> Assuming that immigration numbers, as captured by the percent foreign-born, are generally very slow changing, we use linear interpolation to estimate the percent foreign-born for the cohorts in between those for whom census results can be used.

Cohorts are grouped into 5-year socialization cohorts and we calculate the average context during each cohort's formative years using the above-mentioned historic census results. In our analysis, for example, for the 1945-49 birth cohort, level of diversity is 5.0 per cent foreign born, as estimated by the 1961 census, when this generation was about 15-20 years old. For the 1955-59 cohort, that figure is 6.4, from the 1971 census, with the cohort between these two (1950-54) being assigned a value of 5.7, and so on. In the model, the variable was standardized to range from 0, the lowest historical point of foreign-born population, to 1, the historical high of 13.4 percent estimated in the 2011 census.

### **Macro-Level Economic Variables**

To capture the current (period) effects of economic conditions, we use the *unemployment rate*, *GDP growth*, and *income inequality* in the UK for the year of the survey. To capture the economic context during the respondents' formative years, we match to each respondent economic indicators, averaged over the five-year interval corresponding to a cohort's formative years when they were around 15 years old. The annual unemployment rate is

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<sup>11</sup> No census was conducted in 1941.



drawn from the British Office of National Statistics (ONS 2016) data back to 1965, and before that we rely on data reported in Mitchell (1988); per capita GDP growth is based on data from the Maddison-Project (2001). To measure income inequality in the formative years, we use the Gini coefficient, available from UNU-WIDER (2017).<sup>12</sup>

## **Empirical Analyses**

This paper investigates whether cohort differences in immigration attitudes exist (Hypothesis 1 - H1) and what could explain these potential cohort effects (H2-H4). We follow Yang and Land (2013: 8), defining cohort effects to ‘reflect formative experiences resulting from the intersection of individual biographies and macro-social influences.’ Our expectation is that the changing nature of immigration conditions to which each subsequent cohort was exposed during their formative years will leave an enduring mark on the immigration attitudes of that generation. In order to test our hypotheses we need to isolate the effect of a respondent belonging to a specific cohort ( $C_i$ ) from aging ( $A_{it}$ ) and being interviewed in a specific year ( $P_t$ ). The problem in identifying the unique APC effects on the outcome variable is the so-called ‘APC Conundrum’ (Glenn 2005, 20), as:

$$C_i = P_t - A_{it} \quad [1]$$

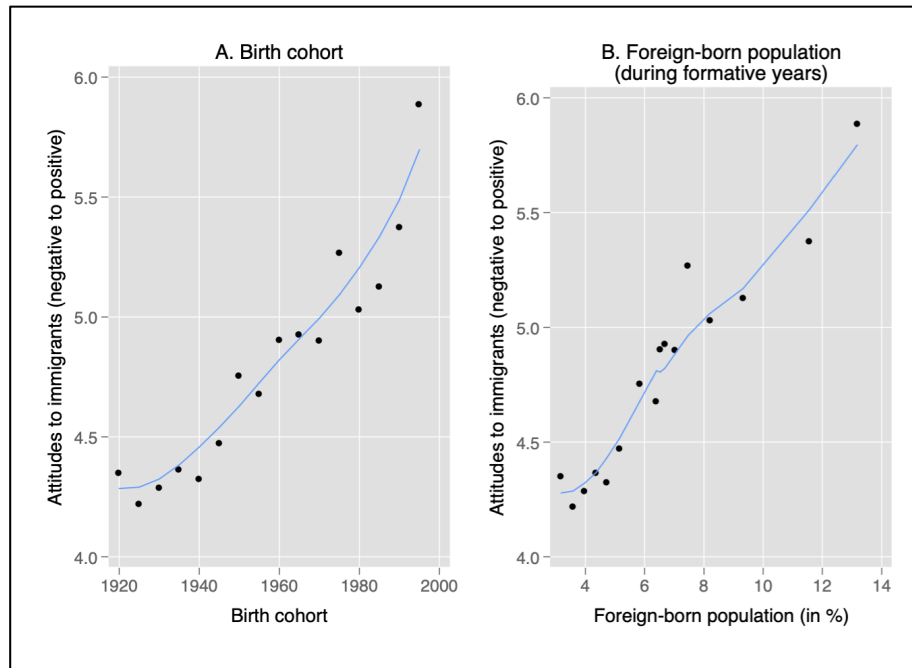
Once we know someone’s age and the current year (both measured in years), we know when they were born. Estimating unique parameters in regression models is thus impossible. To deal with this problem, some studies omit one of the three variables that create the identification problem (age, period or cohort), depending on theoretical expectations. In the case of anti-immigration attitudes, it is likely that all three variables could be relevant. As there is no perfect solution to the APC identification problem, we triangulate

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<sup>12</sup> Appendix 1 plots the over time development for the key macro variables: foreign-born population (both levels and 5-year change), GDP growth, unemployment, and income inequality.

our results by drawing on two modeling approaches to investigate these effects: generalized additive models (GAMs) and hierarchical age–period–cohort (HAPC) models.

**Figure 1:** Average immigration attitudes by birth cohorts and foreign-born population



Source: ESS, UK Census (UK). Note: Smoothed lowess line to capture trends in data

Before turning to the multivariate modeling, we first explore the data descriptively. Figure 1 plots the average attitudes to immigration across our 15 birth cohorts for their birth year and the percent foreign born during their formative years.<sup>13</sup> The figure indicates that younger cohorts are more positive about immigration than older cohorts. This trend corresponds closely to the level of diversity during the cohort’s formative years (Figure 1.B). It is not possible, however, to determine whether the positive trend in Figure 1.A is due to younger generations being more positive about immigration (cohort effect) or whether this is because these recent birth groups are still younger (age effect). The analyses below investigate whether the apparent connection between diversity in the formative years and positive attitudes to immigration still exists with more rigorous testing.

<sup>13</sup> Figure created using Stata package designed by Bischof (2017).

## **Exploring the Cohort Effect: Generalized Additive Models (GAM)**

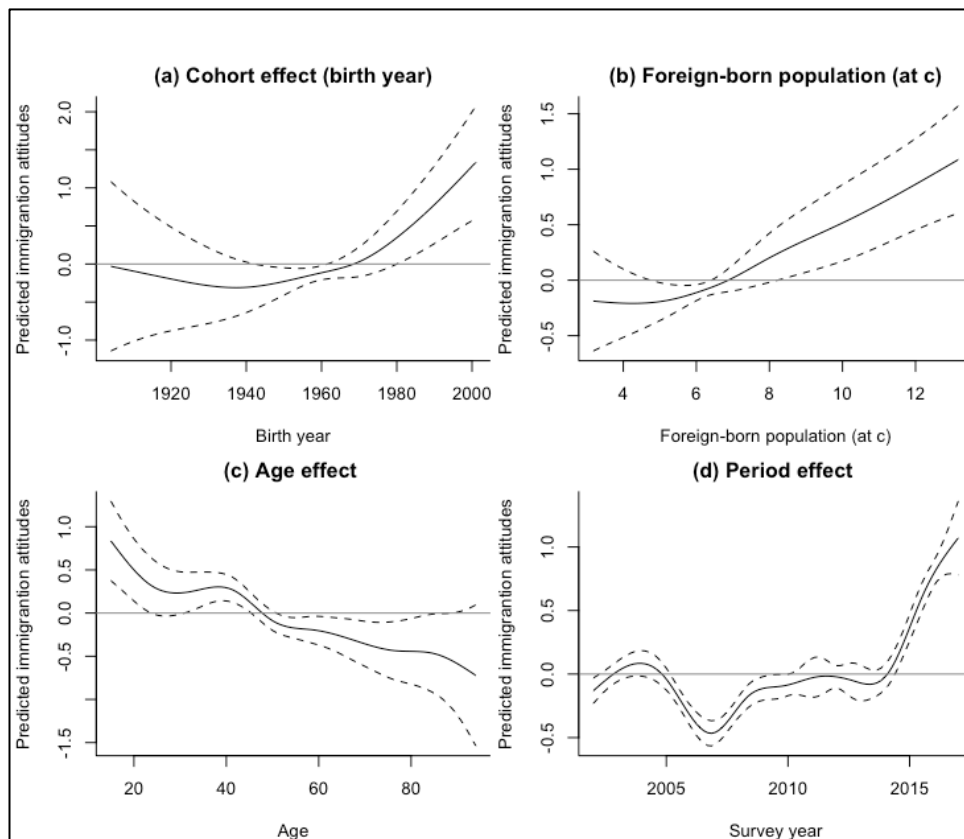
The Model. Following the work of Neundorf (2010) and Grasso (2014), generalized additive models (GAMs) are applied here to account for potential nonlinearity between birth cohorts and attitudes to immigration. GAMs allow the modeling of unique effects for each birth cohort, permitting the main independent variable to be estimated non-parametrically. The advantage of this method over normal descriptive graphs such as those shown above is the inclusion of control variables, most importantly age and period effects. These are added in a linear, parametric way, as in multivariate ordinary-least-squares regression (see Beck and Jackman 1998; Hastie and Tibshirani 1990) before using graphs to investigate the potential non-linear effects of key variables, controlling for other relevant factors.<sup>14</sup> Further information about GAMs, including our models, is provided in Appendix 2.

GAM Results. We estimate four separate generalized additive models. In each model, we control for all individual-level control variables and depending which of the APC effects is estimated non-parametrically, the remaining two are controlled for as fixed parameters; one variable is then included as a smooth function. For example, in Figure 2a, we control for age categories and period dummies, while estimating the smooth function of the cohort effect using the birth year as a continuous-level variable (testing H1). In Figure 2b, we substitute the birth year of our respondents to use the level of foreign-born population during their formative years as a proxy and explanation (H2) for the cohort effect. This approach is further another APC identification strategy, as we use a substantive factor (immigration during one's formative years) to proxy one of the APC effects, in our case the cohort effect (Rodgers 1982). In Appendix 3 we further present the smooth functions of three measures of the economic socialization context to test H3.

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<sup>14</sup> See Appendix 3 for estimates of control variables  $z$ , including year dummies and age categories.

**Figure 2:** Smooth functions based on GAM (incl. 95% c.i.)



*Note:* The figure shows the estimated smooth functions based on four separate GAMs. All models include control variable and coefficients are reported in Appendix 3.

Figure 2a illustrates the impact of cohort on immigration attitudes, controlling for age, survey year, education, gender, and individual economic circumstances; even under this fairly conservative test, cohort is relevant in explaining differences in attitudes to immigration. Cohorts born between 1940 and 1960 appear to be most negative and cohorts born after 1980 most positive about immigration. The large confidence intervals for cohorts born before 1930 show the sparsity of the data, as we do not have many respondents that belong to these birth groups.

Figure 2b illustrates the impact of the level of diversity in the cohort's formative years: taking into account individual-level factors (including age and education) and period effects, greater diversity in a cohort's formative years produces more positive attitudes to immigration for that cohort. Figures 2a and 2b provide empirical evidence that cohorts are

indeed relevant to explaining variation in attitudes to immigration and cohort differences may be due to increased early-years diversity.

Figures 2c and 2d illustrate age and period effects, controlling for other individual-level variables and for cohort and/or period effects as appropriate; these indicate that life-cycle (age) effects are also relevant to attitudes to immigration in the UK, though these are less pronounced once we control for cohort effects. Figure 2d reveals that there are clear period effects: attitudes to immigration in the UK generally became relatively more negative in 2008 and a great deal more positive in 2016.<sup>15</sup>

### **Explaining Cohort Differences: Hierarchical Age, Period, Cohort models (HAPC)**

The Model. We further investigate cohort differences in attitudes to immigration using hierarchical age–period–cohort (HAPC) models. Recent advances in social statistical analysis of age, period, cohort models by Yang and colleagues (Yang 2006; Yang and Land 2006; see also Gorodzeisky and Semyonov 2018; Smets and Neundorf 2014 for a politics application) emphasize the advantages of hierarchical modeling. Yang suggests using mixed (fixed and random effects) models, allowing random intercepts to account for cross-classified grouping of cohorts and periods (survey years). The advantage of the HAPC model is that it estimates cohort and period effects as random effects, which does not impose linearity, thus solving the identification problem. A second advantage is the ability to test why cohorts (or periods) are different from one another. Modeling cohorts as random effects allows the inclusion of substantively interesting factors such as levels of diversity in the cohort’s formative years to

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<sup>15</sup> Though it is difficult to determine precisely what has produced these period effects (i.e., beyond those for which we already control, including economic conditions), 2008 coincided with the setting in of the ‘Great Recession’ following the 2007 economic crisis; Round 8 of the ESS coincided with the UK’s Brexit referendum and reveals some potential backlash against anti-immigration sentiment following the referendum (also reported in subsequent polls; see <https://www.theguardian.com/world/2019/may/02/britons-more-sold-on-immigration-benefits-than-other-europeans>).

test theoretical expectations about variability in cohort attitudes to immigration. We further explain the rationale behind HAPC models in Appendix 4.

Results. Our hierarchical age-period-cohort (HAPC) modeling begins by including the age fixed effect and cohort and period random effects in an otherwise null model (see Table 1, M0). As shown in this model, all three of these components—age, cohort and period—are independently relevant to understanding attitudes to immigration in the UK. Model 1 adds the individual-level control variables, including education, which is likely to be pertinent in understanding cohort differences in attitudes to immigration. As expected, respondents with higher education are more positive about immigration. In fact, when these individual-level control variables are included in the model (M1), the variance component for cohort increases. This is a product of more accurate estimates of cohort effects once we account for societal changes, in particular, education, over the last few decades. The goal of the remaining analyses is to try to explain this residual variance—i.e., to account for this variance using measures of the socialization context.<sup>16</sup>

Model 2 adds the proportion of the foreign-born population during the cohort's formative years. As was the case with the GAM results, these results indicate that level of diversity in the formative years is significantly related to contemporary attitudes to immigration, even controlling for individual-level age, education, and the other factors shown in Table 1. The variance for the cohort component also reduces by approximately 60% once this variable is added to the model. Model 3 then adds the economic circumstances the cohorts faced during their formative years, which further reduces the variance in cohort variation by 70% compared to M1. However, according to our results none of the measures that capture the economic context during a cohort's formative years seem to have a lasting direct effect on immigration attitudes today. H3 is therefore not confirmed. However, even with all of these

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<sup>16</sup> Appendix 5 further plots the random effects for the cohort and period estimates.

**Table 1: Linear HAPC Model Predicting Positive Immigration Attitudes**

	M0 (b/se)	M1 (b/se)	M2 (b/se)	M3 (b/se)	M4 (b/se)
Age	-0.011*** (0.001)	-0.007*** (0.002)	0.014*** (0.004)	0.015*** (0.005)	0.014*** (0.005)
<u>Individual-level controls</u>					
Female		-0.208*** (0.036)	-0.206*** (0.036)	-0.207*** (0.036)	-0.207*** (0.036)
Education (ref: primary)					
Lower secondary		0.372*** (0.057)	0.373*** (0.057)	0.378*** (0.057)	0.378*** (0.057)
Upper secondary		0.564*** (0.059)	0.565*** (0.059)	0.569*** (0.059)	0.571*** (0.059)
Non-tertiary		0.796*** (0.150)	0.792*** (0.150)	0.793*** (0.150)	0.796*** (0.150)
Degree		1.515*** (0.052)	1.523*** (0.052)	1.527*** (0.052)	1.527*** (0.052)
Unemployed		0.116 (0.090)	0.111 (0.090)	0.112 (0.090)	0.113 (0.090)
Sub. Income		0.378*** (0.024)	0.376*** (0.024)	0.376*** (0.024)	0.376*** (0.024)
<u>Socialization context</u>					
Foreign-born pop.			0.201*** (0.037)	0.207*** (0.043)	0.203*** (0.044)
Unemployment				0.016 (0.011)	0.016 (0.011)
GDP Growth				-0.010 (0.017)	-0.011 (0.017)
Income inequality (gini)				0.009 (0.007)	0.009 (0.007)
<u>Current context</u>					
Foreign-born pop.					0.128* (0.069)
Unemployment					-0.084 (0.065)
GDP Growth					0.076 (0.051)
Income inequality (gini)					0.146 (0.101)
Intercept	5.118*** (0.139)	3.195*** (0.184)	0.815* (0.448)	0.383 (0.560)	-5.447 (4.271)
<u>Variance Components</u>					
Cohort (1935-2015)	0.088*** (0.030)	0.183*** (0.049)	0.073*** (0.027)	0.058*** (0.026)	0.058*** (0.026)
Period (2002-2017)	0.322*** (0.083)	0.290*** (0.075)	0.261*** (0.068)	0.260*** (0.068)	0.169*** (0.046)
N	13,081	13,081	13,081	13,081	13,081
AIC	57,575	56,092	56,074	56,075	56,077

*Significance: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $P < 0.01$ . Data ESS, round1-8. Note: Entries are regression coefficients and their standard errors of a HAPC model. The dependent variable is an index on immigration attitudes where 0='negative' and 10='positive'.*

economic contextual variables in the model, higher levels of diversity in the formative years continues to impact attitudes to immigration in the expected direction according to H2b.

Controlling for individual-level and macro-level factors, if a generation is exposed to 1 per cent higher levels of foreign-born population, immigration attitudes are 0.2 points higher (i.e., more positive) on a 0-10 point scale. This is equivalent to a 1/10 standard deviation change in the dependent variable (s.d.=2.21). To put this into perspective, let us take an example. Generations that grew-up in the 1930s were exposed to only 3 per cent of immigration. In the early 2000s, this proportion increased to about 10 per cent. This 7 per cent increase in exposure to diversity, is comparable to getting a university degree compared to having only primary education ( $b=1.515$ ;  $p < 0.001$ ).

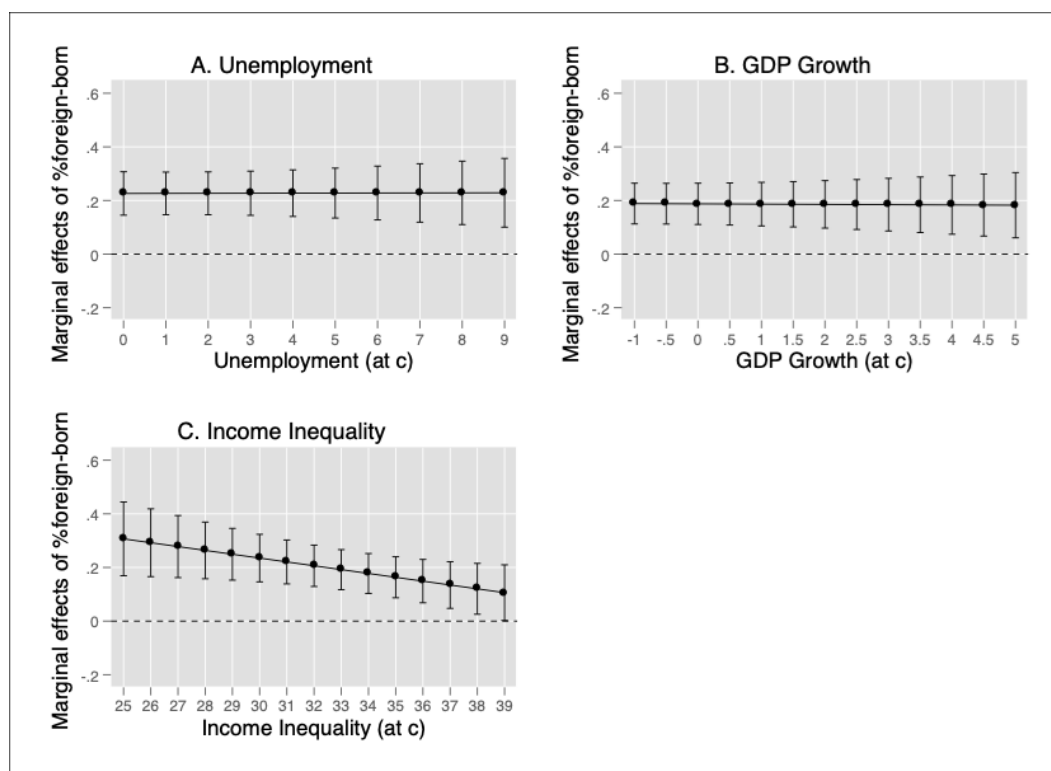
Model 4 further controls for potential period effects. These results indicate that contemporary levels of diversity are only weakly associated with more positive attitudes to immigration ( $b=0.128$ ;  $p < 0.1$ ). Moreover, the results of M4 suggest that the levels of immigration during one's formative years have a stronger impact than current levels of foreign-born population. This confirms the arguments and findings of political socialization literature, which stresses the importance of early socialization experiences. Also in contrast to expectations, none of the contemporary macro-economic indicators seem to affect immigration attitudes once we have controlled for levels of immigration during one's youth and today.

Based on Table 1, we can confirm Hypothesis 2b, which stated that increased diversity during a respondent's formative years is associated with more positive attitudes to immigration. However, it is possible that the impact of diversity is dependent on whether



respondents also faced a threatening economic environment (Quillian 1995; Coenders and Scheepers 1998). We have investigated this possibility using all of the economic indicators shown in Table 1, and of these, only income inequality appeared to moderate the effect of diversity in the early years.

**Figure 3:** Marginal Effects of the Socialization Context of Foreign-Born Population (at c) Conditional of Economic Context During the Formative Years



*Note:* The results are based on M4 in Table 1 and include additionally interaction effects. The coefficients are reported in Appendix 6.

Figure 3 plots the marginal effect of diversity during one’s formative years conditional on unemployment, GDP growth and income inequality.<sup>17</sup> As the results confirm, the general health of the economy does not seem to impact the relationship between immigration levels and attitudes. However, the impact of an influx of foreign-born people into the UK is weakly conditional on the level of income inequality. The positive impact of diversity observed in Table 1 appears to vanish as inequality increases. The findings illustrated in Figure 3 generally suggest that immigration and income inequality levels

<sup>17</sup> The coefficients for these models are reported in Appendix 6.

interact and can offset each other. Thus, H4 is weakly confirmed for the income inequality indicator.

Robustness Tests. To investigate the robustness of our findings that higher immigration levels during one's youth have a long-term positive impact on attitudes towards immigration we estimated several additional models. Results are reported in Appendices 7 and 10.

First, we make sure the results are not being driven by the specifics of our sample (see Appendix 7). We do this by re-running the models by 1) dropping the current younger generations (born after 1995) who we have not yet had the chance to follow for a lengthy period of time; 2) dropping the first cohort, which was socialized from 1935-1939; 3) changing the sample to only include respondents above the age of 20 to not conflate a respondent's socialization and period contexts. For all three specifications, the impact of the foreign-born population during the remaining cohorts' formative years is slightly reduced, but still strong and significant.

Secondly, we change the socialization and current measures of immigration (see Appendix 8). Firstly, instead of using levels, we use the 5-year change in the foreign-born population during a cohort's formative years. The effect of a 1 per cent (positive) change in immigration leads to a 0.381 increase in pro-immigration attitudes in later life. In a second step, we further utilize the richer available data for contemporary immigration. We first calculated change in immigration, compared to 5 and 10 years prior the survey year (period effect). The impact of contemporary change is sensitive to the specification of the length of change. An increase in immigration over a 10-year period has a positive effect on immigration attitudes ( $b=0.233$ ,  $p<0.05$ ), while 5-year change is overall not significant. We do not find a significant effect of net migration.<sup>18</sup> Lastly, we substituted ethnic diversity for

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<sup>18</sup> Net migration is defined the difference between immigration into and emigration from a country during the year. Negative values indicate higher outflows than inflows. Data for the years 2002-2017 were taken from the

the percent foreign born (see Gorodzeisky and Semyonov 2016; Kaufman 2014).<sup>19</sup> The findings from this re-analysis mirror those shown in M4, with coefficients slightly smaller ( $b=0.118$ ,  $p<0.05$ ).

Thirdly, we re-estimated M4, presented in Table 1 for each of the three variables measuring attitudes towards immigration separately, instead of using an index. The results presented in Appendix 9 confirm that the immigration levels during a cohort's formative years have the same effect on all three items. However, current levels of immigration only significantly (positively) impact the item that taps at the economic dimension of immigration.

Fourthly, we explore the impact of how we have specified the cohort variable, a crucial part of the HAPC model. The cohort variable is included in the models as a random effect to capture how cohorts vary in their immigration attitudes. In this third set of robustness tests, we change the cohort variable to reduce the number of birth years to 2-years and set the formative years to correspond to the ages 16 and 17. As Figure A10 in Appendix 10 illustrates, the descriptive relationship between cohorts and immigration levels on immigration attitudes remains the same. Generally the HAPC model based on these 38 2-year birth cohorts remain unchanged vis-à-vis the main results. The effect of the foreign-born population on later life immigration attitudes remains positive and significant.

Finally, we change the definition of the formative years to (1) 10-15 years old; (2) 20-25 years old; and (3) 30-35 years old. Here we restrict the sample to only ages that are higher than the imposed socialization age. E.g., the model that assumes formative years from 20-25, excludes all respondents below the age of 20. As Table A10 clearly shows the socialization

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UK Office of National Statistics data on "Long-Term International Migration (LTIM) estimate" available at [www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration](http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration).

<sup>19</sup> Following on from the work of Gorodzeisky and Semyonov (2018), we compute the level of ethnic diversity in the year of the survey as the percent per ESS round whose father or mother was not born in a European country. Similar ethnic diversity measures for respondents' formative years are not available and so the re-estimated model still relies on percent foreign-born in the cohorts' formative years to estimate overall levels of diversity in the UK during these years.

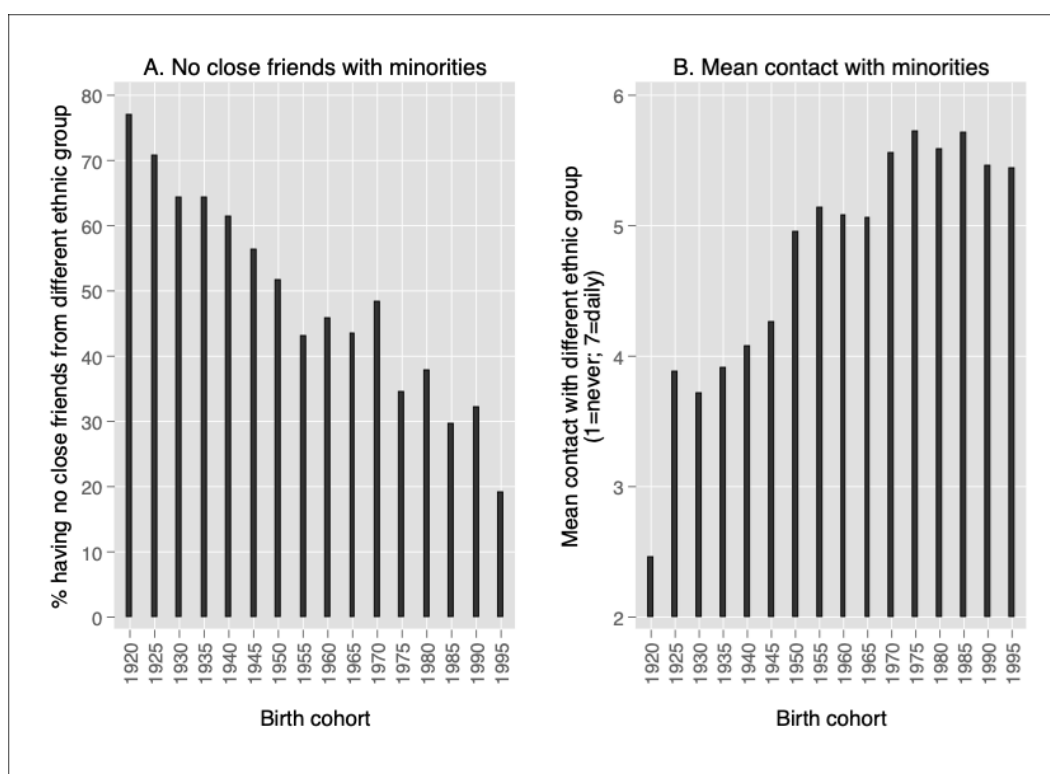
effect vanishes with older ages, which confirms previous research that has stressed the importance of late adolescence as the key formative years.

### **Further Reflection on Macro-Level Diversity and Positive Attitudes to Immigration**

Our findings indicate that it is likely that being socialized in a context in which diversity is relatively high ultimately produces more positive attitudes to immigration. This effect holds even taking into account potentially powerful competing explanations such as rising education levels (but may be moderated by income inequality). Though it is difficult to determine precisely why socialization in a context of high diversity plays such a positive role, this may partly be a result of changing norms surrounding immigrant-origin diversity, with very different norms prevailing during early-years socialization of generations born in more recent decades. Our control for individual-level education should capture some of this change at the individual level, but levels of diversity continue to play an independent role even taking education into consideration.

The impact of early-years diversity may also be a result of increased contact with immigrant-origin minorities. This relationship cannot be systematically investigated due to lack of cross-time indicators of contact, but Round 7 of the ESS did include questions about contact. Based on our hypotheses and findings above, we would expect younger generations that were exposed to higher diversity during their formative years to also have more contact with immigrants. The most relevant type of contact is likely to be friendships (Hewstone and Swart 2011; Pettigrew et al. 2011).

**Figure 4.** Frequency and Closeness of Contact with Immigrant-Origin Minorities



Source: ESS, Round 7 (2014); non-citizens and immigrant-origin minorities omitted; N=1,634. Data is weighted by population and design weight.

As illustrated in Figure 4.A, stark generational differences clearly exist when it comes to having friends from immigrant-origin minority groups: more than 60 per cent of those born before 1940 report having *no* friends from these groups, whereas approximately 70 per cent or more of those born since 1985 *do* report have friends from these groups.<sup>20</sup> Even for those born between 1975-1985, at least 60 per cent have at least some friends from immigrant-origin minority groups.<sup>21</sup> A similar pattern in generational differences emerges when we look at average weekly contact with minorities (plotted in Figure 4.B). Thus, some of the

<sup>20</sup> Respondents were asked ‘Do you have any close friends who are of a different race or ethnic group from most British people? 1- yes, several; 2 - yes, a few; 3 - no, none at all’. In Figure 4.B we plot the percentages of those that answered 3.

<sup>21</sup> Similar differences can be found in the first round of the ESS, which also included a contact question (see Appendix 11).

positive impact of macro-level diversity may be a result of higher levels of contact with immigrant-origin minorities on the part of younger (non-minority) cohorts.<sup>22</sup>

## Conclusion

Our findings imply that public perceptions of immigration and immigrant-origin minorities in the UK may be undergoing a gradual but drastic change as older generations who are less positive about immigration are replaced by cohorts who see immigration in a different light. The evidence presented here indicates that *ceteris paribus*, attitudes to immigrants and immigration are systematically different among older generations. This paper investigated the proposition that this difference is largely a result of different socialization experiences: large-scale post-war migration to the UK began *after* the crucial formative years of older cohorts who, therefore, did not have the opportunity to formulate their attitudes to immigration at a time when the UK was already a country of immigrant-origin minorities.

Very few studies of attitudes to immigration in Europe have investigated the impact of the socialization environment due to the shortage of cross-time data necessary to follow cohorts over many years and to match these with diversity indicators. This paper, therefore, makes an important contribution to the study of attitudes to immigration, finding that in contrast to conflict theories of prejudice which might predict that rising numbers of immigrants or minorities would produce increased hostility to these groups, rising numbers actually create the conditions in which increasingly positive perceptions of these groups may thrive.

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<sup>22</sup> We have explored using macro-level proxies for the level of contact with immigrant-origin minorities during respondents' impressionable years, as survey data on this are sparse. Increased likelihood of having friends from such groups is, for instance, associated with increased civil society participation at the individual level (measured using data from ESS Round 1). Using the extent of civil society organisation (CSO) permeation from the Varieties of Democracy (V-Dem) data (Coppede et al. 2017) as a proxy for contact, we find an interactive relationship between level of diversity in the early years and this proxy; i.e., the positive effect of diversity may depend on the extent of contact with immigrant-origin minorities during cohorts' impressionable years (as measured by CSO). These results are reported in Appendix 11.

Our findings are contrary to earlier work of Coenders and Scheepers (1998) on cohorts in the Netherlands for the 1979-1993 period, which finds that increasing numbers appear to produce a slight increase the sense of ethnic threat. We are thus not contending that our findings are necessarily universal, and it is entirely possible that other contextual factors are important in understanding how increased diversity impacts public attitudes to that diversity. Indeed, our results also indicate that the level of economic inequality at the time of increased diversity may moderate the impact of that diversity. At least in the case of the UK, there is fairly strong evidence that in the long-run, increased diversity is likely to be met with growing acceptance and tolerance, especially if income inequality can be reduced. These results will, of course, need to be revisited as the UK's own context changes and further survey data become available. The extent to which the effects found here are similar in other European countries facing similar cultural divides over immigration should also be explored in future research.

Work on this paper began before the UK voted to 'Brexit' the European Union and we contend that the findings are important for understanding public attitudes to immigration in Britain—and potentially other contexts—regardless of the Brexit vote. However, Brexit has made our findings all the more pressing. Research on voting in that referendum indicates that immigration and the desire to increase UK control over external borders were key motivating factors driving the 'Leave' vote (Curtice 2017; Clarke et al. 2017). In some ways, this vote may be seen as an extension of fairly long-term expressions of concern about immigration that have been witnessed amongst large segments of survey respondents since post-war migration to the UK began, and a particular response to the miscalculation of previous UK governments vis-à-vis expected new arrivals after the 2004 EU enlargement. However, our findings point to the possibility that public attitudes to immigration in the UK could be changing and that this issue may soon no longer be so divisive in the future. More

generally, our findings indicate that immigration need not inevitably lead to intergroup conflict and that being socialized in a context of high diversity may ultimately ameliorate anti-immigration hostility.

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**Diversity and Perceptions of Immigration:  
How the Past Influences the Present**

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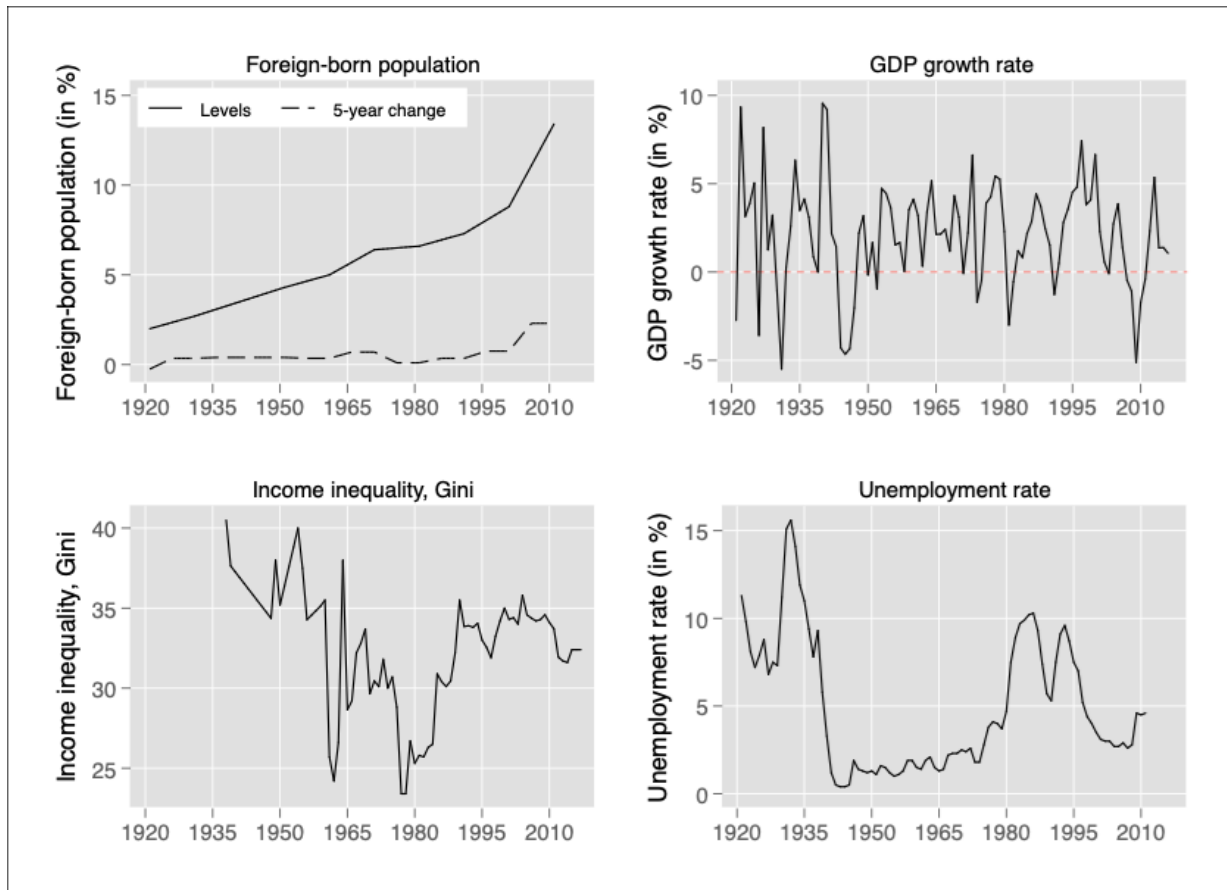
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## Appendix 1: Descriptive Results of Macro Variables



Sources: Foreign-born population: UK census (1921-2011); GDP growth rate: Maddison-Project (2013); Income inequality: UNU-WIDER (2017); Unemployment rate: based on ONS claimant count back to 1965, and Mitchell (1988: 124) data before 1965.

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## Appendix 2: Smoothing Functions in GAM

Generally, we can distinguish between three different types of smoothers: kernel smoothers, local polynomial regression (e.g. lowess), and splines. Especially the latter one receives substantial attention in previous econometric work (Wood 2006). Keele (2008) shows in simulations that automatic smoothing splines have the best fitting properties. He therefore concludes that “barring theoretical concerns, analysts are often better off letting the amount of smoothing be estimated from the data. Automatic smoothing removes any hint of art from the process, and more importantly provides confidence bands that more accurately reflect our uncertainty about the level of smoothness” (Keele 2008: 85). In this paper, we specifically use penalized regression smoothing splines as the automatic smooth function  $s_j(\cdot)$ . An important advantage of these types of splines is their ‘knot-free’ estimation. Using knots is highly constraining, as it is very difficult to find the optimum number of knots. Consequently, the crucial property of our smooth functions refrains from making subjective and even speculative assumptions about the number of knots (Wood 2006). Our GAM model can be expressed as:

$$\gamma_i = \alpha + s(x_i) + \sum_{l=1}^m \beta_l (z_{i,l}) + \varepsilon_i \quad [2]$$

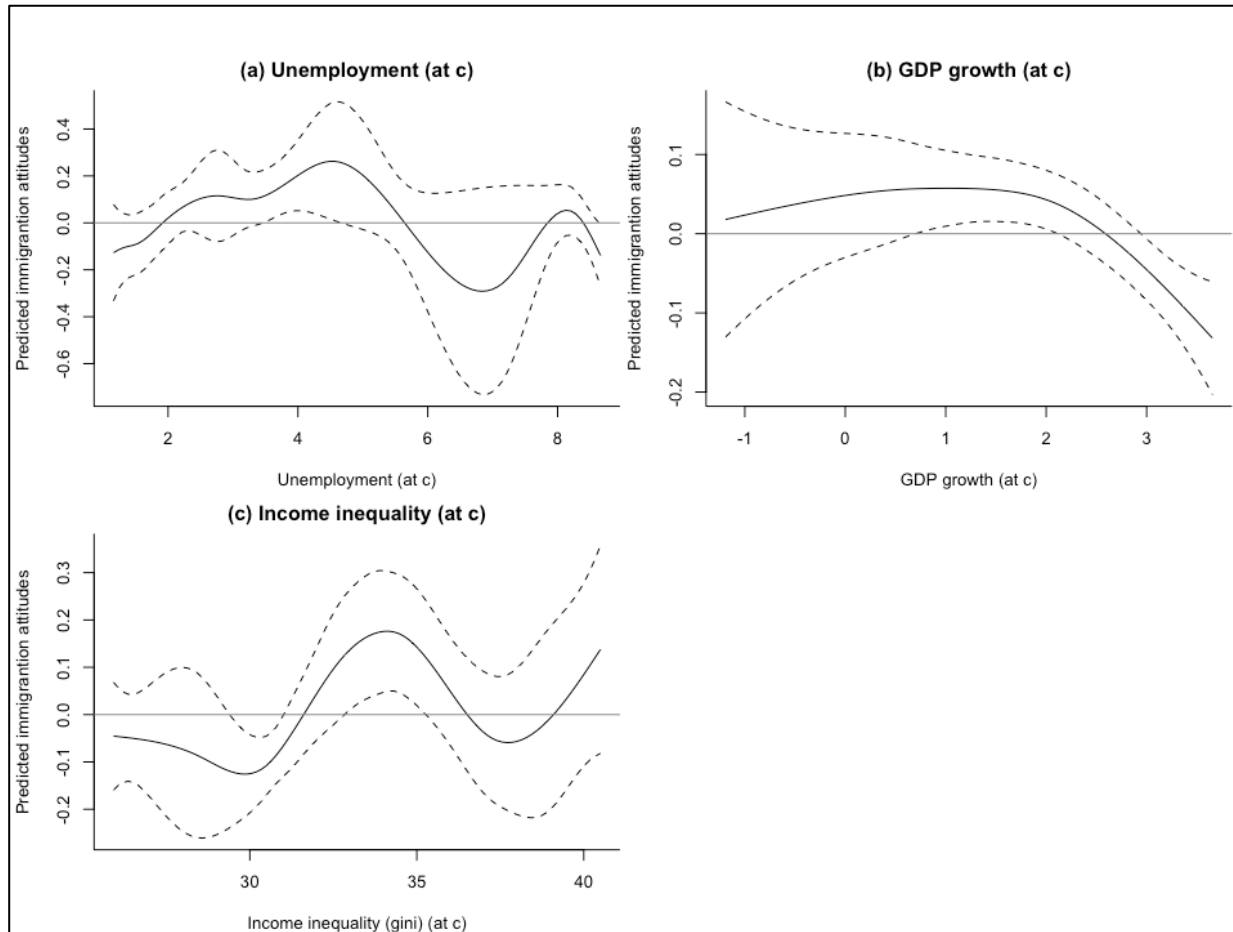
where  $\gamma_i$  is the immigration attitude for respondent  $i$ ,  $\alpha$  represents the intercept. The second part of the equation signifies the standard linear regression with  $m$  as the numbers of independent variables or covariates  $z$  that are weighted with parameter  $\beta_l$ , while  $\varepsilon_i$  represents the stochastic disturbance, which is independent from  $x_i$ ,  $E(\varepsilon_i) = 0$ , and  $\text{var}(\varepsilon_i) = \sigma^2$ , and  $i=1, \dots, n$ . The most important part of this model [2] is the inclusion of the smoothing function  $s(x_i)$  for every value of  $x_i$ , e.g., the birth year, age and survey year of each respondent. ‘Smoothing is an important tool for non-parametric regression, addressing one of the simplest yet most fundamental questions in data analysis: ‘what is our best guess of  $\gamma$ , given  $x$ ?’ (Beck and Jackman 1998, 602).

### Appendix 3: Additional results - GAM

**Table A3:** Coefficients of Generalized Additive Models (presented in Figure 2a)

	Coef	s.e.
Intercept	3.242 ***	0.136
Period (ref: 2002)		
2004	0.193 **	0.072
2006	-0.315 ***	0.073
2008	-0.247 **	0.082
2010	-0.150	0.092
2012	-0.131	0.106
2014	-0.108	0.120
2016	0.640 ***	0.134
Age (ref: 50-56)		
15-21	-0.141	0.307
22-28	-0.288	0.250
29-35	-0.138	0.194
36-42	0.188	0.141
43-49	0.059	0.094
57-63	0.058	0.094
64-70	0.016	0.143
71-77	0.037	0.200
78-84	0.139	0.261
85+	-0.003	0.335
Education (ref: primary)		
Lower Secondary	0.190 ***	0.053
Upper Secondary	0.440 ***	0.054
Non-Tertiary	0.725 ***	0.104
Degree	1.493 ***	0.048
Female	-0.234 ***	0.033
Unemployed	0.126	0.079
Sub. Income	0.325 ***	0.022
	edf	REF.df
s(Birth Year)	4.000	5.162 ***
N of Obs	16,132	
R-Sqr (adj)	0.138	

**Figure A3:** Additional Smooth Functions of economic socialization context on today's immigration attitudes



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## Appendix 4: HAPC Models Explained

The rationale behind the cross-classified random intercepts of cohort and period effects is as follows. As citizens who came of age at roughly the same time share common circumstances, we can assume the errors in a model explaining their immigration attitudes are dependent; random intercept models make it possible to account for this error correlation. Moreover, cohorts are clustered within the same survey year. In repeated cross-sectional surveys such as the ESS used in this research, ‘individuals are nested within cells created by the cross-classification of two types of social context: birth cohorts and survey years’ (Yang and Land 2006, 86). Hence the models presented below estimate fixed effects for age and other individual-level covariates as well as cross-classified random effects for period and cohort. Once we have taken into account the nested character of the data it is possible to evaluate the influence of context-specific variables – such as levels of diversity and economic circumstances—during a respondent’s formative years.

Such a *hierarchical age-period-cohort (HAPC) regression model* for the index measuring immigration attitudes (IA) of the respondent  $i$  (for  $i = 1, \dots, n_{jt}$ ) within the cohort  $j$  (for  $j = 1, \dots, 15$ ) socialization cohorts and the time period  $t$  (or survey year; for  $T = 1, \dots, 8$ ) can be specified as follows:<sup>1</sup>

$$IA_{ijt} = \alpha_{0jt} + \beta_1 * Age_{it} + \sum_{m=2}^M \beta_m * X_{mi} + \varepsilon_{ijt}, \quad \varepsilon_{ijt} \sim N(0, \sigma^2) \quad [3]$$

where we include controls for the age of the respondent as well as for  $m$  individual characteristics ( $m = 2, \dots, M$ )  $X$  such as subjective income, education and others described above. Most importantly, model 3 includes a random intercept  $\alpha_{0jt}$ , which specifies whether the overall mean immigration attitude varies significantly from cohort to cohort and from period to period. These hierarchical models allow us to capture the contextual effects of period and cohort; they can reveal the extent to which individuals' attitudes are shaped by both the current immigration environment and that environment during their formative years. Consider:

$$\alpha_{0jt} = \gamma_0 + \sum_{l=1}^L \gamma_l * Z_{lj} + \sum_{k=1}^K \delta_k * P_{kt} + u_{0j0} + v_{00t} \quad [4]$$

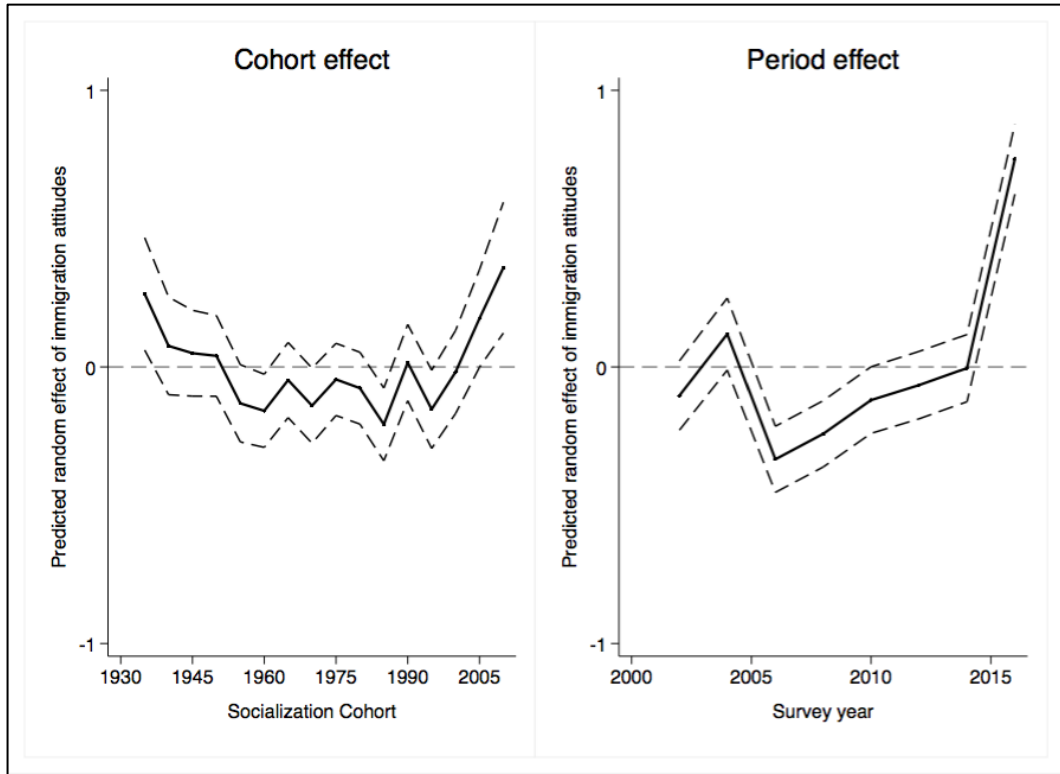
where  $\gamma_0$  is the mean effect of all time periods across all cohorts.  $u_{0j0}$  denotes a cohort specific error term ( $u_{0j0} \sim N(0, \tau_u)$ ) and  $v_{00t}$  a time specific error ( $v_{00t} \sim N(0, \tau_v)$ ). This model includes  $l$  ( $l = 1, \dots, L$ ) covariates  $Z$  that account for immigration and economic context during the formative years of respondent  $i$ . These are assumed to explain inter-cohort variation in immigration attitudes. The model also includes  $k$  ( $k = 1, \dots, K$ ) covariates  $P$  that take into account the current economic and societal situation.

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<sup>1</sup> See Snijders and Bosker (1999, 155-165) for a general introductory discussion of these cross-classified random models.

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**Appendix 5: Random Cohort and Period Effects (based on M1 in Table 1)**



## Appendix 6: Coefficients of Interaction Effects (Figure 3 in Manuscript)

	M5.A (b/se)	M5.B (b/se)	M5.C (b/se)
	Unempl.	GDP growth	Inc. inequality
Age	0.017*** -0.005	0.012*** -0.005	0.010** -0.004
<u>Socialization context</u>			
Foreign-born pop.	0.226*** (0.041)	0.187*** (0.039)	0.665*** (0.234)
Unemployment	0.016 (0.039)		
GDP Growth		-0.009 (0.056)	
Income inequality (gini)			0.095** (0.042)
<u>Interaction: Foreign-born x</u>			
Unemployment	0.000 (0.007)		
GDP Growth		-0.001 -0.008	
Income inequality (gini)			-0.014** (0.007)
Current context econ. Controls	yes	yes	yes
Individual-level controls	yes	yes	yes
Intercept	-5.387 (4.276)	-4.909 (4.262)	-8.124* (4.458)
<u>Variance Components</u>			
Cohort (1935-2015)	0.062*** (0.026)	0.068*** (0.028)	0.061*** (0.026)
Period (2002-2017)	0.169*** (0.046)	0.169*** (0.046)	0.168*** (0.046)
N	13,081	13,081	13,081
AIC	56,077	56,078	56,073

*Significance: \* p<0.1; \*\* p<0.05; \*\*\* P<0.01. Data ESS, round1-8. Note: Entries are regression coefficients and their standard errors of a HAPC model. The dependent variable is an index on immigration attitudes where 0="negative" and 10="positive".*



## Appendix 7: Robustness Tests - Different Samples

	Last cohort	Dropping... First cohort	Age>20
Age	0.009 (0.006)	0.010 (0.007)	0.007 (0.006)
<u>Socialization context</u>			
Foreign-born pop.	0.143** (0.056)	0.173*** (0.052)	0.115* (0.061)
Socialization economic controls	Yes	Yes	Yes
<u>Current context</u>			
Foreign-born pop.	0.144** (0.069)	0.142** (0.070)	0.157** (0.071)
Current economic controls	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes
Intercept	-5.073 (4.265)	-5.287 (4.286)	-5.240 (4.360)
<u>Variance Components</u>			
Cohort (1935-2015)	0.059*** (0.026)	0.059*** (0.027)	0.058*** (0.027)
Period (2002-2016)	0.168*** (0.046)	0.169*** (0.046)	0.172*** (0.047)
N	12,947	12,784	12,469
AIC	55,525	54,851	53,525

*Significance: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $P < 0.01$ . Data ESS, round1-8. Note: Entries are regression coefficients and their standard errors of a HAPC model. The dependent variable is an index on immigration attitudes where 0="negative" and 10="positive".*

## Appendix 8: Robustness Tests - Using different measures to test period immigration effect

	Socialization		Current immigration		
	context b/se	5-year change b/se	10-year change b/se	Net migration b/se	Ethn. Diversity b/se
Age	0.000 (0.003)	0.015*** (0.005)	0.014*** (0.005)	0.016*** (0.005)	0.014*** (0.005)
<u>Socialization Context</u>					
5-year change in foreign-born	0.381*** (0.102)				
Levels of foreign-born		0.207*** (0.044)	0.203*** (0.044)	0.216*** (0.044)	0.203*** (0.044)
Socialization economic controls	yes	yes	yes	yes	yes
<u>Current context</u>					
Levels of foreign-born	0.164** (0.067)				
5-year change in foreign-born		0.405 (0.263)			
10-year change in foreign-born			0.233** (0.116)		
Net migration				-0.001 (0.002)	
Ethnic diversity					0.118** (0.050)
Current context econ. controls	yes	yes	yes	yes	yes
Individual-level controls	yes	yes	yes	yes	yes
Intercept	-3.796 (4.208)	-2.099 (3.229)	-4.580 (3.663)	1.741 (2.808)	-6.336* (3.838)
<u>Variance Components</u>					
Cohort (1935-2015)	0.084*** (0.046)	0.058*** (0.026)	0.058*** (0.045)	0.058*** (0.054)	0.0058*** (0.043)
Period (2002-2017)	0.167*** (0.046)	0.178*** (0.048)	0.165*** (0.045)	0.202*** (0.054)	0.154*** (0.043)
N	13,081	13,081	13,081	13,081	13,081
AIC	56,081	56,077	56,076	56,080	56,075

*Significance: \* p<0.1; \*\* p<0.05; \*\*\* P<0.01. Data ESS, round1-8. Note: Entries are regression coefficients and their standard errors of a HAPC model. The dependent variables measures varying aspects of immigration attitudes where 0="negative" and 10="positive".*

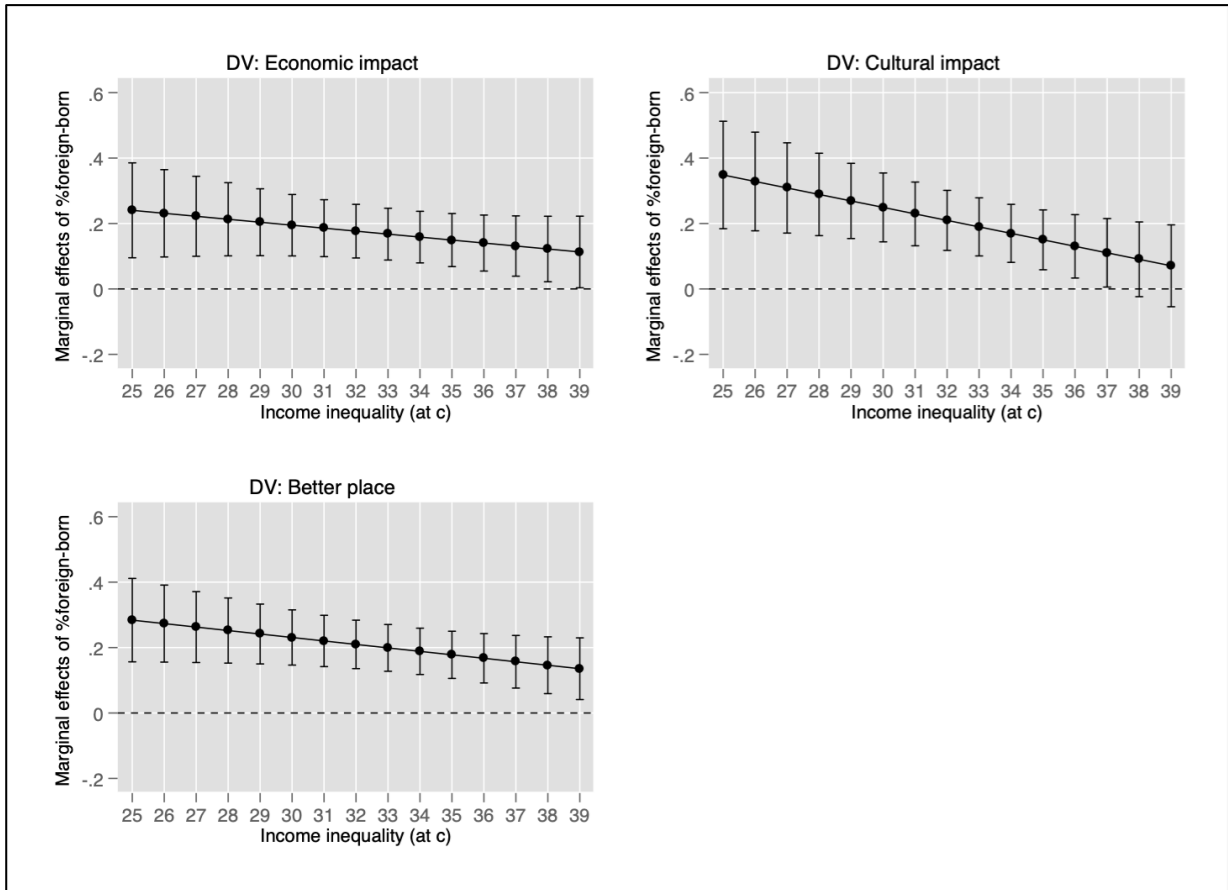
## Appendix 9: Robustness Tests - Single Items of Immigration Attitude Index

**Table A9:** HAPC Results Using Single Items of Immigration Attitudes

	Immig. Good for econ.		Immig. Good for culture		Immig better place	
	Coef	s.e.	Coef	s.e.	Coef	s.e.
Age	0.016***	(0.005)	0.012**	(0.006)	0.013**	(0.005)
<u>Socialization context</u>						
Foreign-born pop.	0.165***	(0.047)	0.214***	(0.053)	0.208***	(0.043)
Socialization econ. Controls		yes		yes		yes
<u>Current context</u>						
Foreign-born pop.	0.199***	(0.051)	0.064	(0.092)	0.120*	(0.061)
Current econ. Controls		yes		yes		yes
Individual-level controls		yes		yes		yes
Intercept	-6.412**	(3.137)	-3.931	(5.714)	-5.763	(3.808)
<u>Variance Components</u>						
Cohort (1935-2015)	0.057***	(0.028)	0.080***	(0.031)	0.023*	(0.048)
Period (2002-2016)	0.116***	(0.036)	0.229***	(0.061)	0.147***	(0.042)
N		13,401		13,342		13,441
AIC		60,032		61,384		59,934

*Significance:* \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $P < 0.01$ . Data ESS, round1-8. *Note:* Entries are regression coefficients and their standard errors of a HAPC model. The dependent variables measures varying aspects of immigration attitudes where 0="negative" and 10="positive".

**Figure A9: Marginal Effects of Foreign-Born Population by Income Inequality (at c)**



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## Appendix 10: Robustness Tests - Changing Cohort Specifications

**Figure A10:** Average Immigration Attitudes by Birth Cohorts and Foreign-Born Population



Source: ESS, UK Census (UK). Note: Smoothed loess line to capture trends in data.

**Table A10:** HAPC Results Using Different Specification of the Cohort Variable

	2-year Birth cohorts b/se	Socialization Age		
		10 – 15 b/se	20 – 25 b/se	30 – 35 b/se
Age	0.014*** (0.005)	0.014** (0.007)	0.010* (0.006)	0.000 (0.007)
<u>Socialization context</u>				
Foreign-born pop.	0.187*** -0.043	0.257*** (0.068)	0.114** (0.047)	0.009 (0.051)
Socialization econ. Controls	Yes	Yes	Yes	Yes
<u>Current context</u>				
Foreign-born pop.	0.130* -0.069	0.133* (0.070)	0.149** (0.070)	0.182*** (0.067)
Current econ. Controls	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes
Intercept	-5.387 (4.246)	-6.180 (4.296)	-5.458 (4.358)	-5.372 (4.140)
<u>Variance Components</u>				
Cohort (1935-2015)	0.000 (0.002)	0.064*** (0.028)	0.041*** (0.030)	0.051*** (0.030)
Period (2002-2016)	0.168*** (0.046)	0.169*** (0.046)	0.172*** (0.047)	0.159*** (0.045)
N	12,877	12,784	12,461	10,898
aic	55,217	54,852	53,492	46,856

*Significance:* \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $P < 0.01$ . Data ESS, round1-8. Note: Entries are regression coefficients and their standard errors of a HAPC model. The dependent variable is an index on immigration attitudes where 0="negative" and 10="positive".

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## Appendix 11: Civil Society Organisation Environment and Diversity

The penultimate section of the main paper suggested one possible explanation for the relationship between high levels of early-years diversity and current attitudes to immigration—that younger generations growing up with such diversity may have experienced more regular contact with immigrant-origin minorities. We are unable to fully test this proposition due to the lack of cross-time data for contact. However, footnote 20 of the paper summarises the findings from a potential macro-level proxy variable—the level of permeation of civil society organisations (CSO). Increased participation in civil society organisations is likely to increase contact with other people generally, and this may also include people from immigrant-origin minority groups.

In order to use the CSO environment as a proxy for cohort contact, we must first establish whether people who are active in CSOs are also more likely to have contact with immigrant-origin minorities. To answer this question, we used the first wave of the ESS (2002-3), which includes measures of whether respondents participated in any activities of the following organisations: Sports club, cultural organisation, trade union, professional association, automobile club, humanitarian organisation, environmental organisation, religious organisation, political party, science/education organisation, social club, or any other voluntary organisation. Based on this list, we created a dummy variable for ‘participation’, with 48% of British respondents participating in at least one of these organisations. We then tabulated this variable with the survey question asking whether respondents have any immigrant-origin friends (45% report having friends from immigrant-origin minority groups).<sup>2</sup> Table A11.1 shows these results: 37% of those not active in any CSO have immigrant-origin friends versus 54% of those that are active in CSOs. Thus, there is a moderate relationship between CSO activity and having immigrant-origin friends at the individual level.

**Table A11.1:** Civil Society Organisation Participation and Immigrant-Origin Contact

	No CSO participation	Participate in at least one CSO
No immigrant friends	62.5%	46.0%
Some immigrant friends	37.5%	54.0%
N	1051	997

We also investigated whether this relationship holds even after controlling for potential confounding factors such as age and education. Table A11.2 provides the logistic regression results for this multivariate model: participation in CSOs is still significantly related to contact with immigrant-origin minorities in the form of friendships.

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<sup>2</sup> The exact question is: ‘Do you have any close friends who are of a different race or ethnic group from most British people?’.

**Table A11.2:** Civil Society Organisation Participation and Immigrant-Origin Contact

	Coef.	SE	Sig
Participation in CSOs	0.252	0.048	***
Age	-0.012	0.003	***
Education			
Lower Secondary	0.253	0.158	
Upper Secondary	0.676	0.194	***
Tertiary Completed	1.072	0.149	***
Unemployed	0.501	0.263	
Female	-0.233	0.107	**
Subjective Income	-0.016	0.076	
Religiosity	-0.007	0.020	
Constant	-0.330	0.323	
Log-likelihood		-1047.137	
Pseudo R2		0.082	
N		1691	

Significance: \*\*  $p < 0.05$ ; \*\*\*  $P < 0.01$ .

Figure A11.1 provides the descriptive distribution of the immigrant friends variable over the birth cohorts used in our analyses.

**Figure A11.1.** Have Immigrant Friends by Birth Cohort





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Using a macro-level indicator of CSO environment as our proxy for cohorts' level of contact with immigrant-origin minorities, we next investigate the impact of this macro-level variable using all rounds of the ESS (1-8). The macro-level variable is compiled by the Varieties of Democracy (V-Dem) team (Coppede et al. 2017) based on the question put to experts: Which of these best describes the involvement of people in civil society organizations (CSOs)? Possible responses:

0: Most associations are state-sponsored, and although a large number of people may be active in them, their participation is not purely voluntary.

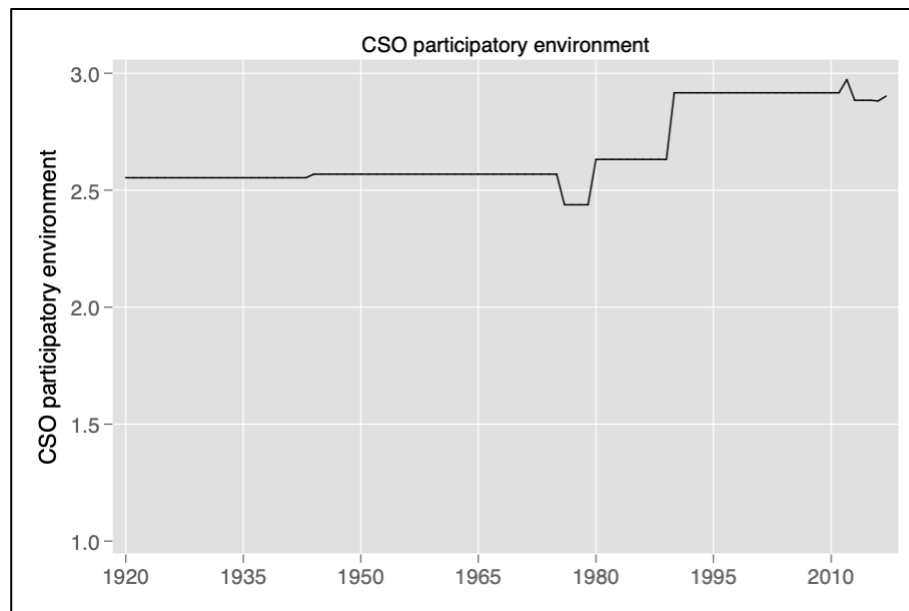
1: Voluntary CSOs exist but few people are active in them.

2: There are many diverse CSOs, but popular involvement is minimal.

3: There are many diverse CSOs and it is considered normal for people to be at least occasionally active in at least one of them.

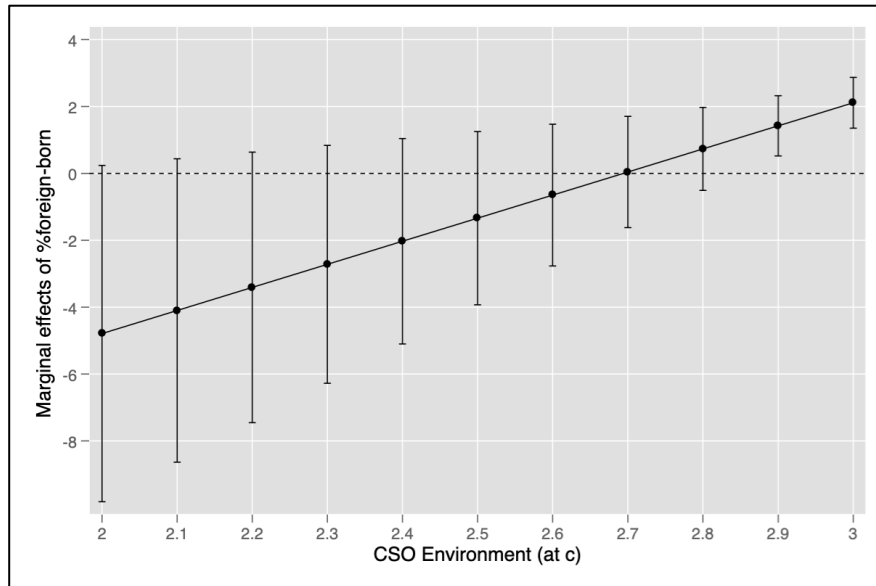
Figure A11.2 shows the development of this variable in the UK in the past 100 years. Though the variation on this variable is somewhat limited (between 2.1 and 3), there is indeed still some variation in this variable, including toward the end of the series when ESS Rounds 1-8 occurred.

**Figure A11.2:** CSO Participatory Environment in the UK, 1920-2017



*Note:* The annual values are based on a Bayesian Item Response Model, which takes into account the uncertainty of expert ratings. The variable then linearly translated the measurement model point estimates back to the original ordinal scale.

**Figure A11.3:** Interaction: foreign-born pop. and CSO environment (both measured during formative years)



Finally, we plot the marginal effects of levels of diversity during each cohort's formative years and the CSO environment at the time. As Figure A11.3 reveals, the positive immigration effect is only visible at very high levels of CSO activity (3). Thus, high levels of diversity in a cohort's early years only have positive effects if levels of contact with immigrant-origin minorities (proxied with CSO environment) is also high.

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