

Education and Issue-Based Polarization: Evidence from the US and Europe

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Abstract

We present the first cross-country evidence on the relationship between issue-based polarization and educational attainment for 18 OECD countries from 2010-2018. In most countries, issue-based polarization between liberals and conservatives increases with education, resulting in an “education-polarization gradient”. Across all three policy issues (economic inequality, immigration, and gay rights), the gradients are strongest in the US. In most countries, the gradients are strongest for inequality and weakest for gay rights. We examine four possible mechanisms behind these gradients: value-ideology sorting, internet use, strength of political ideology, and political participation. The first two mechanisms may be important in explaining these gradients.

Keywords: Education, Polarization, Social divisions, Attitudes, Ideology

JEL codes: I20, P16, D83, O57

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1. Introduction

In many developed countries, disagreement on important policy issues between groups with different social identities (“issue-based polarization”) is increasing (Abramowitz & Saunders 2008; Iyengar & Westwood 2015; Levendusky 2013; Mason 2015).¹ While differences in opinions naturally occur in any democracy (Katsambekis & Stavrakakis 2013; Przeworski 1986), extreme polarization can undermine a democracy’s ability to address critical policy problems by making compromises difficult (Baldassarri & Gelman 2008; Mason 2015; Patty & Penn 2019; Somer & McCoy 2018). Recent studies show that polarization may lead to suboptimal political and economic outcomes by affecting voting behavior (Duell & Valasek 2019; Hetherington & Rudolph 2015), the formation of economic expectations (Gerber & Huber 2010; McConnell et al. 2018), consumption choices (Painter 2020; Panagopoulos et al. 2020), hiring decisions (Gift & Gift 2015) and compliance with government mandates (Painter & Qiu 2021).² Understanding how and why disagreements over policy issues arise is therefore helpful for governing and participating in a democracy.

In this study, we use survey data from 18 OECD countries between 2010 and 2018 to investigate how issue-based polarization varies with education. Specifically, we examine whether the extent of issue-based polarization between highly-educated liberals and conservatives differs from that between less-educated liberals and conservatives. If the extent of issue-based polarization varies with education, we describe this phenomenon as an “education-polarization gradient”.

Education is one of the most important explanatory variables for many social and political attitudes and behaviors (Bartels 2006; Converse 1964; Erikson & Tedin 2015; Prior 2005; Rosenstone & Hansen 1993) . Some argue that education could be the “universal solvent” that reduces disagreements (Converse 1972) by teaching tolerance, appreciation of different viewpoints, and the importance of compromise (Glaser et al. 2021; Sniderman et al. 1990). However, recent studies suggest that differences in opinions between ideologues increase with education (Ballew et al. 2020; Drummond & Fischhoff 2017), even on issues where there is a

¹ Issue-based polarization is conceptually different from affective polarization, which refers to the tendency for partisans to dislike and distrust those from other parties, rather than substantive issue-based disagreements between groups with different social identities (Boxell et al. 2020; Iyengar et al. 2012, 2019).

² Other studies find that polarization can help democracies function by providing focal points to help voters choose between candidates, mobilizing voters, and strengthening political parties (Carlin et al. 2015; Enyedi 2006, 2008; LeBas 2011, 2018; McCoy et al. 2018).

prevailing scientific consensus such as climate change.³ These findings suggest that education's role in issue-based polarization is nuanced, yet there is limited empirical evidence on the nature and determinants of this important relationship.

We focus on issue-based polarization over three policy issues that US and European voters consistently rank as top priorities: income inequality, immigration, and gay rights (Braun & Schäfer 2022; Pew Research Center 2016a; Politico 2020). To estimate the education-polarization gradient, we take the following steps separately for each country. First, we classify respondents into social groups based on the liberal-conservative (left-right) spectrum of political ideology. Political ideology has been documented as an important social identity that is separable from issue positions (Malka & Lelkes 2010; Mason 2015) and is more comparable across countries than other social identities such as partisanship. Second, we regress attitudes (towards a particular issue) on educational attainment, political ideology, their interaction, and covariates that may be correlated with attitudes (e.g. age, gender, and ethnicity). Third, for each education level, we measure issue-based polarization as the predicted difference in attitudes between liberals and conservatives ("predicted disagreement") with a given education level, using the estimated regression coefficients and setting covariates to the pooled sample mean. Fourth, we fit a line through the predicted disagreement points (y-axis) at each education level (x-axis).

Across most OECD countries, the predicted disagreement between liberals and conservatives for all three policy issues increases with education, giving rise to an education-polarization gradient. For example, in the US, the predicted liberal-conservative disagreement with the statement "*The government should concern itself with reducing the income between the rich and the poor*" increases by 7.33 percentage points (pp) on a 0-100 scale for each unit increase in our 5-point educational attainment scale (SE=0.61), rising from 9.85 pp for liberals and conservatives without a high-school degree to 38.87 pp for liberals and conservatives with a postgraduate degree. To put these numbers in context, the predicted disagreement between a Democrat and Republican voter is 27.6 pp, controlling for educational attainment and the same set of covariates. This comparison is notable given the perceived importance of partisanship relative to ideology for political outcomes (Mason 2015).

The education-polarization gradient varies across countries and policy issues. Across all three policy issues, the gradients are consistently strongest in the US. For attitudes toward inequality, the gradient is generally weaker for Eastern European countries (e.g. Czech Republic)

³ This phenomenon may arise because education strengthens pre-existing views and can make individuals less willing to consider information that contradicts these views (Berinsky 2017; Federico 2006; Federico et al. 2011), or less willing to compromise (Glaser et al. 2021).

than for Western European countries and the US. For attitudes toward immigration, the gradient is generally weaker for Baltic region countries (e.g. Denmark and Sweden) than non-Baltic-region countries in our sample. In most countries, the gradient is strongest for attitudes towards income inequality and weakest (but still statistically significant) for attitudes towards gay rights. For example, in Belgium, the gradient is 4.03 (SE=0.97) for attitudes towards inequality and 2.93 (SE=0.71) for attitudes towards gay rights.

These gradients are robust to the inclusion of additional controls (income and parental educational attainment), classifying liberals and conservatives using alternative cutoffs on the same political ideology scale, and the statement used to measure attitudes toward a policy issue. We do not find gradients for subjective statements unrelated to policy issues, such as self-reported health or satisfaction with household income, suggesting that these documented gradients are not due to differences in reporting styles across education levels.

We then investigate possible mechanisms for the observed education-polarization gradients. To contribute to a positive gradient, a potential mechanism must satisfy two conditions: (1) be correlated with educational attainment, and (2) have opposite effects on the attitudes of liberals and conservatives towards a given issue. We focus on four key explanations explored in the literature:

(1) The strength of political ideology (Glaser et al. 2021; Pew Research Center 2016b), measured by how strongly liberal/conservative the respondent is;

(2) Value-ideology sorting (Graham et al. 2012; Mikołajczak & Becker 2019; Pew Research Center 2014a,b), the degree to which an individual's values aligns with their political ideology (e.g. compassion/loyalty for liberals, respect for traditions for conservatives).

(3) Political participation (Mayer 2011; Persson 2015), measured by reported participation in previous national elections.

(4) Media consumption, measured by time spent on the internet (Boxell et al. 2017; Lelkes et al. 2017).

While these mechanisms have been hypothesized as potential contributors to polarization, their relative contribution to variation in attitudes or issue-based polarization has not been empirically tested.

To examine whether these mechanisms contribute to the education-polarization gradient, we use an omitted variable argument: if these mechanisms are important, then including them as additional variables should reduce the magnitude of the gradient. We run four additional regressions, separately for each mechanism. In each additional regression, we add a measure of the proposed mechanism, fully interacted with educational attainment and political ideology, to our baseline specification and re-estimate the gradient. If the gradient is no longer statistically

significant at the 5% level when that mechanism is added, then we infer that the mechanism is a potential contributor to the gradient.

We find that for attitudes towards income inequality and immigration, value-ideology sorting and internet use are potential mechanisms driving the education-polarization gradient. These findings are consistent with studies demonstrating the relationship between endorsement of certain values (such as justice and fairness) and preferences for redistribution (Corneo & Grüner 2002; Davidov et al. 2008; Krawczyk 2010) and studies on the relationship between selective media consumption and belief strength (Lelkes et al. 2017; Levendusky 2013; Tewksbury & Riles 2015). In contrast, there is little evidence that the strength of political ideology or political participation are important drivers for any of the issues examined. Across policy issues, the gradients in attitudes towards gay rights are least affected by the inclusion of controls for potential mechanisms.

Our work builds on three strands of literature. First, our findings of education-polarization gradients for policy issues complement existing studies that demonstrate an education-polarization gradient for scientific issues such as climate change.⁴ While most of these studies focus on a single country (the US), we take a cross-country approach and explore the heterogeneity in the magnitude of this gradient across 18 countries. Furthermore, focusing on policy issues (rather than scientific issues) is important given its close link to voter priorities as well as other political and economic outcomes.

Second, our estimation and comparison of issue-based polarization in the US and Europe contribute to studies in political science and political economy that document the extent of polarization. While the rise of affective and ideological polarization is well-documented, especially in the US (Abramowitz & Saunders 2008; Boxell et al. 2020; Draca & Schwarz 2021; Iyengar & Westwood 2015), less is known about the nature and extent of issue-based polarization, both in the US or other countries (Abramowitz 2010; Fiorina et al. 2008). We show that in many countries, issue-based polarization is larger among the more-educated than the less-educated. Since the former group is more likely to overlap in characteristics with the governing elite and the latter more likely to overlap in characteristics with the mass public, these findings also complement existing work on elite and mass polarization (Ellis & Ura 2008; Fiorina 2017; Rehm & Reilly 2010) and its effect on how democracies function.

⁴ For example, see: Bolin & Hamilton (2018); Drummond & Fischhoff (2017); Ehret et al. (2017); Haider-Markel & Joslyn (2009); Hamilton (2011); Kahan et al. (2012); McCright & Dunlap (2011); van der Linden et al. (2018).

Third, our work extends the theoretical and empirical literature on the causes of polarization (Acemoglu et al. 2016; Dixit & Weibull 2007; Mason 2015; Tappin et al. 2021; Tewksbury & Riles 2015). We provide the first empirical tests of four prominent explanations in the literature. We construct a new measure of value-ideology sorting, a mechanism that is under-explored in the existing literature, and apply it for the first time in this context.

The remainder of the paper is organized as follows. In Section 2, we describe a conceptual framework for understanding the education-polarization gradient. In Section 3, we describe our data sources and key variables. In Section 4, we outline our regression specification. In Section 5, we present evidence of the education-polarization gradient for 18 countries. In Section 6, we examine potential mechanisms for this gradient. Section 7 concludes, discusses the limitations of this study, and outlines avenues for future research.

2. Conceptual Framework

To understand why education and issue-based polarization may be correlated, we provide a conceptual framework that decomposes this relationship into “direct” and “indirect” channels. Our framework aims to explain gaps in disagreement within a cross-section (between-person comparisons) rather than within-person changes in response to education. We define attitudes towards an issue (A) as the extent to which an individual agrees with a statement that is associated with the stance of liberal-leaning policies over the past decade (e.g. “*The government should help reduce income differences*”). Attitudes (A) are a function of education (E), political ideology (P), individual characteristics that cannot be affected by education (\mathbf{X} , a $G \times 1$ vector), such as gender and age, and characteristics that can be affected by education (\mathbf{K} , a $Q \times 1$ vector), such as the way information is processed:

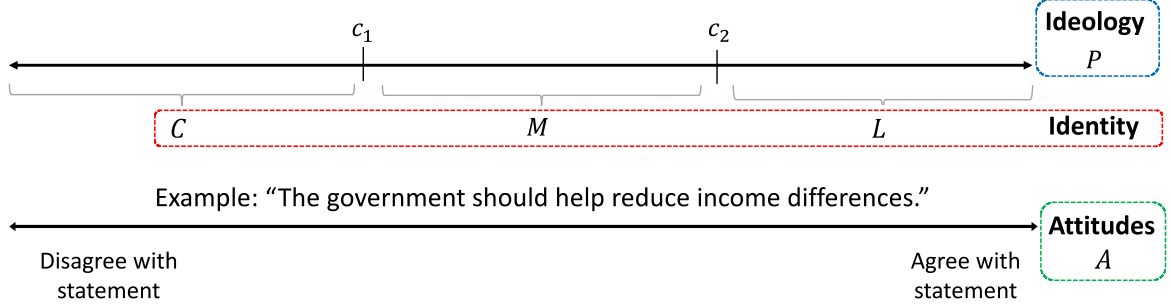
$$A = f(E, P, \mathbf{X}, \mathbf{K}) \quad (1)$$

Political ideology is defined as the set of beliefs an individual holds that governs their political behaviour (Jost 2006; Mikołajczak & Becker 2019). We use the common classification of political ideology as a liberal and conservative spectrum (e.g. Carney et al. 2008; Jost et al. 2003). We define P as a continuous variable, where $P \in [-\infty, +\infty]$, such that larger values indicate beliefs that are more consistent with liberal ideas.

An individual’s political ideology determines their political identity (e.g. whether they classify themselves as a liberal or conservative; or the political party they support). In our framework there are three political identities determined by two cutoffs (c_1 and c_2): an individual is classified as conservative (C) if $P \leq c_1$, moderate (M) if $c_1 < P < c_2$, and liberal (L) if $P \geq c_2$ (Figure 1). An individual’s political ideology (the value of P) may be correlated with

education. For example, compared to less-educated individuals, more-educated individuals may be more likely to have a particular political identity, and have political ideologies that are closer to the extreme ends of the spectrum.⁵

Figure 1: An individual's political ideology, political identity, and attitudes towards an issue.



An education-polarization gradient exists if more-educated liberals have stronger liberal-leaning views (higher A) than less-educated liberals, and more-educated conservatives have weaker liberal-leaning views (lower A) than less-educated liberals. In a cross-sectional between-person setting, we define the total derivative of attitudes with respect to education ($\frac{dA}{dE}$) as the difference in attitudes between more- and less-educated individuals with the same political identity (L , M , or C). The education polarization gradient exists if $\frac{dA}{dE} > 0$ for liberals and $\frac{dA}{dE} < 0$ for conservatives.⁶

Using the definition of A from equation (1), we can decompose $\frac{dA}{dE}$ into the following expression:

$$\frac{dA}{dE} = \sum_{q=1}^Q \frac{\partial A}{\partial K_q} \cdot \frac{\partial K_q}{\partial E} + \frac{\partial A}{\partial P} \cdot \frac{\partial P}{\partial E} + \frac{\partial A}{\partial E} \quad (2)$$

This expression breaks down the cross-sectional correlation between attitudes and education into three channels: indirect relationships with \mathbf{K} (individual characteristics) and/or P (ideology), and a direct relationship with attitudes (A).

The first term captures an "indirect" relationship between education and attitudes. *Ceteris paribus*, an education-polarization gradient would exist if more-educated individuals have greater amounts of certain characteristics (such as beliefs in certain values) than less-educated

⁵ For example, over the past few decades in the US, higher educational attainment has been associated with stronger support for liberal-leaning political figures (Pew Research Center 2018a; Weiner & Eckland 1979).

⁶ In a simpler setting with two education levels (low l and high h), the gradient would exist if $\mathbb{E}(A|E = h, \mathbf{X}, \mathbf{K}) - \mathbb{E}(A|E = l, \mathbf{X}, \mathbf{K}) > 0$ for liberals and $\mathbb{E}(A|E = h, \mathbf{X}, \mathbf{K}) - \mathbb{E}(A|E = l, \mathbf{X}, \mathbf{K}) < 0$ for conservatives.

individuals ($\frac{\partial K_q}{\partial E} > 0$ for both liberals and conservatives), and these characteristics are correlated with attitudes ($\frac{\partial A}{\partial K_q} > 0$ for liberals and $\frac{\partial A}{\partial K_q} < 0$ for conservatives).

The second term also captures an “indirect” relationship between education and attitudes: an education-polarization gradient may arise if more-educated liberals and conservatives have more “extreme” political ideologies compared to their less-educated counterparts ($\frac{\partial P}{\partial E} > 0$ for liberals and $\frac{\partial P}{\partial E} < 0$ for conservatives), and political ideology is in turn correlated with attitudes ($\frac{\partial A}{\partial P} > 0$ for liberals and $\frac{\partial A}{\partial P} < 0$ for conservatives).

The third term captures the “direct” relationship between education and attitudes. One potential reason for this direct relationship is that across various stages of the education cycle, individuals sort into groups composed of members that are similar to them, reinforcing existing beliefs. Socioeconomic inequities result in differential access to education, so students are likely to meet others with similar socioeconomic backgrounds and experiences (Boliver 2016; Jerrim et al. 2015). Within education institutions, students may prefer to network and form friendships with those from a similar background (Currarini et al. 2010; Lazarsfeld & Merton 1954; Weber et al. 2020).⁷ Furthermore, political homogeneity of university campuses may result in students being exposed to a limited range of viewpoints (Linville & Havice 2011). After formal schooling, geographic and social sorting may result in individuals living and interacting with those with similar educational backgrounds (Bishop 2009; Eika et al. 2019).

While our analysis focuses on differences between liberals and conservatives, we still include moderates in our framework and empirical analysis for two reasons. First, even in countries where there are two dominant parties on opposite ends of the political spectrum, there are alternative parties that form the “political center” (Norwegian Centre for Research Data 2021). Second, including moderates in our regression sample will minimize potential selection bias compared to conducting analyses only on the subsample of liberals and conservatives.

This framework explains why education may be correlated with attitudes in a cross-section of individuals, and conditions under which we would observe an education-polarization gradient. Since the concept of issue-based polarization applies to cross-sectional, between-person

⁷ Lazarsfeld & Merton (1954) distinguish between status homophily (a tendency to associate with people with similar characteristics) and value homophily (a tendency to associate with people with similar values). Since socioeconomic characteristics may be correlated with values and values influence beliefs, both forms of homophily may reinforce each other.

comparisons, our analysis is correlational and does not require us to examine the causal within-person relationship between attitudes and education.

3. Data and Variable Construction

3.1 Data Sources

To examine the relationship between education and issue-based polarization, we use data from nationally representative surveys for 18 OECD countries (the US and 17 countries in Europe) collected between 2010 and 2018. We focus on these survey years due to the availability of key variables.⁸

US Sample. For the US, we use the General Social Survey (GSS). The GSS collects data on a representative sample of American adults above 18 years old to examine trends in attitudes, behaviors, and attributes (Smith 2016). Previous literature has used the GSS to examine the relationship between education and attitudes towards scientific issues such as climate change, nanotechnology, and genetically modified food (Drummond & Fischhoff 2017), cultural and moral issues such as abortion and homosexuality (Ellis & Ura 2008), and economic issues such as government spending and redistribution (Makowsky & Miller 2014).

European Sample. For European countries, we use the European Social Survey (ESS). The ESS is a cross-national representative survey of individuals above 15 years old. The ESS measures attitudes, beliefs, and behaviors across over 30 European countries. In most countries, the survey is conducted every other year. We focus on OECD countries that have data from 2010 to 2018 on attitudes towards inequality and immigration (attitudes towards gay rights is only measured after 2016).⁹ 17 countries satisfy these criteria: Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the UK.

3.2 Variable Construction

We construct measures of respondents' attitudes, educational attainment, and political identities in a way that is consistent across both surveys that we use (see Appendix A).

⁸ Furthermore, since the global financial crisis changed the nature of political polarization on policy issues in many developed economics (Funke et al. 2016), focusing on this period helps reduce the confluence of such factors.

⁹ We chose 2010 as the earliest survey year because the harmonized education variable is only available for these 17 countries from 2010 onwards.

Attitudes. Policy issues are commonly categorized into three substantive domains: economic, immigration, and social (Caughey et al. 2019). We investigate attitudes towards one issue in each domain: (1) economic inequality, (2) immigration, and (3) gay rights. Aside from being the only three issues that are asked in multiple waves of both the GSS and ESS over our timeframe,¹⁰ these issues consistently rank as top policy priorities for American and European voters.¹¹ While the economy and immigration are longstanding concerns for voters, gay rights are a newer issue that have grown in prominence over the past few decades.¹²

We measure attitudes towards these issues using self-reported agreement with given statements in the GSS and ESS (Table 1). Some issues have multiple statements (e.g. "immigration is good for the economy" and "immigration should increase"). To increase comparability across the two surveys, we select the statements that are most similar in wording. We demonstrate that our results are robust to the choice of statement within a given issue (Appendix C). As the survey questions use different Likert scales, following the approach of Boxell et al. (2020), we rescale the responses to each statement by subtracting the minimum value and dividing by the maximum value. The rescaled responses range from 0 (strong disagreement) to 100 (strong agreement).

Education. The GSS uses a 5-point scale to measure educational attainment: (1) less than high school, (2) high school, (3) post-secondary (e.g. junior college, vocational degrees), (4) bachelor's degree, (5) graduate degree (e.g. JD, MD, PhD). To address cross-country differences in educational systems, the ESS uses a harmonized educational attainment variable based on the International Standard Classification of Education (ISCED) (UNESCO Institute for Statistics 2012).

¹⁰ While the GSS contains survey questions on a wide range of policy issues, such as abortion, gun rights, and healthcare, the ESS has a more limited range of questions. The issues we chose are the only three that are asked in more than two waves of the ESS and have analogous questions in the GSS.

¹¹ For example, in the 2016 US presidential election, 84% of voters considered the economy as being very important for their vote, 70% considered immigration, and 40% considered gay rights (Pew Research Center 2016a). In the 2020 presidential election, there was support for redistribution policies, with 53% of voters believing that tax code reforms that favoured middle-income households rather than high-income individuals or businesses was one of the top priorities (Politico 2020). In Europe, the economy and immigration are among the four key issues that mobilized voters in the 2019 European Parliament election (Braun & Schäfer 2022).

¹² Legislation on gay rights is a divisive issue: only 13 out of 27 EU countries and the UK have laws that allow same-sex couples to marry and adopt children (Dotti Sani & Quaranta 2021), and in the US, same-sex marriage was only made legal in all states in 2015 (Supreme Court of the United States 2014).

The ESS ISCED-based education variable uses a 7-point scale, which we collapse into a 5-point scale to match the GSS scale.¹³

Table 1: Statements used to measure attitudes towards three policy issues

Issue	GSS (US)	ESS (Europe)
Inequality	<p>“Some people think that the government in Washington ought to reduce the income differences between the rich and the poor... Others think that the government should not concern itself with reducing this income between the rich and the poor...What score between 1 and 7 comes closest to how you feel?”</p> <p>(1=Government should not; 7=Government should)</p>	<p>“To what extent do you agree or disagree that “The government should take measures to reduce differences in income levels”</p> <p>(1=Disagree strongly; 5=Agree strongly)</p>
Immigration	<p>“Do you think the number of immigrants to America nowadays should be...?”</p> <p>(1=Reduced a lot; 5=Increased a lot)</p>	<p>“To what extent do you think [country] should allow people from the poorer countries outside Europe to come and live here?”</p> <p>(1=Allow none; 4=Allow many)</p>
Gay rights	<p>“Do you agree or disagree that homosexual couples should have the right to marry one another?”</p> <p>(1=Strongly disagree; 5=Strongly agree)</p>	<p>“To what extent do you agree or disagree that gay male and lesbian couples should have the same rights to adopt children as straight couples?”</p> <p>(1=Disagree strongly; 5=Agree strongly)</p>

Political Identity. We measure political identity using a 3-point political ideology scale: (1) liberal, (2) moderate, and (3) conservative. We use political ideology rather than party affiliation (e.g. Democrat vs. Republican) as our measure of political identity to facilitate cross-country comparisons and to overcome the difficulty of classifying individuals who report supporting "independent" or non-mainstream parties. Furthermore, political ideology has been documented to function as a social identity that is separable from partisanship¹⁴ and issue positions (Malka & Lelkes 2010).

For the GSS, we construct this variable by collapsing the 7-point political viewpoint scale, which ranges from extremely liberal (=1) to extremely conservative (=7). We classify an individual as "liberal" if they report 1-3 on the 7-point GSS scale, "moderate" if they report 4, and "conservative" if they report 5-7. For the ESS, we construct this variable by collapsing the 11-

¹³ The 7-point ESS scale is (1) less than lower secondary; (2) lower secondary; (3) lower-tier upper secondary; (4) upper-tier upper secondary; (5) advanced vocational, sub-degree; (6) lower tertiary education, BA level; (7) higher tertiary education, ≥ MA level. We collapse this into a 5-point scale by combining (1) and (2) as "less than high school", (3) and (4) as "high school", and treating (5), (6), (7) as equivalent to (3), (4), (5) of the GSS scale, respectively.

¹⁴ According to the GSS, the correlation between partisanship and ideology is strong but not perfect. 92.3% of self-reported liberals voted for Democrats, 72.50% of self-reported moderates voted for Democrats, and 28.50% of self-reported conservatives voted for Democrats.

point political viewpoint scale, which ranges from extreme left (=0) to extreme right (=10). We classify an individual as "liberal" if they report 0-4 on the 11-point ESS scale, "moderate" if they report 5, and "conservative" if they report 6-10. We chose these classifications so that in each survey the three groups have similar sizes. We demonstrate that our results are not only robust to the cutoffs used to define political identity, but also that our classification yields more conservative estimates of education-attitude polarization compared to alternative cutoffs.

3.3 Sample

Table B1 (Appendix B) decomposes the sample by educational attainment and political identity for each country. Consistent with existing studies on the correlation between education and political ideology (Hastie 2007; Pew Research Center 2016c), we find that the proportion of liberals increases with the level of education in all countries. Table B2 (Appendix B) demonstrates that the distribution of characteristics (e.g. gender and ethnic minority status) are similar across political identity categories.

4. Estimating the Education-Polarization Gradient

We estimate the following equation separately for each country:

$$A_i = \alpha + \sum_{s=2}^5 \beta_s E_i^s + \gamma_m mod_i + \gamma_l lib_i + \sum_{s=2}^5 \delta_s^{mod} E_i^s \times mod_i + \sum_{s=2}^5 \delta_s^{lib} E_i^s \times lib_i + \boldsymbol{\eta}' \mathbf{X}_i + \epsilon_i \quad (3)$$

for all i in country c

where A_i is respondent i 's attitude towards a particular issue (the extent of agreement with a given liberal-leaning statement); E_i^s equals 1 if respondent i 's highest educational attainment equals s , where s takes on 5 values (less than high school=1, high school=2, post-secondary=3, BA=4, and post-BA =5) and less than high school is the omitted category; mod_i equals 1 if respondent i is classified as a "moderate" and zero otherwise, lib_i equals 1 if the respondent reports being a "liberal" and zero otherwise, and \mathbf{X}_i is a vector of characteristics that cannot be affected by education. In the vector \mathbf{X}_i , we include indicators for female, nine age groups¹⁵, ethnic minority status¹⁶, and survey year. Finally, ϵ_i is the error term. We weight the regressions using probability weights provided in the survey data to ensure national representativeness.

¹⁵ The age groups are: 18-24; 25-29; 30-39; 40-49; 50-59; 60-69; 70-79; 80-89, 90 years old or above.

¹⁶ In the GSS, the binary variable ethnic minority takes on a value of 1 if the respondent is non-white and 0 otherwise. In the ESS, the binary variable ethnic minority takes on a value of 1 if the respondent says "yes" to "Do you belong to a minority ethnic group in [country]?"

Estimating these regressions separately for each country and including survey-year indicators help mitigate potential country- and period-specific differences in the interpretation of the liberal-conservative scale.

At each level of educational attainment, we define issue-based polarization as the difference in attitudes for the "average" liberal and "average" conservative (i.e. the predicted value of A_i evaluated at the pooled sample means of \mathbf{X}), holding educational attainment fixed. Using equation (3), for each education level s , this difference in attitudes can be written as:

$$\mathbb{E}[A_i|\text{Liberal}; E = s; \mathbf{X}_i = \bar{\mathbf{X}}] - \mathbb{E}[A_i|\text{Conservative}; E = s; \mathbf{X}_i = \bar{\mathbf{X}}] = \begin{cases} \gamma_l & \text{if } s = 1 \\ \gamma_l + \delta_s^{lib} & \text{if } s \geq 2 \end{cases} \quad (4)$$

The education-polarization gradient is captured by the γ_l and δ_s^{lib} parameters. An education-polarization gradient is present if $\gamma_l < \gamma_l + \delta_2 < \dots < \gamma_l + \delta_5$ or $\gamma_l > \gamma_l + \delta_2 > \dots > \gamma_l + \delta_5$, meaning that the liberal-conservative difference in attitudes widens or narrows with education.

To examine the statistical significance of the gradient, we conduct two tests. First, we fit a line through the five estimated points that capture the degree of predicted disagreement between liberals and conservatives at each education level ($\hat{\gamma}_l, \hat{\gamma}_l + \hat{\delta}_2^{lib}, \dots, \hat{\gamma}_l + \hat{\delta}_5^{lib}$). We then examine whether the gradient of this line is statistically different from zero. Second, we conduct an F-test that $\hat{\gamma}_l = \hat{\gamma}_l + \hat{\delta}_2^{lib} = \dots = \hat{\gamma}_l + \hat{\delta}_5^{lib}$ to test whether the difference in attitudes between liberal and conservatives at each education level is equal. The second test allows for non-linearities in the relationship between issue-based polarization and educational attainment.

5. Results

5.1 Main Results

Education-Polarization Gradients in the US

Figure 2 shows that in the US, issue-based polarization increases among individuals with higher levels of education, giving rise to an education-polarization gradient. In each panel, we use the estimated coefficients of equation (3) to plot predicted agreement with a particular statement (right y-axis) for liberals (grey squares), moderates (grey circles), and conservatives (grey triangles) at five education levels (<HS, HS, Post-secondary, BA, and >BA). When predicting the strength of agreement, we set the vector of individual characteristics (\mathbf{X}) to the pooled sample mean. The black diamond markers (left y-axis) show the percentage-point difference in predicted attitudes between liberals and conservatives at each education level ("predicted disagreement"). For all panels, predicted disagreement (dotted black line) increases with educational attainment because the predicted attitude lines (solid grey) exhibit a funnelling pattern, resulting in an

education-polarization gradient. The estimated coefficients, R^2 , and sample sizes corresponding to these regression estimates are reported in Table C1 (Appendix C).

Panel A of Figure 2 shows the education-polarization gradient in attitudes towards inequality, measured by agreement with the statement that *“The government should concern itself with reducing the income between the rich and the poor”*. The black diamonds show that predicted disagreement between a liberal and conservative without a high-school degree is 9.85 percentage points (pp), but it more than quadruples for liberals and conservatives with a postgraduate degree (38.87 pp). The fitted line through these five points provides an estimated education-polarization gradient of 7.33 (SE=0.61). This means that on average the gap in attitudes between liberal and conservatives increases by 7.33 pp for every 1-point increase on a 5-point educational attainment scale. The F-statistic corresponding to the null hypothesis that the predicted disagreement between liberals and conservatives is equal across education levels ($\hat{\gamma}_l = \hat{\gamma}_l + \hat{\delta}_2^{lib} = \dots = \hat{\gamma}_l + \hat{\delta}_5^{lib}$) is 26.92, a strong rejection of the null hypothesis.

Panel B depicts the education-polarization gradient in attitudes towards immigration, measured by agreement with the statement *“Do you think the number of immigrants to America nowadays should be increased a lot?”*. Predicted disagreement between liberals and conservatives with a postgraduate degree is more than 4 times larger (18.08 pp) than the gap in attitudes between liberals and conservatives without a high school degree (4.67 pp). The education-polarization gradient is 2.96 (SE=0.47) and the F-statistic testing equality of predicted disagreement across education levels is 6.56, rejecting the null of equality of predicted disagreement across education levels.

Panel C shows that there is also a notable education-polarization gradient in attitudes towards gay rights, measured by agreement with the statement that *“Homosexuals should have the right to marry one another”*. The education-polarization gradient in attitudes towards gay rights is 4.96 (SE=0.91). This gradient is pronounced for the three lowest education levels (a predicted disagreement of 14.32 pp for individuals without a high-school degree, which increases to 31.18 pp for individuals who only completed a post-secondary school degree), but predicted disagreement remains similar for individuals with higher education levels (BA and >BA). The F-statistic testing the equality of predicted disagreement across education levels is 12.25, again a rejection of the null hypothesis.

To interpret the economic significance of the gradients, for each issue we compare the degree of issue-based polarization across education levels with the degree of issue-based polarization

among respondents who voted for opposing candidates in the last presidential election.¹⁷ Partisanship is viewed as one of the most prominent political identities, being central to both voting outcomes and political competition (Tajfel et al. 1979). In contrast, political ideology has often been viewed as secondary in importance to political competition (Mason 2015). Therefore, polarization across partisans is a useful benchmark for our results.

For attitudes towards inequality, the predicted disagreement between Democrat and Republican voters is 27.6 pp. This means that among liberals and conservatives without a high school degree, predicted disagreement (9.85 pp) is 35.7% of the analogous gap between individuals who voted for different candidates. Among liberals and conservatives with a postgraduate degree, predicted disagreement (38.87 pp) is much larger at 141% of the gap between individuals who voted for different candidates. For attitudes towards immigration, predicted disagreement among individuals with less than a high school degree is 38.2% of the predicted disagreement between a Democrat voter and a Republican voter (12.24 pp); this figure is 147.7% among individuals with a postgraduate degree. With regards to attitudes towards gay rights, predicted disagreement between a Democrat voter and a Republican voter is 24.04 pp. This comparison suggests that when education level is accounted for, issue-based polarization among groups with different political ideologies has a similar magnitude as issue-based polarization among partisans.

Education-Polarization Gradients in Europe

Figure 3 presents the education-polarization gradients for 17 European OECD countries. Each point represents the predicted disagreement between liberals and conservatives at a given education level. Each line corresponds to one country and is constructed in the same way as the dotted black lines for the US in Figure 2. The estimated gradients and corresponding F-statistics for each country are reported in Table C2 (Appendix C).

Panel A of Figure 3 plots the gradient for attitudes towards economic inequality, measured by agreement with the statement *“The government should take measures to reduce differences in income levels”*. All countries apart from Hungary, Poland, and Portugal have a statistically significant education-polarization gradient (ranging from 1.76 (SE = 0.47) in Estonia to 4.27 (SE = 0.19) in Switzerland) and all gradients are positive, except for Hungary. The gradient is generally weaker for Eastern European countries compared to Western European countries and

¹⁷ Using the GSS, we classify each respondent as a Democrat voter, Republican voter, or “Other” voter based on who they reported voting for in the last presidential election. We then predict agreement (with the same statement) for a Democrat voter and a Republican voter, setting the baseline covariates to the pooled sample mean.

the US.¹⁸ Table B2 (Appendix B) presents corresponding F-statistics and rejects the equality of predicted disagreement across education levels for these countries.

Panel B of Figure 3 plots education-polarization gradients for attitudes towards immigration, measured by agreement with the statement “[Your country] should allow people from the poorer countries outside Europe to come and live here”. The estimated gradient is positive for all 17 countries and statistically significant for 12 countries.¹⁹ The gradient is generally weaker for countries in the Baltic region (Denmark, Estonia, Finland, Germany, Poland, Sweden) compared to other countries. The F-statistics testing the equality of predicted disagreement across education levels is significant for 14 countries at the 5% level, indicating that some countries may not have a positive linear relationship but still have variation in polarization across education levels (e.g. Czech Republic and Estonia).

Panel C of Figure 3 plots education-polarization gradients for attitudes towards gay rights, measured by agreement with the statement “Gay male and lesbian couples should have the same rights to adopt children as straight couples”. There is some cross-country variation in the presence of an education-polarization gradient. In 8 countries (Belgium, Czech Republic, Finland, France, Germany, Ireland, Poland, Spain), there is a significant positive education-polarization gradient in attitudes towards gay rights. The estimated gradient is positive but not statistically significant for 6 other countries (Denmark, Estonia, Portugal, Sweden, Switzerland, UK) and negative but not statistically significant for the remaining 3 countries (Hungary, Netherlands, Norway).

Besides variation in the gradients, Figure 3 also shows heterogeneity in the level of polarization across European countries. Even among the least-educated individuals (those with less than a high school degree), the level of predicted disagreement has a wide range for all three issues. Some countries are polarized on particular issues, but the estimated degree of polarization does not vary with education. For example, Switzerland has an estimated 12 pp difference in attitudes towards immigration across all education levels. In contrast, estimated differences in attitudes towards immigration are near-zero for all education levels in Estonia. Therefore, the level and gradient are both helpful for understanding the degree of polarization in a country.

¹⁸ When we regress the estimated gradients for attitudes towards inequality on a binary indicator for Eastern European country, the coefficient is negative and significant at the 5% level.

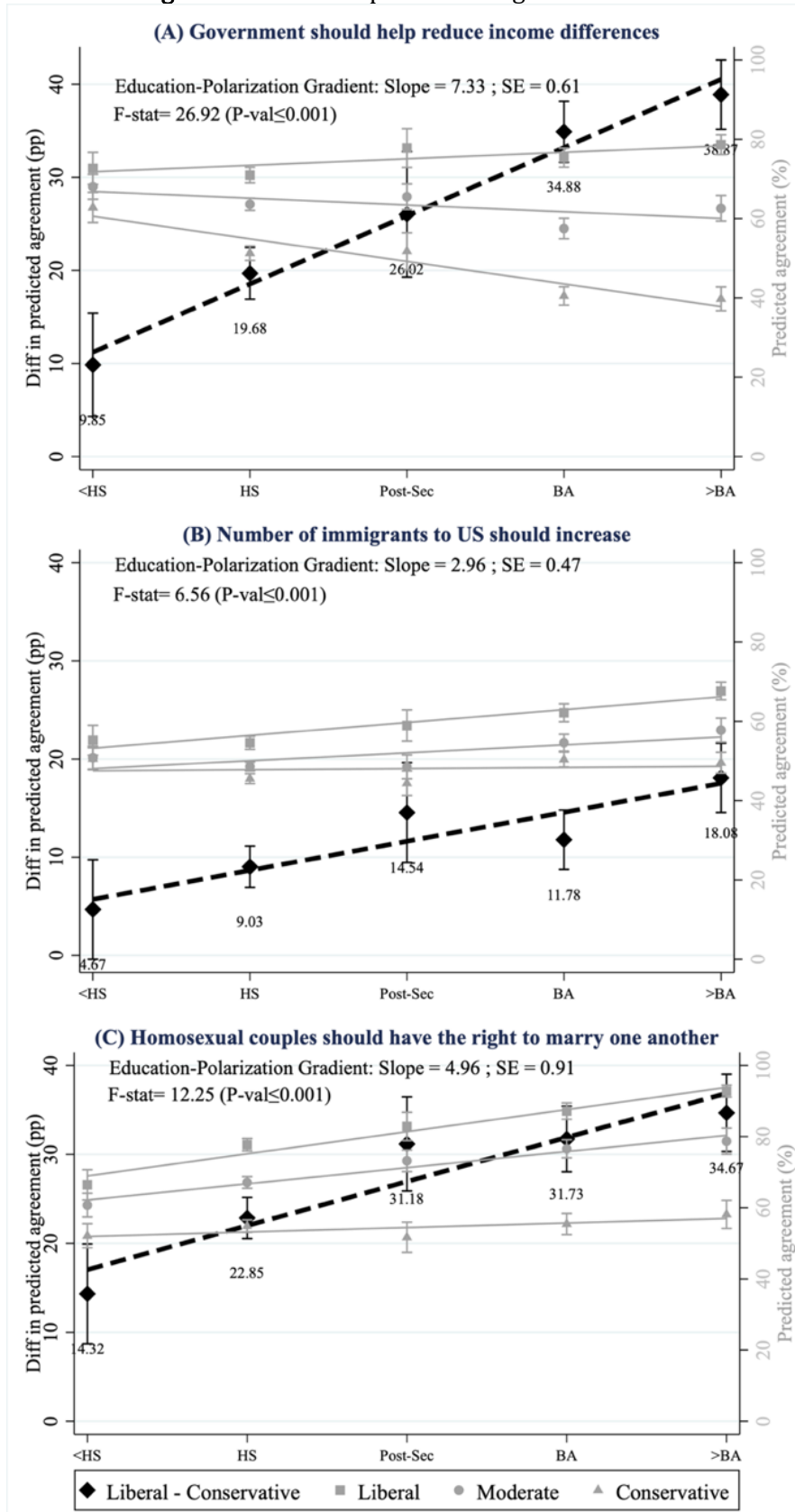
¹⁹ These 12 countries are: Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Netherlands, Poland, Spain, Sweden, and the UK.

Summary of findings

In sum, Figures 2 and 3 suggest the following 3 stylized facts:

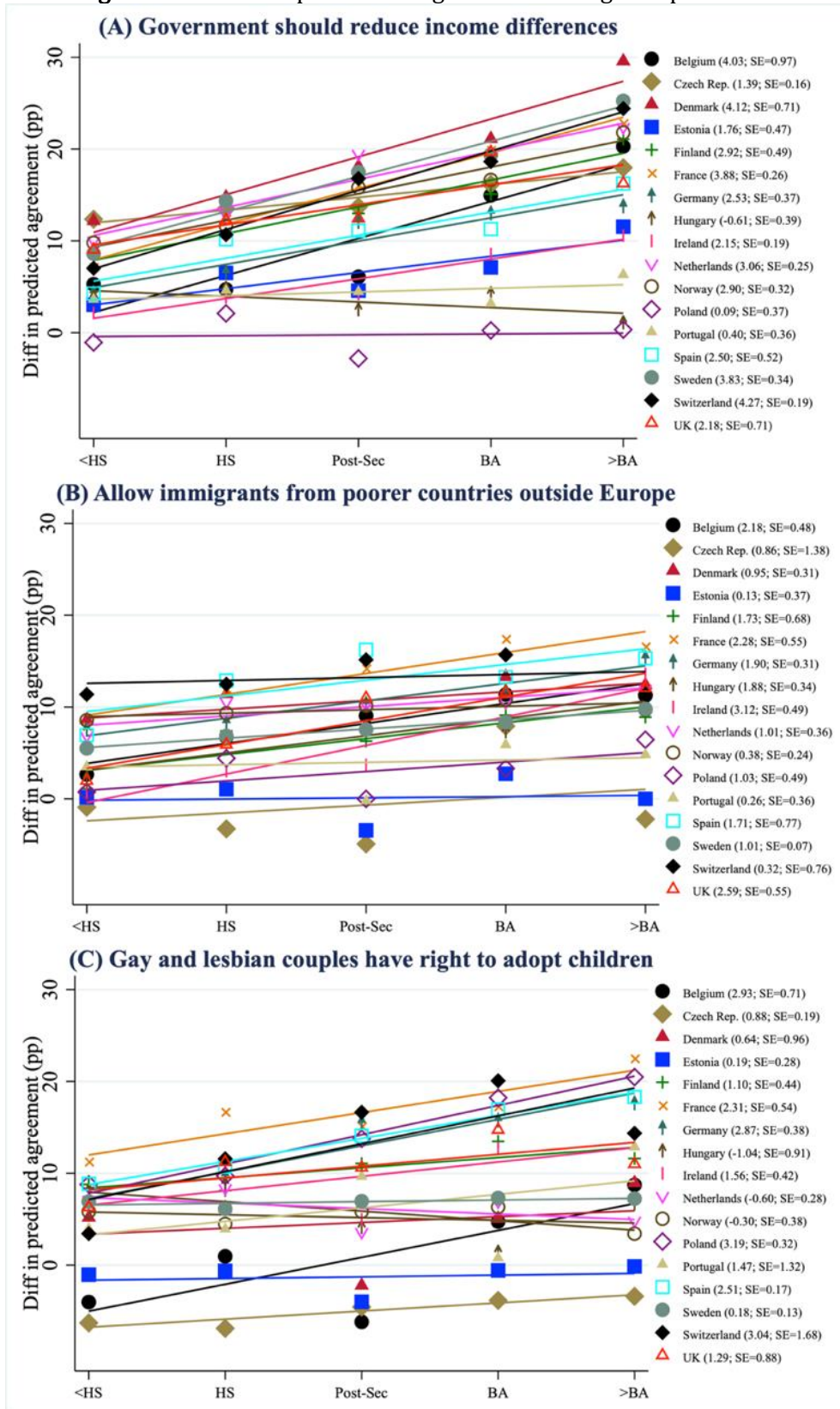
1. Across most OECD countries, the predicted disagreement between liberals and conservatives in attitudes towards important policy issues increases with education levels, giving rise to an education-polarization gradient. These gradients exist even when controlling for standard individual-level characteristics that are correlated with attitudes to these issues.
2. Education-polarization gradients vary across countries. Across all three issues (inequality, immigration, gay rights), the gradient is consistently strongest in the US. For attitudes toward inequality, the gradient is generally weaker for Eastern European countries. For attitudes toward immigration, the gradient is generally weaker for Baltic region countries.
3. Education-polarization gradients vary across policy issues. In most countries, the gradient is strongest for attitudes towards inequality and weakest (but still statistically significant) for attitudes towards gay rights.

Figure 2: Education-polarization gradients in the US



Notes: Each panel plots predicted agreement with a particular statement (right y-axis) for liberals, moderates, and conservatives at five education levels. Predicted agreement is based on equation (3) with covariates set to the pooled sample mean. The black diamond markers (left y-axis) show the percentage-point difference in predicted attitudes between liberals and conservatives at each education level.

Figure 3: Education-polarization gradients among European countries



Notes: Each panel plots the education-polarization gradient for countries in Europe. Each line corresponds to one country and is constructed in the same way as the dotted black lines for the US in Figure 2.

5.2 Robustness Checks

The estimated education-polarization gradients are robust to the following changes to the baseline specification.

Additional controls. The error term in our baseline specification may contain variables that are both correlated with an individual’s educational attainment and attitudes towards the issues considered, such as socioeconomic background. To address this potential omitted variable bias, we include other relevant variables that are available in both the GSS and ESS: respondents’ family income²⁰ and parental educational attainment.²¹ Table C3 (Appendix C) presents estimated gradients for each country when indicators for household income categories (columns 1, 4, 7) and the father’s educational attainment (columns 2, 5, 8) are included as controls in equation 1. The estimated gradients with and without these additional controls are similar.

Construction of political identity variable. In columns (3), (6), (9) of Table C3 (Appendix C), we present estimated gradients when we use different cutoffs to classify political identities. In the baseline specification for the US sample, we classify individuals as “liberal” if they report 1-3 on the 7-point GSS scale, “moderate” if they report 4, and “conservative” if they report 5-7. In this robustness check, we classify individuals as “liberal” if they report 1-2, “moderate” if they report 3-5, and “conservative” if they report 6-7. In the baseline specification for the European sample, we classify individuals as “liberal” if they report 0-4 on the 11-point ESS scale, “moderate” if they report 5, and “conservative” if they report 6-10. In this robustness check, we classify individuals as “liberal” if they report 0-3, “moderate” if they report 4-6, and “conservative” if they report 7-10. We still obtain significant gradients with this alternative classification. In fact, the alternative classification results in steeper gradients than the baseline classification by construction, because it excludes individuals closer to the ideological center when calculating the predicted disagreement between liberals and conservatives.

Choice of statement to measure attitudes. To verify that the education-polarization gradient is not driven by the specific statements chosen, we estimate these gradients for alternative statements on the same issues (Figure C1, Appendix C). For the GSS, our alternative measures of attitudes towards inequality are the extent to which individuals believe that government should provide help for the poor (slope=3.96, SE=0.71) and the sick (slope=5.64, SE=0.51). Our alternative measures of attitudes towards immigration are agreement with the statement that

²⁰ In the GSS, household income is measured by 25 income categories (ranging from under \$1000 to \$150,000 and over). In the ESS, household income is measured by income deciles.

²¹ Although variables such as income and occupation are likely to be correlated with attitudes, we do not control for these in the baseline regression as they may be “bad controls” (Angrist & Pischke 2008).

immigrants take jobs away from Americans (reverse-coded) (slope=5.02, SE=1.15) and that immigrants are good for the economy (slope=4.45, SE=0.73). Our alternative measure of attitudes towards gay rights is agreement with the statement that sexual relations between homosexuals are wrong (reverse-coded) (slope=5.67, SE=1.17). The baseline gradients are 7.33 for inequality, 2.96 for immigration, and 4.96 for gay rights, indicating that for each issue, the estimated gradients for the alternative statements are similar and statistically significant. Furthermore, the alternative statements measuring attitudes towards immigration and gay rights result in stronger gradients than the baseline statements.

For the ESS, our alternative measure of attitudes towards inequality is agreement with the statement that society is fair when income and wealth are equally distributed; our alternative measure of attitudes towards immigration is agreement with the statement that immigration is good for the economy;²² and our alternative measure of attitudes towards gay rights is agreement with the statement that gay and lesbians should be free to live life as they wish. For attitudes towards inequality and towards immigration, the estimated gradients using the baseline and alternative statements are similar for most countries. For example, the gradient in attitudes towards immigration using the baseline statement is 2.59 in the UK compared to 2.66 (SE=0.63) for the alternative statement. In contrast, the alternative statement for attitudes towards gay rights results in flatter estimated gradients compared to the baseline statement. One possible reason for this result is that the alternative statement (“gays and lesbians should be free to live a life as they choose”) is broader so may capture general attitudes towards gays and lesbians rather than specific attitudes towards their constitutional rights.

Placebo statements. Reporting styles to Likert-scale questions may differ systematically according to sociodemographic characteristics (Bond & Lang 2019). To examine whether our results are driven by more-educated respondents being generally more likely to use the extreme ends of the Likert scale, we conduct placebo tests to check whether differences between liberals and conservatives for subjective but non-policy-related questions increase with educational attainment. Figure C2 (Appendix C) shows that in both the GSS and ESS, there is no education-polarization gradient in self-reported health or satisfaction with financial situation, suggesting that our results are unlikely to be driven by systematic differences in reporting styles across education groups.

Sample period. One concern is that these gradients are driven by our choice of sample period (2010 onwards), given studies documenting the recent rise in various forms of polarization in

²² Another alternative statement is "immigration makes [country] a better place to live", which results in an even steeper gradient than the baseline statement.

the US (Abramowitz & Saunders 2008; Iyengar & Westwood 2015) and Europe (Boxell et al. 2020; McCoy et al. 2018). To investigate this, we estimate the same models using GSS data collected between 2004 and 2008. The results, presented in Figure C3 (Appendix C), suggest that the education-polarization gradients are similar in the 2000s. We cannot conduct the same analysis for the ESS because the harmonized education variable is not available for all countries before 2010 and constructing our own harmonized variable for these years may introduce measurement error.

6. Mechanisms

6.1 Mechanisms Methodology

Constructing Measures of Mechanisms

We use questions asked in the GSS and ESS to investigate possible reasons for the education-polarization gradient across these countries. To contribute to a positive gradient, any potential mechanism must satisfy two conditions: (1) be correlated with educational attainment, and (2) have opposite effects on the attitudes of liberals and conservatives towards a given issue. We focus on four explanations explored in the literature: strength of political ideology, sorting of values and political ideology, political participation, and internet use. We construct measures of the proposed mechanisms as follows.

Strength of political ideology. More-educated individuals may have stronger political ideologies ($\frac{\partial P}{\partial E} > 0$), and more extreme political ideologies could be associated with stronger attitudes towards certain issues ($\frac{\partial A}{\partial P} > 0$). For example, in the US, more-educated Democrats tend to have more liberal views than less-educated Democrats (Glaser et al. 2021; Pew Research Center 2018a). To measure the strength of political ideology in the GSS, we construct a binary indicator that equals 1 if the respondent reports being “extremely liberal” (=1) or “extremely conservative” (=7), and zero otherwise. In the ESS, we construct a binary indicator that equals 1 if the respondent reports 0-1 or 9-10 on the 11-point left-right scale, and zero otherwise.²³

Value-ideology sorting. Issue-based positions and values are likely to be strongly correlated because support for policies such as redistribution may be an implicit endorsement of certain values such as fairness and justice (Corneo & Grüner 2002; Davidov et al. 2008; Krawczyk 2010).

²³ Note that since the binary indicator for strength of political ideology is collinear with the binary indicator for being a moderate, identification for regressions that include this indicator comes from comparing liberals and conservatives. Our baseline results are also robust to the exclusion of moderates (results available upon request).

If education strengthens beliefs in these values, then attitudes will be indirectly strengthened. This effect may operate separately from an individual’s understanding of the (empirical or theoretical) effects of these policies. Furthermore, individuals with different political ideologies identify with different values: liberals endorse concerns of compassion and fairness more than conservatives, while conservatives endorse concerns of loyalty and respect for tradition more than liberals (Graham et al. 2012; Mikołajczak & Becker 2019). If educated individuals have stronger values that align with their political ideology, then this may give rise to an education-polarization gradient. While this mechanism has been hypothesized in the theoretical literature, it has not yet been empirically tested.

We construct a new measure of value-ideology sorting. This measure is influenced by Mason (2015), who considers the effect of partisan-ideology sorting on polarization. We focus on three values: obedience (importance of following rules and authority), independence (importance of thinking for oneself), and compassion (importance of helping others). We chose these values because they have been documented to be correlated with political ideology (Pew Research Center 2014a,b) and proxies for them are available in both the GSS and ESS.²⁴

We use the following formula to construct the value-ideology sorting score (S) for each individual i :

$$S_i = z \left(\frac{1}{3} \sum_{j=1}^3 [|V_{i,j} - \tilde{P}_i| \times \tilde{P}_i \times \tilde{V}_{i,j}] \right) \quad \text{where } i = 1, 2, \dots, N \quad (5)$$

1. We code each value (V_j ; $j = \{1,2,3\}$) such that lower numbers correspond to more “liberal-aligned” values and higher values reflect more “conservative-aligned” values on a 1-5 scale.²⁵
2. For each value, we create an “alignment” score by taking the absolute difference between the political ideology scale (\tilde{P}_i equal to P_i from Section 2, rescaled to a 1-5 range) and the value scale ($V_{i,j}$).
3. Then, we create an individual-level “sorting” score for each value j by multiplying this absolute difference by (a) the strength of political ideology on a 1-3 scale, \tilde{P}_i (1=moderate; 2=liberal/conservative; 3=extremely liberal/extremely conservative)

²⁴ See Appendix A for the values questions asked in the GSS and ESS.

²⁵ In the GSS, respondents are asked to rank these values in importance from 1-5, allowing us to use this ranking as a measure of strength of value. In the ESS, respondents are asked the extent to which someone with a particular value (e.g. independence) “is or is not like you” on a 1-6 scale. We collapse this into 1-5 scale by combining “not like me” and “not like me at all” (categories 5 and 6) into one group.

and (b) the strength of values on a 1-3 scale, $\tilde{V}_{i,j}$ (1=neither important nor unimportant, 2=important/unimportant; 3=very important/very unimportant).²⁶

4. Finally, to obtain a single sorting measure for each individual (S_i), we take the mean of the three sorting scores and standardize it (denoted as $z(\cdot)$) by subtracting the country-level mean and dividing by the country-level standard deviation.

Political participation. Participation in political activities like campaigning or voting may strengthen pre-existing attitudes via repeated exposure to people who hold similar views (Banda & Cluverius 2018) and political participation has been shown to be positively correlated with educational attainment (Mayer 2011; Persson 2015). To measure political participation, we construct a binary indicator that equals 1 if the respondent reported voting in the last presidential election (for the GSS) or the last national election (for the ESS), and zero otherwise.

Internet use. Several studies have documented a relationship between media consumption, motivated reasoning, and attitudinal strength, though the direction of the effect is unclear (Boxell et al. 2017; Ksiazek et al. 2010; Lelkes et al. 2017). We focus on internet use rather than other media sources (e.g. TV and newspaper) because recent surveys of US and European residents indicate that news consumption increasingly takes place on digital platforms (e.g. smartphones, computers, and tablets) rather than via television or print media (Pew Research Center 2018b, 2021).²⁷ An education-polarization gradient may occur if education is correlated with internet use and the internet exposes users to content that affirms their prior beliefs (Iyengar & Hahn 2009; Pew Research Center 2017; Tewksbury & Riles 2015).

To measure internet use in the GSS, we use a continuous variable of self-reported hours spent using the internet per week. In the ESS, we use a continuous variable for the number of minutes spent using the internet per day. For both measures, the top 1% of values are winsorised.²⁸ For the ESS, this variable is only available for the 2016 and 2018 waves.²⁹

Figure D1 (Appendix D) uses the GSS to provide preliminary evidence that these variables differ across education levels, and thus might drive the education-polarization gradient. Political

²⁶ As noted by Mason (2015), this multiplication identifies cases where an individual is ideologically moderate and does not strongly identify with the value and thus receives the same alignment score as an extreme liberal who identifies strongly with liberal values.

²⁷ Furthermore, internet use is the only media consumption variable available in both the ESS and GSS.

²⁸ Some respondents report spending an infeasible number, such 24 hours per day, on the internet.

²⁹ The ESS has an alternative measure of frequency of internet use per week which takes on values from 1 (=never) to 5 (=every day). This variable is also only available for the 2016 and 2018 waves. Results are similar when this alternative measure is used.

participation and internet usage increase with educational attainment, while strength of political ideology and the degree of value-ideology alignment have a U-shaped pattern. Table D1 (Appendix D) presents these patterns for the other European countries in our sample. Overall, many European countries have a similar pattern to the US.³⁰

Estimating the Role of Mechanisms

To examine whether any of these mechanisms contribute to the education-polarization gradient, we use an omitted variable bias argument: if these mechanisms are omitted variables in the baseline equation (3), then including them as additional variables will reduce the magnitude of the gradient if (1) the mechanisms and educational attainment are positively correlated and (2) the mechanism and attitudes are correlated in opposite directions for liberals and conservatives. Therefore, we assess whether the estimated education-polarization gradients found in the baseline results change statistically when controlling for these mechanisms.

We run four additional regressions, separately for each mechanism. In each additional regression, we augment the baseline equation by adding: (a) a measure of mechanism M , (b) an interaction between mechanism M and educational attainment (to allow for the association between mechanisms M and attitude strength to vary with education), (c) an interaction between mechanism M and political identity (to allow for the association between mechanism M and attitude strength to vary with political identity). If M is a continuous variable (value-ideology sorting and internet use), we also include its quadratic term to allow for nonlinearities in the relationship between this mechanism and attitudes. Specifically, we estimate the following equation separately for different mechanisms and then compare the resulting gradient from these different models:

$$\begin{aligned}
 A_i = & \alpha + \sum_{s=2}^5 \beta_s E_i^s + \gamma_m mod_i + \gamma_l lib_i + \sum_{s=2}^5 \delta_s^{mod} E_i^s \times mod_i + \sum_{s=2}^5 \delta_s^{lib} E_i^s \times lib_i + \boldsymbol{\eta}' \mathbf{X}_i \\
 & + \mu_1 M_i + \mu_2 1\{M_i \text{ is continuous}\} M_i^2 + \sum_{s=2}^5 \kappa_s (M_i \times E_i^s) + \xi_m (M_i \times mod_i) + \xi_l (M_i \times lib_i) + u_i
 \end{aligned} \tag{6}$$

6.2 Mechanisms Results

For each country with a significant baseline education-polarization gradient for a given issue, Figure 4 shows four estimated education-polarization gradients, each from a model controlling

³⁰ Some exceptions include countries with a decreasing pattern (rather than U-shaped) for strength of political ideology (e.g. Finland, France, UK), an increasing (rather than U-shaped) pattern for value-ideology alignment (e.g. Netherlands, Spain, UK), and a U-shaped (rather than increasing) pattern for internet use (e.g. Denmark, Finland, Norway, Estonia).

for a different mechanism. The baseline gradient estimate (without controls for mechanisms) is presented under the country label on the x-axis. Table D2 (Appendix D) presents estimated education-polarization gradients for all countries, including those without a significant baseline gradient, from models controlling for a different mechanism.

Panel A (Figure 4) shows that in Belgium, Estonia, and the UK, controlling for the value-ideology sorting score eliminates the education-polarization gradient. For example, in the UK, adding this control reduces the gradient by 42.7% from 2.18 to 1.25. In France, Germany, the Netherlands, Spain, Switzerland, and the US, controlling for value-ideology sorting reduces the gradient but does not eliminate it. For example, in the US, adding this control reduces the gradient by 36.3% from 7.33 to 4.67. This finding is consistent with studies demonstrating the relationship between endorsement of certain values and preferences for redistribution (Corneo & Grüner 2002; Davidov et al. 2008; Krawczyk 2010).

Panel A also suggests that controlling for internet use eliminates the education-polarization gradient in several countries including Belgium (4.03 to 3.16), Finland (2.93 to 2.30), and Ireland (2.15 to 0.58). One potential explanation for this finding is that educated individuals spend more time on the internet and that individuals' process of selecting and consuming information on the internet strengthens existing beliefs (Iyengar & Hahn 2009; Lelkes et al. 2017; Levendusky 2013). In contrast, there is little evidence suggesting that controlling for the strength of political ideology moderates the education-polarization gradient. One potential explanation for this is that there is weak evidence that strength of political ideology increases with education (Figure D1 and Table D1, Appendix D). Furthermore, there is no evidence that controlling for political participation moderates the gradient, even though there is a strong relationship between political participation and education.³¹

Panel B shows that controlling for the value-ideology sorting score eliminates the education-polarization gradient in attitudes towards immigration for 9 out of 12 countries, including Belgium (2.18 to 1.42), Germany (1.90 to 1.60), the UK (2.59 to 1.70) and the US (2.96 to 0.69). Controlling for internet use also eliminates the gradient in 10 countries, including Belgium (2.18 to 0.79), France (2.28 to -0.64), Germany (1.90 to 0.02) Sweden (1.01 to 0.03), and the UK (2.59 to 1.41). Like Panel A, there is little evidence that controlling for the strength of political ideology or political participation moderates the education-polarization gradient in attitudes towards immigration.

³¹ This suggests that even though political participation is increasing in education, it may not have opposing effects on the attitudes of conservatives and liberals.

Figure 4: Education-polarization gradients with controls for mechanisms



Notes: For each country, the bars represent the estimated education-polarization gradient with one mechanism included as a regressor. The baseline education-polarization gradient is reported in brackets underneath each country name. 95% confidence intervals are reported (note that they may extend beyond the range shown).

While gradients in attitudes towards inequality (Panel A) and immigration (Panel B) are attenuated by controls for value-ideology sorting and internet use for several countries, Panel C shows that the gradient in attitudes towards gay rights is robust to the inclusion of controls for each of the four mechanisms for most countries. For example, controlling for value-ideology sorting reduces the gradient from 4.96 to 4.54 in the US and reduces the gradient from 3.23 to 2.72 in Poland.

To further understand the drivers of policy attitudes, we use dominance analysis (Azen & Budescu 2003; Grömping 2007), a method that determines the relative importance of independent variables based on their contribution to the fit of the regression model. Figure D2 (Appendix D) presents dominance analysis results for all countries, including those that do not exhibit a significant education-polarization gradient in the baseline regression.

Panels A and B both show that the “baseline” variables (education level, political ideology, and their interaction) account for between 13.01% (Hungary, Panel A) and 24.79% (Belgium, Panel A) of the variation in attitudes. Demographic characteristics such as age and gender account for between 5% (Germany and Switzerland, Panel A) to 40% (Estonia, Panel B) of the variation. Among the four mechanisms that we focus on, strength of political ideology accounts for 10-26%, value-ideology sorting accounts for 6-23%, political participation accounts for 11-22%, and internet use accounts for 12-36%.³²

In contrast to the drivers of attitudes towards inequality (Panel A) and immigration (Panel B), Panel C shows that demographic characteristics such as age, gender, and ethnic minority status explain a large percentage of the variation in attitudes towards gay rights, ranging from 13.20% (Poland) to 61.69% (Norway).³³ Compared to Panels A and B, educational levels and political ideology contribute a considerably smaller degree (4.59% in Estonia to 16.24% in Poland) to explaining variation in attitudes. Since the combination of political ideology, education level, and other demographic characteristics account for most of the variation (ranging from 29.44% in Poland to 67.84% in Norway), the four mechanisms do not explain as much variation

³² Since the dominance analysis (DA) method examines mechanisms that explain variation in attitudes across all individuals in the sample whereas the gradient reduction analysis examines mechanisms that explain the predicted disagreement in attitudes, some mechanisms may be important in the DA but not significantly reduce the gradient.

³³ Note that the US regression on attitudes towards gay rights does not include the internet use variable. In the GSS, the questions on attitudes towards gay rights, all variables used to construct the value-ideology sorting score (obedience, independence, helping others), and internet use are never asked in the same survey, so we are unable to estimate a regression that includes internet use as a predictor of attitudes towards gay rights.

in attitudes towards gay rights compared to variation in attitudes towards inequality and immigration. This finding is consistent with our result in Figure 4 that, for most countries, the gradient in attitudes towards gay rights is robust to the inclusion of controls for each of the four mechanisms.

Summary of mechanisms analysis

In sum, our results suggest that:

1. Value-ideology sorting and internet use are potential mechanisms driving the education-polarization gradient in attitudes towards inequality and immigration. In contrast, there is little evidence that strength political ideology or political participation are important drivers for any of the issues examined.
2. There is variation across policy issues in the importance of mechanisms in explaining the education-polarization gradient. The gradients in attitudes towards gay rights are least affected by the inclusion of controls for potential mechanisms.

7. Conclusion

We present the first cross-country evidence on the relationship between issue-based polarization and educational attainment between 2010 and 2018 for 18 OECD countries. In many of these countries, issue-based polarization between highly-educated liberals and conservatives is greater than that among less-educated liberals and conservatives, giving rise to an education-polarization gradient. This gradient varies across countries and the three policy issues examined (inequality, immigration, and gay rights). Across all three policy issues, the education-polarization gradient is strongest in the US. In most countries, the gradient is strongest for attitudes towards inequality and weakest for attitudes towards gay rights. These findings complement recent studies examining the role of education in issue-based polarization for scientific issues (e.g. Drummond & Fischhoff 2017).

Our data allow us to conduct the first empirical test of four prominent mechanisms explored in the literature: value-ideology sorting (the strength of alignment between political ideology and non-political values), internet use, strength of political ideology, and political participation. We find evidence that value-ideology sorting and internet use may help explain these gradients, but do not find evidence that the strength of political ideology or political participation are important drivers of these gradients.

Although polarization can help democracies function by providing focal points to facilitate voters' choice between candidates, mobilizing voters, and strengthening political parties (Carlin et al. 2015; Enyedi 2006, 2008; LeBas 2011, 2018; McCoy et al. 2018), it can also result in

suboptimal economic and political outcomes (e.g. Hetherington & Rudolph 2015). Given the political and economic consequences of polarization, it is important to understand how disagreements over policy issues arise. One view is that the primary source of disagreement is the lack of information or knowledge, so education could play a mediating role by providing the necessary information to understand the issue and appreciate alternative viewpoints (Glaser et al. 2021). Our findings contribute to the growing body of literature that challenges this notion and investigates alternative explanations for this education-polarization gradient.

This study has several important limitations. First, differences across surveys, political systems, and other factors make cross-country comparisons of issue-based polarization challenging. Second, since we are interested in between-person cross-sectional attitudinal differences, we are unable to comment on the causal effect of education or the tested mechanisms on attitudes. Future work may investigate potential causal relationships. Third, while our results provide some preliminary evidence on potential drivers of this gradient, due to data limitations, we are unable to examine other factors that may be important. Future work should investigate the role of other potential mechanisms such as social sorting (Harteveld 2021; Mason 2016), differences in information processing or cognitive biases (Ellis & Ura 2008; Kahan et al. 2017), and a desire to maintain consistency with one's social identity (Falk & Zimmermann 2018).

References

- Abramowitz AI. 2010. Transformation and polarization: The 2008 presidential election and the new American electorate. *Elect. Stud.* 29(4):594–603
- Abramowitz AI, Saunders KL. 2008. Is polarization a myth? *J. Polit.* 70(2):542–55
- Acemoglu D, Chernozhukov V, Wernz M. 2016. Fragility of asymptotic agreement under Bayesian learning. *Theor. Econ.* 11(1):187–225
- Angrist JD, Pischke J-S. 2008. *Mostly Harmless Econometrics*. Princeton university press
- Azen R, Budescu DV. 2003. The dominance analysis approach for comparing predictors in multiple regression. *Psychol. Methods.* 8(2):129–48
- Baldassarri D, Gelman A. 2008. Partisans without Constraint: Political Polarization and Trends in American Public Opinion. *Am. J. Sociol.* 114(2):408–46
- Ballew MT, Pearson AR, Goldberg MH, Rosenthal SA, Leiserowitz A. 2020. Does socioeconomic status moderate the political divide on climate change? The roles of education, income, and individualism. *Glob. Environ. Change.* 60:102024
- Banda KK, Cluverius J. 2018. Elite polarization, party extremity, and affective polarization. *Elect. Stud.* 56:90–101
- Bartels LM. 2006. What's the Matter with What's the Matter with Kansas? *Q. J. Polit. Sci.* 1(2):201–26
- Berinsky AJ. 2017. Rumors and Health Care Reform: Experiments in Political Misinformation. *Br. J. Polit. Sci.* 47(2):241–62
- Bishop B. 2009. *The Big Sort: Why the Clustering of like-Minded America Is Tearing Us Apart*. Houghton Mifflin Harcourt
- Bolin JL, Hamilton LC. 2018. The news you choose: News media preferences amplify views on climate change. *Environ. Polit.* 27(3):455–76
- Boliver V. 2016. Exploring Ethnic Inequalities in Admission to Russell Group Universities. *Sociology.* 50(2):247–66
- Bond TN, Lang K. 2019. The sad truth about happiness scales. *J. Polit. Econ.* 127(4):1629–40
- Boxell L, Gentzkow M, Shapiro JM. 2017. Greater Internet use is not associated with faster growth in political polarization among US demographic groups. *Proc. Natl. Acad. Sci.* 114(40):10612–17

- Boxell L, Gentzkow M, Shapiro JM. 2020. Cross-Country Trends in Affective Polarization. *w26669*, National Bureau of Economic Research
- Braun D, Schäfer C. 2022. Issues that mobilize Europe. The role of key policy issues for voter turnout in the 2019 European Parliament election. *Eur. Union Polit.* 23(1):120–40
- Carlin RE, Singer MM, Zechmeister EJ. 2015. *The Latin American Voter: Pursuing Representation and Accountability in Challenging Contexts*. Ann Arbor: University of Michigan Press
- Carney DR, Jost JT, Gosling SD, Potter J. 2008. The Secret Lives of Liberals and Conservatives: Personality Profiles, Interaction Styles, and the Things They Leave Behind. *Polit. Psychol.* 29(6):807–40
- Caughey D, O'grady T, Warshaw C. 2019. Policy Ideology in European Mass Publics, 1981–2016. *Am. Polit. Sci. Rev.* 113(3):674–93
- Converse P. 1964. The nature of belief systems in mass publics (1964). *Crit. Rev.* 18(1–3):1–74
- Converse P. 1972. Change in the American Electorate. In *The Human Meaning of Social Change*, pp. 263–338. New York: Russell Sage Foundation
- Corneo G, Grüner HP. 2002. Individual preferences for political redistribution. *J. Public Econ.* 83(1):83–107
- Currarini S, Jackson MO, Pin P. 2010. Identifying the roles of race-based choice and chance in high school friendship network formation. *Proc. Natl. Acad. Sci.* 107(11):4857–61
- Davidov E, Schmidt P, Schwartz SH. 2008. Bringing values back in: The adequacy of the European Social Survey to measure values in 20 countries. *Public Opin. Q.* 72(3):420–45
- Dixit AK, Weibull JW. 2007. Political polarization. *Proc. Natl. Acad. Sci.* 104(18):7351–56
- Dotti Sani GM, Quaranta M. 2021. Mapping Changes in Attitudes towards Gays and Lesbians in Europe: An Application of Diffusion Theory. *Eur. Sociol. Rev.* jcab032
- Draca M, Schwarz C. 2021. How Polarized are Citizens? Measuring Ideology from the Ground-Up. *ID 3154431*, Social Science Research Network, Rochester, NY
- Drummond C, Fischhoff B. 2017. Individuals with greater science literacy and education have more polarized beliefs on controversial science topics. *Proc. Natl. Acad. Sci.* 114(36):9587–92
- Duell D, Valasek J. 2019. Political polarization and selection in representative democracies. *J. Econ. Behav. Organ.* 168:132–65

- Ehret PJ, Sparks AC, Sherman DK. 2017. Support for environmental protection: an integration of ideological-consistency and information-deficit models. *Environ. Polit.* 26(2):253–77
- Eika L, Mogstad M, Zafar B. 2019. Educational assortative mating and household income inequality. *J. Polit. Econ.* 127(6):2795–2835
- Ellis CR, Ura JD. 2008. United We Divide?: Education, Income, and Heterogeneity in Mass Partisan Polarization. *Educ. Income Heterog. Mass Partis. Polariz. Novemb. 6 2008*
- Enyedi Z. 2006. Party politics in post-communist transition. *Handb. Party Polit.* 228–38
- Enyedi Z. 2008. The Social and Attitudinal Basis of Political Parties: Cleavage Politics Revisited. *Eur. Rev.* 16(3):287–304
- Erikson RS, Tedin KL. 2015. *American Public Opinion: Its Origins, Content and Impact*. Routledge
- Falk A, Zimmermann F. 2018. Information Processing and Commitment. *Econ. J.* 128(613):1983–2002
- Federico CM. 2006. Race, Education, and Individualism Revisited. *J. Polit.* 68(3):600–610
- Federico CM, Fisher EL, Deason G. 2011. Expertise and the ideological consequences of the authoritarian predisposition. *Public Opin. Q.* 75(4):686–708
- Fiorina MP. 2017. *Unstable Majorities: Polarization, Party Sorting, and Political Stalemate*. Hoover Press
- Fiorina MP, Abrams SA, Pope JC. 2008. Polarization in the American public: Misconceptions and misreadings. *J. Polit.* 70(2):556–60
- Funke M, Schularick M, Trebesch C. 2016. Going to extremes: Politics after financial crises, 1870–2014. *Eur. Econ. Rev.* 88:227–60
- Gerber AS, Huber GA. 2010. Partisanship, Political Control, and Economic Assessments. *Am. J. Polit. Sci.* 54(1):153–73
- Gift K, Gift T. 2015. Does Politics Influence Hiring? Evidence from a Randomized Experiment. *Polit. Behav.* 37(3):653–75
- Glaser JM, Berry JM, Schildkraut DJ. 2021. Education and the Curious Case of Conservative Compromise. *Polit. Res. Q.* 74(1):59–75
- Graham J, Nosek BA, Haidt J. 2012. The Moral Stereotypes of Liberals and Conservatives: Exaggeration of Differences across the Political Spectrum. *PLOS ONE.* 7(12):e50092
- Grömping U. 2007. Estimators of relative importance in linear regression based on variance decomposition. *Am. Stat.* 61(2):139–47

- Haider-Markel D, Joslyn M. 2009. A Partisan Education? How Education Extends Partisan Divisions over Facts. . 40
- Hamilton LC. 2011. Education, politics and opinions about climate change evidence for interaction effects. *Clim. Change*. 104(2):231–42
- Harteveld E. 2021. Ticking all the boxes? A comparative study of social sorting and affective polarization. *Elect. Stud.* 72:102337
- Hastie B. 2007. Higher education and sociopolitical orientation: The role of social influence in the liberalisation of students. *Eur. J. Psychol. Educ.* 22(3):259–74
- Hetherington MJ, Rudolph TJ. 2015. *Why Washington Won't Work: Polarization, Political Trust, and the Governing Crisis*. University of Chicago Press
- Iyengar S, Hahn KS. 2009. Red Media, Blue Media: Evidence of Ideological Selectivity in Media Use. *J. Commun.* 59(1):19–39
- Iyengar S, Lelkes Y, Levendusky M, Malhotra N, Westwood SJ. 2019. The Origins and Consequences of Affective Polarization in the United States. *Annu. Rev. Polit. Sci.* 22(1):129–46
- Iyengar S, Sood G, Lelkes Y. 2012. Affect, not ideology a social identity perspective on polarization. *Public Opin. Q.* 76(3):405–31
- Iyengar S, Westwood SJ. 2015. Fear and Loathing across Party Lines: New Evidence on Group Polarization. *Am. J. Polit. Sci.* 59(3):690–707
- Jerrim J, Chmielewski AK, Parker P. 2015. Socioeconomic inequality in access to high-status colleges: A cross-country comparison. *Res. Soc. Stratif. Mobil.* 42:20–32
- Jost JT. 2006. The end of the end of ideology. *Am. Psychol.* 61(7):651–70
- Jost JT, Glaser J, Kruglanski AW, Sulloway FJ. 2003. Political conservatism as motivated social cognition. - PsycNET. *Psychol. Bull.* 129(3):339–75
- Kahan DM, Peters E, Dawson EC, Slovic P. 2017. Motivated numeracy and enlightened self-government. *Behav. Public Policy.* 1(1):54–86
- Kahan DM, Peters E, Wittlin M, Slovic P, Ouellette LL, et al. 2012. The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nat. Clim. Change.* 2(10):732–35
- Katsambekis G, Stavrakakis Y. 2013. Populism, anti-populism and European democracy: a view from the South. *Popul. Polit. Ecol.* 117:

- Krawczyk M. 2010. A glimpse through the veil of ignorance: Equality of opportunity and support for redistribution. *J. Public Econ.* 94(1):131–41
- Ksiazek TB, Malthouse EC, Webster JG. 2010. News-seekers and Avoiders: Exploring Patterns of Total News Consumption Across Media and the Relationship to Civic Participation. *J. Broadcast. Electron. Media.* 54(4):551–68
- Lazarsfeld PF, Merton RK. 1954. Friendship as a social process: A substantive and methodological analysis. *Freedom Control Mod. Soc.* 18(1):18–66
- LeBas A. 2011. *From Protest to Parties: Party-Building and Democratization in Africa.* Oxford University Press
- LeBas A. 2018. Can Polarization Be Positive? Conflict and Institutional Development in Africa. *Am. Behav. Sci.* 62(1):59–74
- Lelkes Y, Sood G, Iyengar S. 2017. The Hostile Audience: The Effect of Access to Broadband Internet on Partisan Affect. *Am. J. Polit. Sci.* 61(1):5–20
- Levendusky MS. 2013. Why do partisan media polarize viewers? *Am. J. Polit. Sci.* 57(3):611–23
- Linville DL, Havice PA. 2011. Political bias on campus: Understanding the student experience. *J. Coll. Stud. Dev.* 52(4):487–96
- Makowsky MD, Miller SC. 2014. Education, intelligence, and attitude extremity. *Public Opin. Q.* 78(4):832–58
- Malka A, Lelkes Y. 2010. More than Ideology: Conservative–Liberal Identity and Receptivity to Political Cues. *Soc. Justice Res.* 23(2):156–88
- Mason L. 2015. “I Disrespectfully Agree”: The Differential Effects of Partisan Sorting on Social and Issue Polarization. *Am. J. Polit. Sci.* 59(1):128–45
- Mason L. 2016. A Cross-Cutting Calm: How Social Sorting Drives Affective Polarization. *Public Opin. Q.* 80(S1):351–77
- Mayer AK. 2011. Does education increase political participation? *J. Polit.* 73(3):633–45
- McConnell C, Margalit Y, Malhotra N, Levendusky M. 2018. The Economic Consequences of Partisanship in a Polarized Era. *Am. J. Polit. Sci.* 62(1):5–18
- McCoy J, Rahman T, Somer M. 2018. Polarization and the Global Crisis of Democracy: Common Patterns, Dynamics, and Pernicious Consequences for Democratic Polities. *Am. Behav. Sci.* 62(1):16–42

- McCright AM, Dunlap RE. 2011. Cool dudes: The denial of climate change among conservative white males in the United States. *Glob. Environ. Change*. 21(4):1163–72
- Mikołajczak G, Becker JC. 2019. What Is (Un)fair? Political Ideology and Collective Action. *J. Soc. Polit. Psychol.* 7(2):810–29
- Norwegian Centre for Research Data. 2021. European Election Database
- Painter M. 2020. Firm Statements, Consumer Political Beliefs, and the Limits of Stakeholder Capitalism. *ID 3557961*, Social Science Research Network, Rochester, NY
- Painter M, Qiu T. 2021. Political beliefs affect compliance with government mandates. *J. Econ. Behav. Organ.* 185:688–701
- Panagopoulos C, Green DP, Krasno J, Schwam-Baird M, Endres K. 2020. Partisan Consumerism: Experimental Tests of Consumer Reactions to Corporate Political Activity. *J. Polit.* 82(3):996–1007
- Patty JW, Penn EM. 2019. Are Moderates Better Representatives than Extremists? A Theory of Indirect Representation. *Am. Polit. Sci. Rev.* 113(3):743–61
- Persson M. 2015. Education and political participation. *Br. J. Polit. Sci.* 45(3):689–703
- Pew Research Center. 2014a. Teaching the Children: Sharp Ideological Differences, Some Common Ground
- Pew Research Center. 2014b. Beyond red vs. blue: The political typology
- Pew Research Center. 2016a. Top voting issues in 2016 election
- Pew Research Center. 2016b. Ideological Gap Widens Between More, Less Educated Adults
- Pew Research Center. 2016c. A wider ideological gap between more and less educated adults. *Pew Res. Cent. US Polit. Policy*
- Pew Research Center. 2017. Americans' Attitudes About the News Media Deeply Divided Along Partisan Lines
- Pew Research Center. 2018a. Wide gender gap, growing educational divide in voters' party identification
- Pew Research Center. 2018b. News Media in Western Europe: Populist Views Divide Public Opinion
- Pew Research Center. 2021. 86% of Americans get news online from smartphone, computer or tablet

- Politico. 2020. Americans' domestic priorities for President Trump and Congress in the months leading up to the 2020 election. Harvard T. H. Chan School of Public Health
- Prior M. 2005. News vs. Entertainment: How Increasing Media Choice Widens Gaps in Political Knowledge and Turnout. *Am. J. Polit. Sci.* 49(3):577–92
- Przeworski A. 1986. Some Problems in the Study of the Transition to Democracy. In *Transitions From Authoritarian Rule*, Vol. 3, eds. G O'Donnell, PC Schmitter, L Whitehead. Baltimore and London: The Johns Hopkins University Press
- Rehm P, Reilly T. 2010. United we stand: Constituency homogeneity and comparative party polarization. *Elect. Stud.* 29(1):40–53
- Rosenstone SJ, Hansen JM. 1993. *Mobilization, Participation, and Democracy in America*. Longman Publishing Group
- Smith TW. 2016. General Social Surveys, 1972-2014 [machine-readable data file]/Principal Investigator, Tom W. Smith; Co-Principal Investigator, Peter V. Marsden; Co-Principal Investigator, Michael Hout; Sponsored by National Science Foundation. *Chic. NORC Univ. Chic. Prod.*
- Sniderman PM, Glaser JM, Griffin R. 1990. Information and Electoral Choice. In *Information and Democratic Processes*, pp. 164–78. Chicago: University of Illinois Press
- Somer M, McCoy J. 2018. Transformations through Polarizations and Global Threats to Democracy: *Ann. Am. Acad. Pol. Soc. Sci.*
- Supreme Court of the United States. 2014. Obergefell et al. v. Hodges, Director, Ohio Department of Health, et al
- Tajfel H, Turner JC, Austin WG, Worchel S. 1979. An integrative theory of intergroup conflict. *Organ. Identity Read.* 56(65):9780203505984–16
- Tappin BM, Pennycook G, Rand DG. 2021. Rethinking the link between cognitive sophistication and politically motivated reasoning. *J. Exp. Psychol. Gen.* 150(6):1095
- Tewksbury D, Riles JM. 2015. Polarization as a Function of Citizen Predispositions and Exposure to News on the Internet. *J. Broadcast. Electron. Media.* 59(3):381–98
- UNESCO Institute for Statistics. 2012. International standard classification of education: ISCED 2011. *Comp. Soc. Res.* 30:
- van der Linden S, Leiserowitz A, Maibach E. 2018. Scientific agreement can neutralize politicization of facts. *Nat. Hum. Behav.* 2(1):2–3

Weber H, Schwenzer M, Hillmert S. 2020. Homophily in the formation and development of learning networks among university students. *Netw. Sci.* 8(4):469–91

Weiner TS, Eckland BK. 1979. Education and political party: the effects of college or social class? *Am. J. Sociol.* 84(4):911–28

Online Appendix

Education and Issue-Based Polarization: Evidence from the US and Europe

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A. Data Appendix

Construction of attitudinal variables

We use the following questions/statements to measure attitudes towards our three main policy issues of interest (inequality, immigration, and gay rights).

Inequality: main questions

- GSS: “Some people think that the government in Washington ought to reduce the income differences between the rich and the poor... Others think that the government should not concern itself with reducing this income between the rich and the poor...What score between 1 and 7 comes closest to how you feel?” (1=Government should not; 7=Government should)
- ESS: “To what extent do you agree or disagree that “The government should take measures to reduce differences in income levels” (1=Disagree strongly; 5=Agree strongly)

Inequality: alternative questions

- GSS alternative 1: “Some people think that the government in Washington to see to it that people have help in paying for doctors and hospital bills. Others think that these matters are not the responsibility of the federal government and that people should take care of these things themselves. Where would you place yourself on the scale or haven’t you made your mind on this?” (1=Government should help; 5=People should take care of themselves)
- GSS alternative 2: “Washington should do everything possible to improve the standard of living of all poor Americans. Other people think it is not the government’s responsibility, and that each person should take of himself. Where would you place yourself on the scale or haven’t you made your mind on this?” (1=Government should help; 5=People should take care of themselves)
- ESS alternative: How much do you agree or disagree with each of the following statements? A society is fair when income and wealth are equally distributed among all people. (1=Strongly agree; 5=Strongly disagree)

Immigration: main questions

- GSS: “Do you think the number of immigrants to America nowadays should be...?” (1=Reduced a lot; 5=Increased a lot)
- ESS: “To what extent do you think [country] should allow people from the poorer countries outside Europe to come and live here?” (1=Allow none; 4=Allow many)

Immigration: alternative questions

- GSS alternative 1: “To what extent do you agree that immigrants take jobs away from people who were born in America?” [1=Agree strongly; 5=Disagree strongly]
- GSS alternative 2: “To what extent do you agree that immigrants are generally good for America’s economy.” [1=Agree strongly; 5=Disagree strongly]
- ESS alternative: Would you say it is generally bad or good for [country]’s economy that people come to live here from other countries? [0=Bad; 10=Good]
- ESS alternative: Is [country] made a worse or a better place to live by people coming to live here from other countries? [0=Worse; 10=Better]

Gay rights: main questions

- GSS: “Do you agree or disagree that homosexual couples should have the right to marry one another?” (1=Strongly disagree; 5=Strongly agree)
- ESS: “To what extent do you agree or disagree that gay male and lesbian couples should have the same rights to adopt children as straight couples?” (1=Disagree strongly; 5=Agree strongly)

Gay rights: alternative questions

- GSS: “Regarding sexual relations between two adults of the same sex – do you think it is always wrong, almost always wrong, wrong only sometimes, or not wrong at all?” (1=Always wrong; 4=Not wrong at all)
- ESS: “To what extent you agree or disagree that... Gay men and lesbians should be free to live their own life as they wish.” (1=Disagree strongly; 5=Agree strongly)

Construction of education variable

- The GSS uses a 5-category classification: (1) less than high school, (2) high school, (3) junior college, (4) bachelor, (5) graduate degree (e.g. JD, MD, PhD). The ESS uses a 7-category classification: (1) less than lower secondary, (2) lower secondary, (3) lower tier upper secondary, (4) upper tier upper secondary, (5) advanced vocational, (6) bachelor’s level, (7) above master’s level.
- The ESS uses a harmonized educational attainment variable based on the International Standard Classification of Education (ISCED). The ESS ISCED-based education variable uses a 7-point scale: (1) less than lower secondary; (2) lower secondary; (3) lower-tier upper secondary; (4) upper-tier upper secondary; (5) advanced vocational, sub-degree; (6) lower tertiary education, BA level; (7) higher tertiary education, \geq MA level. To match the GSS, we collapse this into a 5-point scale by combining (1) and (2) as “less than high school” and (3) and (4) as “high school”.

Construction of political identity variable

- The GSS measures political viewpoints via the following question: “We hear a lot of talk these days about liberals and conservatives. I’m going to show you a seven-point scale on which the political views that people might hold are arranged from extremely liberal to extremely conservative. Where would you place yourself on this scale? (1=Extremely liberal; 7=Extremely conservative)”. For our main analysis, we classify respondents reporting 3 or lower as “liberal”, 4 as “moderate”, and 5 or higher as “conservative”.
- The ESS measures political viewpoints via that following question: “In politics people sometimes talk of “left” and “right”. Using this card, where would you place yourself on this scale, where 0 means the left and 10 means the right? (0=Left; 10=Right)” For our main analysis, we classify respondents reporting 4 or lower as “liberal”, 5 as “middle”, and 6 or higher as “liberal”.

Construction of value variables in the value-ideology sorting score

We use the following three questions in the GSS and ESS to measure values:

*GSS: “If you had to choose which thing on this list would you pick as the most important for a child to learn to prepare him or her for life? Which comes next in importance? Which comes third? Which comes fourth? Which comes fifth?”*The list includes:

- “to obey” (obedience, reverse coded)
- “to think for himself or herself” (independence)
- “to help others when they need help” (compassion)

ESS: “Now I will briefly describe some people. Please listen to each description and tell me how much each person is or is not like you.” (1-6 scale)

- She/he believes that people should do what they're told. She/he thinks people should follow rules at all times, even when no-one is watching (obedience, reverse coded).
- It is important to her/him to make her/his own decisions about what she/he does. She/he likes to be free and not depend on others (independence).
- It's very important to her/him to help the people around her/him. She/he wants to care for their well-being (compassion).

B. Sample Composition

Table B1: Education-Political Ideology Cells

Note: Rows indicate the percentages of conservatives, moderates, and liberals for each education level, with overall percentages across all education levels in the final row.

A. Belgium				
	Conservative	Moderate	Liberal	Observations
<HS	31.98%	40.2%	27.82%	2389
HS	28.06%	36.6%	35.34%	2446
Post-sec	30.08%	37.47%	32.44%	986
BA	32.39%	32.65%	34.96%	1521
>BA	36%	22.92%	41.09%	1145
Total	31.28%	35.64%	33.08%	8487
B. Czech Republic				
	Conservative	Moderate	Liberal	Observations
<HS	37.95%	29.63%	32.42%	1139
HS	33.32%	29.21%	37.47%	6090
Post-sec	30.53%	25.28%	44.19%	1446
BA	14.76%	26.55%	58.69%	323
>BA	23.8%	19.14%	57.06%	1075
Total	31.64%	27.39%	40.97%	10073
C. Denmark				
	Conservative	Moderate	Liberal	Observations
<HS	30.45%	25.94%	43.61%	1425
HS	34.12%	21.4%	44.49%	1979
Post-sec	29.49%	15.76%	54.75%	572
BA	43.87%	18.99%	37.14%	1394
>BA	45.15%	15.42%	39.43%	651
Total	35.02%	21.63%	43.35%	6021
D. Estonia				
	Conservative	Moderate	Liberal	Observations
<HS	21.49%	49.03%	29.48%	1466
HS	19.38%	49.11%	31.51%	3053
Post-sec	20.74%	47.49%	31.77%	1532
BA	16.41%	38.83%	44.75%	1001
>BA	22.67%	35.53%	41.8%	1561
Total	20.22%	44.85%	34.93%	8613
E. Finland				
	Conservative	Moderate	Liberal	Observations
<HS	22.22%	37.29%	40.49%	2206
HS	25.13%	35.14%	39.73%	2996
Post-sec	20.8%	25.57%	53.64%	1711
BA	25.16%	23.45%	51.39%	1239
>BA	25.2%	16.15%	58.64%	1269
Total	23.65%	30.61%	45.73%	9421

F. France				
	Conservative	Moderate	Liberal	Observations
<HS	31.79%	35.03%	33.18%	2310
HS	33.42%	34.62%	31.96%	3798
Post-sec	42.01%	24.51%	33.48%	1249
BA	44.11%	20.62%	35.27%	426
>BA	44.18%	22.26%	33.55%	1245
Total	35.67%	31.45%	32.88%	9028

G. Germany				
	Conservative	Moderate	Liberal	Observations
<HS	37.39%	40.45%	22.16%	1750
HS	35.66%	42.1%	22.24%	5961
Post-sec	40.45%	37.07%	22.48%	2673
BA	48.5%	30.13%	21.37%	1159
>BA	52.28%	27.47%	20.24%	1971
Total	39.38%	38.62%	22%	13514

H. Hungary				
	Conservative	Moderate	Liberal	Observations
<HS	21.24%	37.49%	41.27%	1408
HS	21.41%	33.68%	44.91%	4050
Post-sec	25.4%	33.89%	40.71%	566
BA	25.21%	30.1%	44.7%	734
>BA	24.54%	33.89%	41.56%	369
Total	22.28%	34.24%	43.48%	7127

I. Ireland				
	Conservative	Moderate	Liberal	Observations
<HS	26.72%	44.21%	29.07%	3531
HS	26.05%	43.46%	30.49%	2294
Post-sec	26.41%	43.79%	29.8%	2353
BA	29.25%	37.5%	33.25%	1286
>BA	32.99%	32.12%	34.89%	1120
Total	27.53%	41.69%	30.78%	10584

J. Netherlands				
	Conservative	Moderate	Liberal	Observations
<HS	24.15%	32.33%	43.51%	3058
HS	28.88%	28%	43.11%	2260
Post-sec	35.29%	18.85%	45.86%	613
BA	38.13%	19.84%	42.04%	950
>BA	41.84%	16.43%	41.74%	1508
Total	30.62%	26.27%	43.12%	8389

K. Norway				
	Conservative	Moderate	Liberal	Observations
<HS	29.29%	29.99%	40.72%	1337
HS	28.02%	25.77%	46.21%	2393

Post-sec	30.67%	18.64%	50.69%	930
BA	38.46%	17.68%	43.87%	1513
>BA	45.5%	15.07%	39.43%	1166
Total	32.57%	23.24%	44.19%	7339

L. Poland

	Conservative	Moderate	Liberal	Observations
<HS	19.7%	33.53%	46.76%	2812
HS	23.17%	34.12%	42.7%	2249
Post-sec	26.65%	29.21%	44.14%	363
BA	21.39%	39.07%	39.54%	416
>BA	23.62%	34.19%	42.2%	1208
Total	21.93%	33.94%	44.13%	7048

M. Portugal

	Conservative	Moderate	Liberal	Observations
<HS	37.65%	32.08%	30.27%	3869
HS	35.57%	36.85%	27.58%	1124
Post-sec	31.2%	39.19%	29.61%	199
BA	37.68%	34.17%	28.15%	353
>BA	41.4%	30.2%	28.41%	627
Total	37.45%	33.1%	29.45%	6172

N. Spain

	Conservative	Moderate	Liberal	Observations
<HS	41.14%	32.39%	26.48%	4337
HS	44.4%	32.51%	23.09%	1284
Post-sec	48.76%	32.17%	19.07%	716
BA	45.38%	29.45%	25.17%	798
>BA	47.07%	25.48%	27.46%	1109
Total	43.66%	31.06%	25.29%	8244

O. Sweden

	Conservative	Moderate	Liberal	Observations
<HS	32.28%	27.84%	39.88%	1596
HS	35.01%	24.29%	40.7%	2530
Post-sec	33.36%	19.59%	47.05%	1680
BA	39.47%	14.87%	45.66%	973
>BA	31.9%	15.14%	52.96%	1055
Total	34.15%	22.07%	43.78%	7834

P. Switzerland

	Conservative	Moderate	Liberal	Observations
<HS	28.12%	39.6%	32.28%	1440
HS	27.82%	34.05%	38.14%	3140
Post-sec	30.58%	29.13%	40.29%	1148
BA	43.43%	19.77%	36.81%	438
>BA	46.77%	19.91%	33.32%	928
Total	31.8%	31.64%	36.56%	7094

Q. UK				
	Conservative	Moderate	Liberal	Observations
<HS	25.18%	46.31%	28.51%	3143
HS	27.08%	45.61%	27.31%	2237
Post-sec	25.59%	43.07%	31.34%	1605
BA	37.67%	33.01%	29.32%	1273
>BA	42.81%	30.35%	26.84%	1204
Total	29.85%	41.58%	28.57%	9462

R. US				
	Conservative	Moderate	Liberal	Observations
<HS	27.28%	39.73%	32.99%	1353
HS	23.93%	43.3%	32.77%	5645
Post-sec	21.46%	42.59%	35.95%	870
BA	33.51%	28.94%	37.54%	2175
>BA	41.83%	26.44%	31.73%	1253
Total	27.87%	38.29%	33.84%	11296

Table B2: Demographic Characteristics by Political Ideology

Note: Columns show the average values for each political ideology group, with overall averages in the final column. Comparisons across rows show differences in demographic characteristics across ideology groups. Female and Minority are indicator variables, where “Minority” equals 1 if the individual identifies as non-white.

A. Belgium				
	Conservative	Moderate	Liberal	All
Female	51.85%	55.97%	44.58%	51.33%
Minority	7.19%	4.87%	2.62%	5.14%
Age	46.79	47.3	48.78	47.47
Income decile	5.61	5.54	5.96	5.66
B. Czech Republic				
	Conservative	Moderate	Liberal	All
Female	52.35%	55.6%	45.71%	51.18%
Minority	3.12%	2.3%	1.96%	2.54%
Age	53.85	45.68	42.96	46.4
Income decile	5.22	5.9	6.54	5.89
C. Denmark				
	Conservative	Moderate	Liberal	All
Female	54.62%	51.43%	45.35%	50.73%
Minority	4.63%	4.07%	1.92%	3.69%
Age	44.07	49.94	48.92	47.33
Income decile	5.45	5.31	5.77	5.52
D. Estonia				
	Conservative	Moderate	Liberal	All
Female	53.01%	56.33%	50.46%	54.34%
Minority	27.69%	20.35%	7.89%	17.99%
Age	50.21	46.44	46.25	47.36
Income decile	5.43	5.58	6.44	5.72
E. Finland				
	Conservative	Moderate	Liberal	All
Female	52.42%	53.53%	48.02%	51.35%
Minority	2.64%	2.2%	1.5%	2.12%
Age	47.57	45.54	51.58	48.44
Income decile	5.33	5.31	6.17	5.68
F. France				
	Conservative	Moderate	Liberal	All
Female	52.17%	53.56%	50.34%	52.21%
Minority	6.39%	4.59%	3.82%	5.19%
Age	46.86	45.8	51.27	47.73
Income decile	5.27	4.86	5.46	5.15
G. Germany				
	Conservative	Moderate	Liberal	All
Female	51.04%	53.65%	42.6%	51.07%

Minority	6.42%	5.86%	4.89%	6.51%
Age	46.67	48.89	51.92	48.64
Income decile	5.74	5.57	5.98	5.68

H. Hungary

	Conservative	Moderate	Liberal	All
Female	54.18%	53.94%	49.82%	53.09%
Minority	4.04%	5.84%	4.95%	5.74%
Age	54.37	46.03	47.11	47.48
Income decile	5.37	5.28	5.63	5.35

I. Ireland

	Conservative	Moderate	Liberal	All
Female	45.47%	53.98%	45.33%	50.96%
Minority	4.59%	3.72%	3.47%	4.34%
Age	42.52	44.61	49.38	44.32
Income decile	4.57	4.4	4.8	4.47

J. Netherlands

	Conservative	Moderate	Liberal	All
Female	53.2%	56.17%	43.47%	50.73%
Minority	9.83%	6.89%	3.91%	7.33%
Age	46.4	47.47	47.63	46.84
Income decile	6.25	5.87	6.81	6.31

K. Norway

	Conservative	Moderate	Liberal	All
Female	53.38%	53.47%	43.04%	49.11%
Minority	7.43%	7.2%	4.51%	6.26%
Age	45.54	44.45	46.97	45.72
Income decile	5.06	4.71	5.5	5.15

L. Poland

	Conservative	Moderate	Liberal	All
Female	48.53%	52.09%	50.11%	52.22%
Minority	1.71%	1.89%	1.62%	1.66%
Age	48.43	43.07	48.12	46.2
Income decile	5.56	5.36	5.28	5.25

M. Portugal

	Conservative	Moderate	Liberal	All
Female	51.87%	52.89%	51.23%	53.07%
Minority	1.85%	1.41%	3.31%	2.31%
Age	49.69	46.69	51.55	48.65
Income decile	5.11	5.14	5.22	5.02

N. Spain

	Conservative	Moderate	Liberal	All
Female	50.45%	49.89%	50.18%	51.23%
Minority	2.38%	2.36%	2.12%	2.63%

Age	46.44	46.58	50.38	47.67
Income decile	5.11	4.89	5.34	4.99

O. Sweden

	Conservative	Moderate	Liberal	All
Female	53.93%	52.43%	44.83%	50%
Minority	5.57%	5.08%	2.36%	4.21%
Age	46.09	47.02	48.54	46.98
Income decile	5.82	5.82	6.8	6.21

P. Switzerland

	Conservative	Moderate	Liberal	All
Female	55.3%	56.04%	41.04%	51.1%
Minority	9.06%	7.88%	5.22%	7.61%
Age	44.4	49.53	49.17	47.44
Income decile	5.68	5.12	5.84	5.51

Q. UK

	Conservative	Moderate	Liberal	All
Female	48.11%	53.73%	44.31%	51.04%
Minority	10.63%	10.5%	8.36%	10.29%
Age	45.33	46.07	52.18	46.71
Income decile	5.64	5.39	6	5.53

R. US

	Conservative	Moderate	Liberal	All
Female	55.26%	56.49%	51.16%	54.52%
Minority	29.71%	28.33%	19.22%	26.16%
Age	45.17	45.75	49.99	46.95
Income category	17.95	17.28	18.38	17.74

C. Results Appendix

Table C1: GSS baseline regression estimates

	(1)	(2)	(3)
	Inequality	Immigration	Gay rights
Education			
HS	-1.70 (2.23)	-0.65 (2.09)	11.26*** (2.26)
Post-sec	5.13 (3.09)	3.72 (2.77)	16.43*** (2.97)
BA	2.72 (2.44)	6.93** (2.23)	20.73*** (2.46)
>=BA	5.98* (2.44)	12.41*** (2.27)	26.36*** (2.33)
Political ideology			
Moderate	-4.64 (2.69)	-4.41 (2.28)	-5.70* (2.68)
Liberal	-9.85*** (2.82)	-4.67 (2.58)	-14.32*** (2.85)
Education X Political ideology			
HS X Moderate	-2.70 (3.03)	-1.56 (2.53)	-4.88 (3.00)
HS X Liberal	-9.83** (3.16)	-4.35 (2.73)	-8.53** (3.09)
Post-Sec X Moderate	-7.62 (3.93)	-6.00 (3.52)	-3.97 (3.62)
Post-Sec X Liberal	-16.17*** (4.38)	-9.87** (3.64)	-16.86*** (3.85)
BA X Moderate	-13.23*** (3.24)	-3.13 (2.80)	-4.90 (3.18)
BA X Liberal	-25.03*** (3.34)	-7.11* (2.94)	-17.41*** (3.51)
>BA X Moderate	-11.41** (3.46)	-5.45 (2.85)	-8.38* (3.45)
>BA X Liberal	-29.02*** (3.47)	-13.41*** (3.12)	-20.35*** (3.50)
R ²	0.19	0.12	0.27
Observations	7521	7360	7332

Notes: Estimated coefficients of equation (3) for the GSS sample. In addition to the variables presented above, all regressions include controls for sex, age bins (9 indicators), ethnic minority status, and survey year. Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table C2: ESS estimated education-polarization gradients

	Inequality		Immigration		Gay rights	
	(1) Gradient (SE)	(2) F-stat (P-val)	(3) Gradient (SE)	(4) F-stat (P-val)	(5) Gradient (SE)	(6) F-stat (P-val)
Belgium	4.03 (0.97)	29.32 (0.00)	2.18 (0.48)	8.27 (0.00)	2.93 (0.71)	5.01 (0.00)
Czech Republic	1.39 (0.16)	1.61 (0.17)	0.86 (1.38)	3.1 (0.01)	0.88 (0.19)	0.4 (0.81)
Denmark	4.12 (0.71)	19.84 (0.00)	0.95 (0.31)	2.48 (0.04)	0.64 (0.96)	0.74 (0.56)
Estonia	1.76 (0.47)	6.28 (0.00)	0.13 (0.37)	2.26 (0.06)	0.19 (0.28)	0.32 (0.87)
Finland	2.92 (0.49)	22.81 (0.00)	1.73 (0.68)	8.72 (0.00)	1.1 (0.44)	1.02 (0.40)
France	3.88 (0.26)	15.95 (0.00)	2.28 (0.55)	6.6 (0.00)	2.31 (0.54)	1.96 (0.10)
Germany	2.53 (0.37)	10.12 (0.00)	1.9 (0.31)	6.18 (0.00)	2.87 (0.38)	2.97 (0.02)
Hungary	-0.61 (0.39)	0.74 (0.56)	1.88 (0.34)	2.26 (0.06)	-1.04 (0.91)	0.9 (0.47)
Ireland	2.15 (0.19)	6.9 (0.00)	3.12 (0.49)	16.38 (0.00)	1.56 (0.42)	2.79 (0.03)
Netherlands	3.06 (0.25)	18.04 (0.00)	1.01 (0.36)	2.63 (0.03)	-0.6 (0.28)	0.7 (0.59)
Norway	2.9 (0.32)	18.55 (0.00)	0.38 (0.24)	0.62 (0.65)	-0.3 (0.38)	0.38 (0.82)
Poland	0.09 (0.37)	1.51 (0.20)	1.03 (0.49)	3.05 (0.02)	3.19 (0.32)	3.95 (0.00)
Portugal	0.4 (0.36)	0.49 (0.74)	0.26 (0.36)	0.83 (0.50)	1.47 (1.32)	1.07 (0.37)
Spain	2.5 (0.52)	15.7 (0.00)	1.71 (0.77)	8.52 (0.00)	2.51 (0.17)	2.89 (0.02)
Sweden	3.83 (0.34)	19.78 (0.00)	1.01 (0.07)	2.47 (0.04)	0.18 (0.13)	0.07 (0.99)
Switzerland	4.27 (0.19)	24.57 (0.00)	0.32 (0.76)	2.21 (0.07)	3.04 (1.68)	4.03 (0.00)
United Kingdom	2.18 (0.71)	8.71 (0.00)	2.59 (0.55)	12.17 (0.00)	1.29 (0.88)	1.9 (0.11)

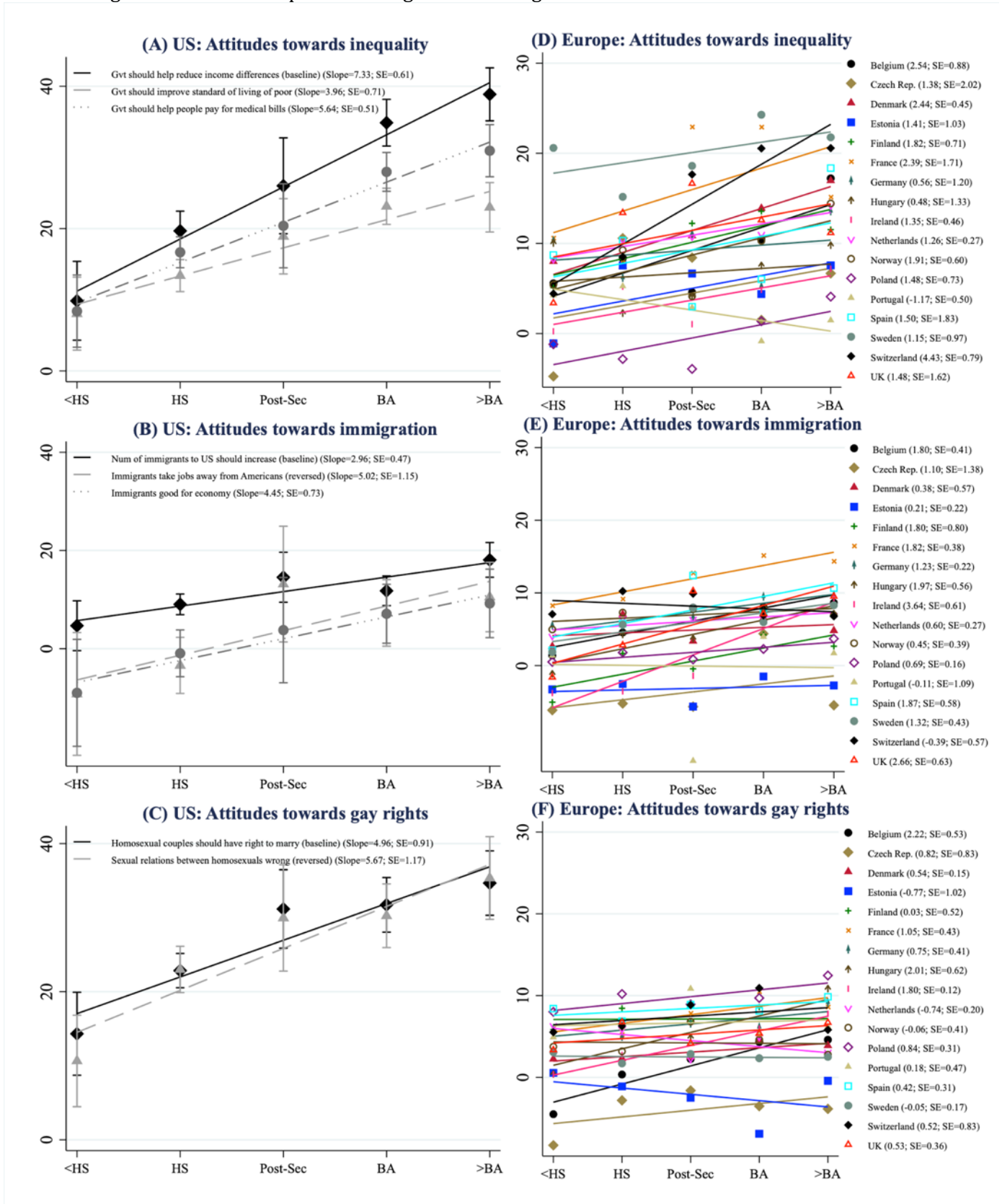
Notes: Estimated education-polarization gradients for European countries and corresponding F-statistics. See main text for further details on how the gradients and F-statistics are computed.

Table C3: Education-polarization gradients
with additional controls and alternative classification of political Ideology

	Inequality			Immigration			Gay Rights		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	+ HH Income	+ Father's education	Alt Pol ideology	+ HH Income	+ Father's education	Alt Pol ideology	+ HH Income	+ Father's education	Alt Pol ideology
Belgium	3.98 (0.89)	4.02 (0.93)	4.87 (1.05)	2.09 (0.33)	1.95 (0.53)	3.20 (0.51)	3.33 (0.76)	3.33 (0.83)	2.82 (0.7)
Czech Rep.	1.67 (0.4)	1.46 (0.13)	1.77 (0.25)	0.82 (1.5)	0.86 (1.45)	0.60 (0.99)	0.59 (0.79)	0.84 (0.26)	1.99 (0.82)
Denmark	3.97 (0.48)	4.12 (0.77)	4.87 (0.83)	0.99 (0.38)	1.02 (0.32)	1.38 (0.42)	0.94 (0.94)	1.13 (0.68)	2.08 (1.44)
Estonia	1.37 (0.54)	1.91 (0.33)	2.42 (0.54)	-0.15 (0.39)	0.31 (0.43)	-0.42 (0.57)	0.54 (0.3)	0.42 (0.37)	0.19 (0.6)
Finland	2.54 (0.5)	2.96 (0.47)	3.93 (0.38)	1.81 (0.64)	1.80 (0.78)	2.59 (0.46)	1.20 (0.55)	0.76 (0.42)	2.12 (1.05)
France	3.66 (0.34)	3.61 (0.17)	5.29 (0.52)	2.26 (0.48)	2.57 (0.54)	3.04 (0.63)	2.44 (0.47)	2.22 (0.64)	3.60 (0.65)
Germany	2.38 (0.48)	2.36 (0.33)	3.81 (0.52)	2.05 (0.21)	2.00 (0.27)	3.14 (0.45)	3.03 (0.47)	3.03 (0.49)	2.97 (0.26)
Hungary	-0.49 (0.85)	-0.76 (0.6)	-0.67 (0.38)	1.82 (0.35)	1.66 (0.41)	1.73 (0.52)	-0.23 (1.21)	-0.89 (1.4)	2.36 (2.38)
Ireland	2.59 (0.29)	2.32 (0.14)	3.50 (0.72)	2.61 (0.26)	3.08 (0.46)	3.08 (0.14)	0.99 (0.73)	1.51 (0.49)	1.89 (0.67)
Netherlands	2.79 (0.25)	2.95 (0.28)	4.12 (0.41)	1.19 (0.42)	0.85 (0.39)	1.84 (0.27)	-0.76 (0.36)	-0.79 (0.18)	-0.40 (0.74)
Norway	2.81 (0.41)	2.70 (0.39)	2.89 (0.62)	0.37 (0.24)	0.56 (0.29)	0.76 (0.61)	-0.63 (0.44)	-0.20 (0.48)	0.38 (0.55)
Poland	-0.06 (0.52)	0.43 (0.36)	0.31 (0.46)	1.01 (0.45)	0.97 (0.45)	1.59 (0.44)	3.49 (1.01)	3.12 (0.56)	3.55 (0.5)
Portugal	0.18 (0.97)	0.37 (0.4)	0.74 (0.53)	-0.22 (0.67)	0.36 (0.3)	0.19 (0.62)	0.77 (1.32)	1.07 (1.74)	0.93 (1.9)
Spain	2.47 (0.53)	2.39 (0.47)	2.86 (0.83)	1.88 (0.78)	1.77 (0.8)	1.36 (1.13)	2.29 (0.49)	2.32 (0.29)	3.15 (0.33)
Sweden	3.84 (0.37)	3.96 (0.41)	4.78 (0.5)	1.07 (0.08)	0.87 (0.15)	1.20 (0.14)	0.07 (0.1)	0.67 (0.37)	0.20 (0.67)
Switzerland	3.66 (0.51)	4.31 (0.25)	5.52 (0.49)	0.33 (0.73)	0.62 (0.72)	1.45 (1.05)	3.89 (1.61)	3.52 (1.72)	4.87 (2.63)
UK	2.12 (0.76)	2.19 (0.89)	3.23 (0.56)	2.76 (0.55)	2.55 (0.74)	3.99 (0.66)	2.43 (0.93)	1.49 (0.7)	3.11 (0.48)
US	7.07 (0.78)	6.91 (0.75)	8.42 (1.09)	3.07 (0.54)	2.48 (0.47)	4.71 (0.32)	4.74 (0.9)	4.86 (0.84)	5.78 (1.17)

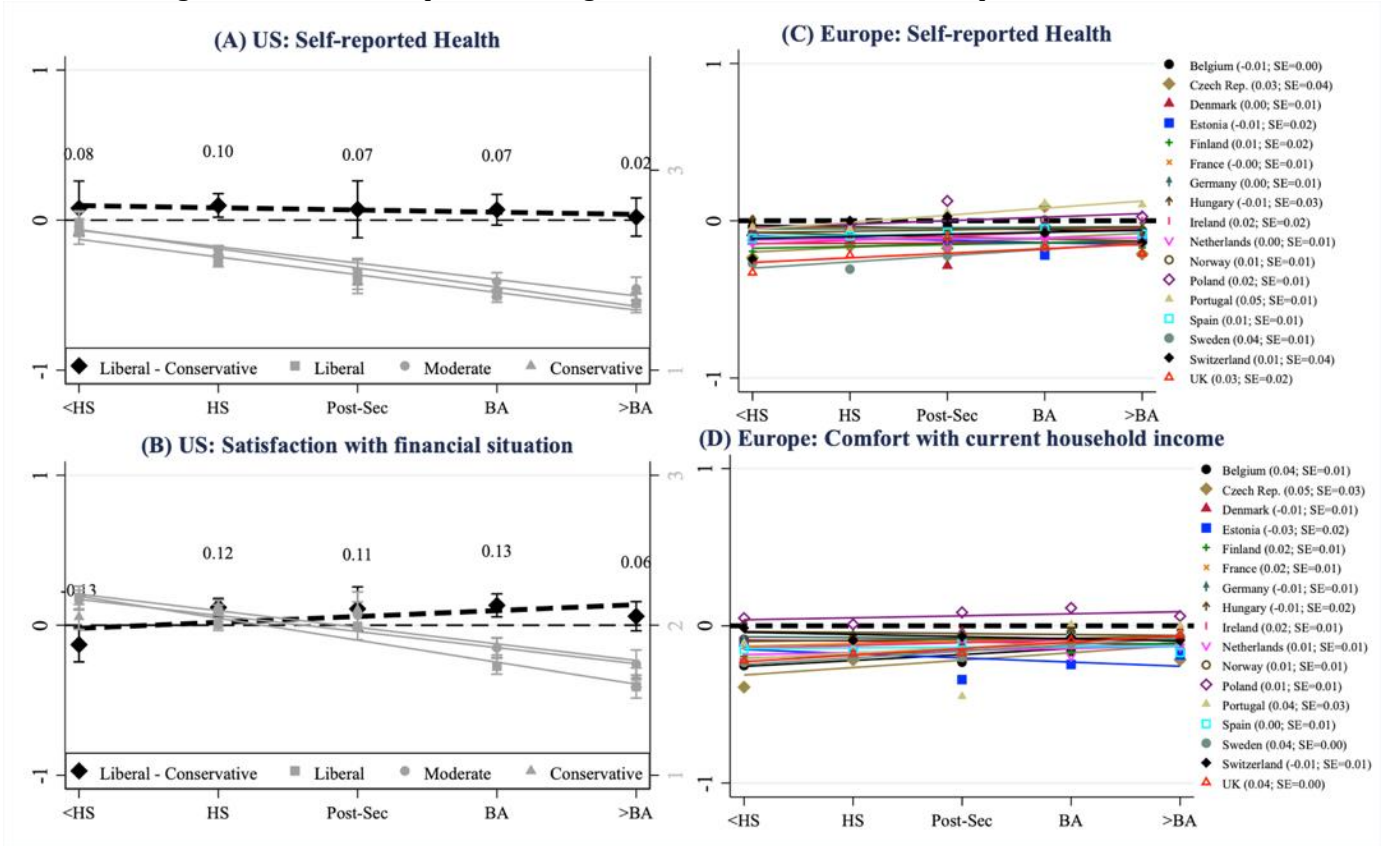
Notes: In columns (1), (4), (7), additional controls for household income are included (income categories for the US, income deciles for European countries). In columns (2), (5), (8), additional controls for father's education are included (measured in the same way as respondent's education). In columns (3), (6), (9), a different classification for political ideology is used. See main text for details. Standard errors in parentheses.

Figure C1: Education-polarization gradients using alternative statements to measure attitudes



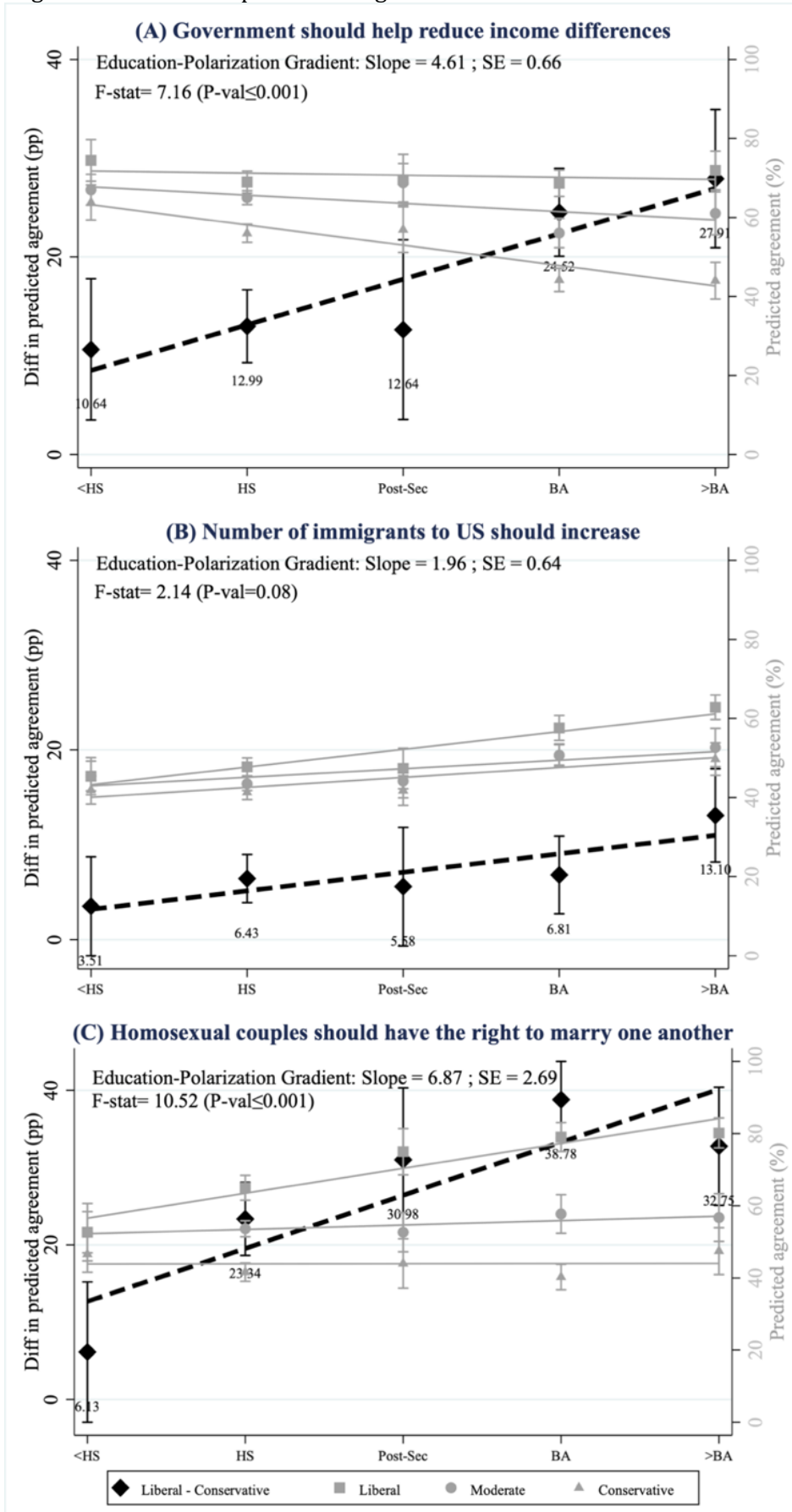
Notes: See Appendix A for alternative statements used in the GSS and ESS.

Figure C2: Education-polarization gradients for attitudes towards placebo statements



Notes: Estimated education-polarization gradients for subjective non-policy-related questions (placebos). In the US, self-reported health is measured on a 1-4 scale and satisfaction with financial situation is measured on a 1-3 scale. In the ESS, self-reported health is measured on a 1-5 scale and satisfaction with financial situation is measured on a 1-4 scale.

Figure C3: Education-polarization gradients in the US between 2004-2008



Notes: Estimated education-polarization gradients for the US between 2004-2008. Each panel plots predicted agreement with a particular statement (right y-axis) for liberals, moderates, and conservatives at five education levels. The black diamond markers (left y-axis) show the percentage-point difference in predicted attitudes between liberals and conservatives at each education level.

D. Mechanisms Appendix

Figure D1: Relationship between mechanisms and educational attainment in the US

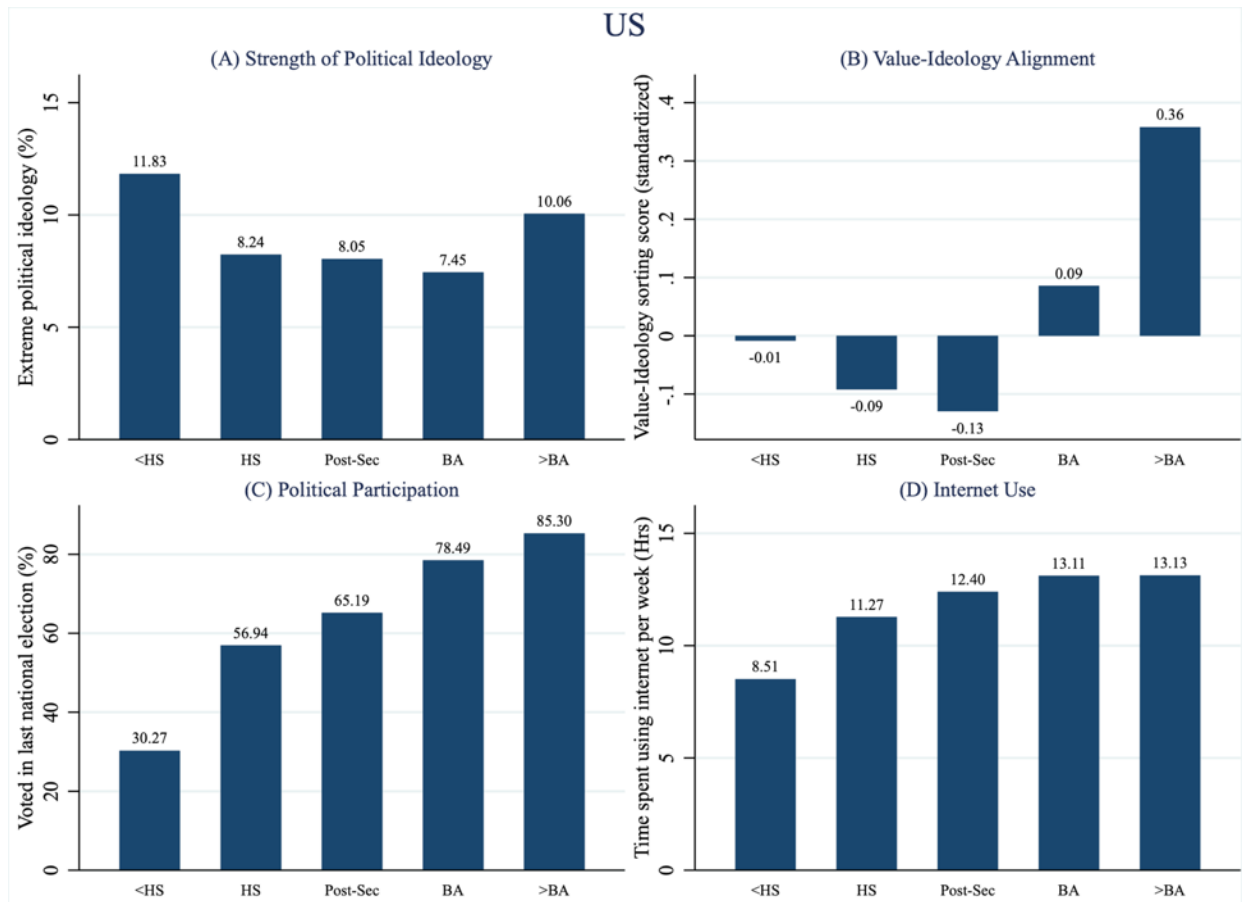


Table D1: Description of relationships between mechanisms and educational attainment for countries in Europe

	(1)	(2)	(3)	(4)	(5)
	Strength of pol ideology	Value-ideology sorting	Political participation	Internet use	Notes
Belgium	Unclear	U-shaped	Increasing*	Increasing	
Czech Republic	U-shaped	U-shaped	Increasing	Unclear	
Denmark	U-shaped*	Unclear	Increasing	U-shaped	*Inverse U-shaped
Estonia	Decreasing	Unclear	Increasing	U-shaped	
Finland	Decreasing	U-shaped	Increasing	U-shaped	
France	Decreasing	U-shaped	Increasing*	Increasing	*Non-monotonic
Germany	Decreasing	U-shaped	Increasing	Decreasing	
Hungary	Unclear	U-shaped	Increasing	Increasing*	*Non-monotonic
Ireland	Decreasing*	U-shaped	Flat	Increasing	*Non-monotonic
Netherlands	Decreasing*	Increasing	Increasing	Increasing	*Non-monotonic
Norway	Decreasing*	U-shaped	Increasing	U-shaped	
Poland	Decreasing*	Unclear	Increasing*	Increasing*	*Non-monotonic
Portugal	U-shaped	Unclear	Increasing*	Increasing*	*Non-monotonic
Spain	Decreasing*	Increasing	Increasing	Increasing*	*Non-monotonic
Sweden	Decreasing	U-shaped	Increasing	Increasing*	*Non-monotonic
Switzerland	Decreasing*	Increasing	Increasing	Increasing*	*Non-monotonic
UK	Decreasing	Increasing	Increasing	Increasing*	*Non-monotonic

Notes: Descriptive relationship between mechanisms and educational attainment in European countries.

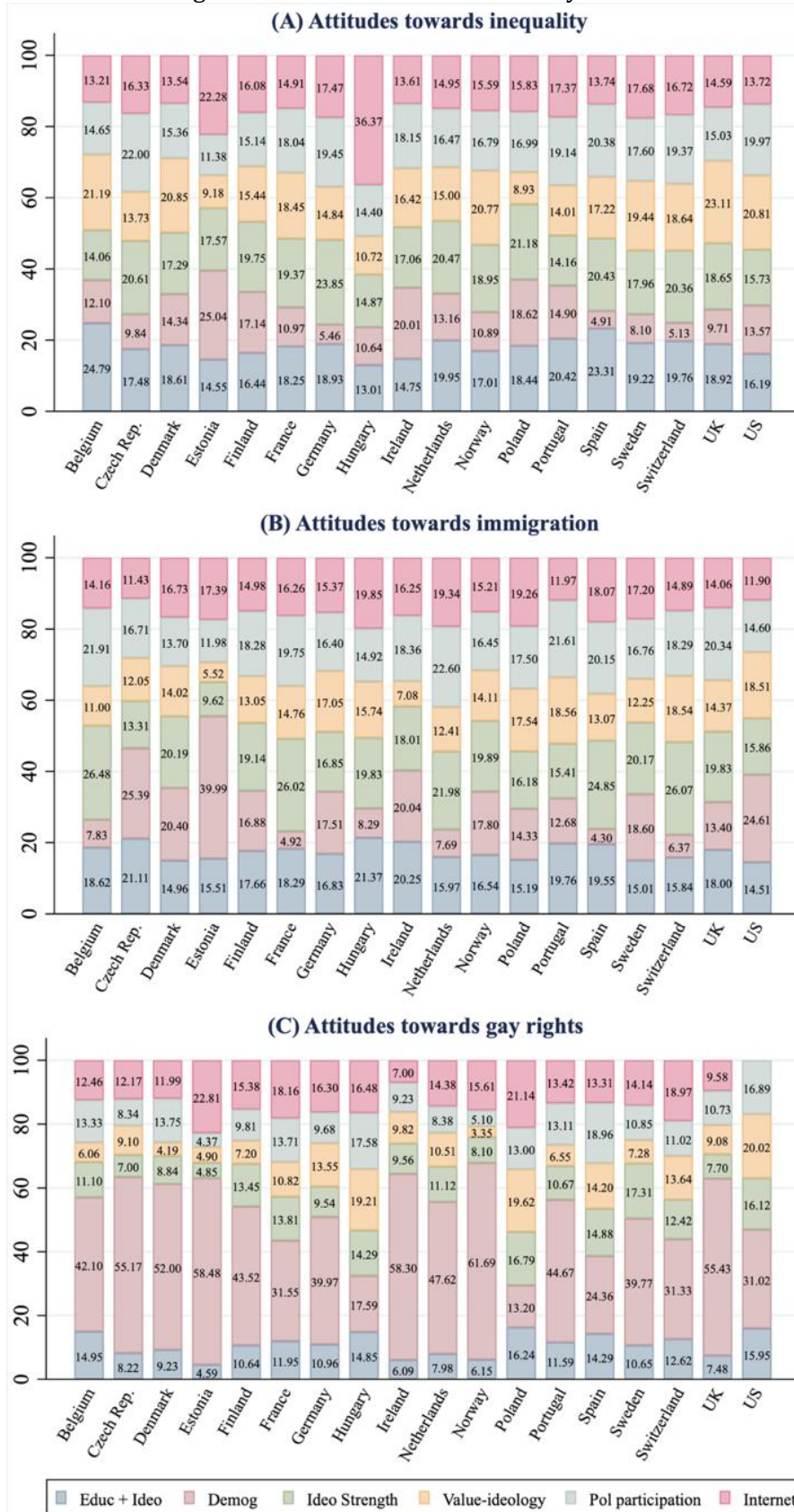
Table D2: Education-polarization gradients with controls for mechanisms

Country	Inequality				Immigration				Gay Rights			
	(1) Strength	(2) Values	(3) Participation	(4) Internet	(5) Strength	(6) Values	(7) Participation	(8) Internet	(9) Strength	(10) Values	(11) Participation	(12) Internet
Belgium	4.04 (0.97)	2.80 (0.96)	4.20 (1.26)	3.16 (0.86)	2.18 (0.48)	2.29 (0.52)	1.42 (0.5)	2.15 (0.48)	2.93 (0.71)	3.11 (0.68)	4.02 (0.91)	2.72 (0.93)
Czech Rep	1.39 (0.16)	1.76 (0.09)	1.07 (0.27)	1.78 (0.18)	0.86 (1.38)	0.79 (1.36)	0.57 (1.46)	0.80 (1.4)	0.88 (0.19)	0.96 (0.22)	1.50 (1.32)	1.27 (0.13)
Denmark	4.31 (0.71)	4.18 (0.77)	4.26 (1.16)	4.04 (0.58)	0.95 (0.31)	0.97 (0.33)	-0.01 (0.5)	1.16 (0.41)	0.64 (0.96)	0.81 (1.06)	0.02 (0.76)	0.53 (0.9)
Estonia	1.85 (0.47)	1.12 (0.47)	1.41 (0.87)	1.83 (0.58)	0.13 (0.37)	0.08 (0.37)	0.19 (0.61)	0.18 (0.35)	0.19 (0.28)	-0.03 (0.19)	0.09 (0.24)	0.11 (0.45)
Finland	3.15 (0.49)	2.56 (0.42)	2.83 (0.52)	2.30 (0.54)	1.73 (0.68)	1.80 (0.72)	0.86 (0.39)	1.83 (0.7)	1.10 (0.44)	1.29 (0.43)	0.43 (0.23)	1.25 (0.43)
France	3.81 (0.26)	3.03 (0.23)	3.90 (0.35)	3.05 (0.18)	2.28 (0.55)	2.66 (0.53)	2.13 (0.11)	2.40 (0.63)	2.31 (0.54)	2.81 (0.63)	2.98 (0.91)	2.39 (0.55)
Germany	2.55 (0.37)	1.84 (0.32)	2.49 (0.26)	2.80 (0.39)	1.90 (0.31)	2.03 (0.31)	1.60 (0.73)	1.79 (0.28)	2.87 (0.38)	3.16 (0.51)	3.57 (0.52)	2.68 (0.37)
Hungary	-0.23 (0.39)	-0.57 (0.31)	-0.72 (0.6)	-0.48 (0.47)	1.88 (0.34)	1.75 (0.35)	2.30 (0.47)	2.03 (0.38)	-1.04 (0.91)	-0.62 (1.25)	-2.12 (1.58)	-1.01 (0.86)
Ireland	2.24 (0.19)	1.92 (0.2)	2.08 (0.29)	0.58 (0.27)	3.12 (0.49)	3.11 (0.51)	3.17 (0.78)	2.95 (0.43)	1.56 (0.42)	1.71 (0.4)	1.73 (0.52)	1.77 (0.35)
Netherlands	3.31 (0.25)	2.27 (0.34)	2.85 (0.28)	3.31 (0.25)	1.01 (0.36)	1.17 (0.43)	0.87 (0.87)	0.97 (0.42)	-0.60 (0.28)	-0.43 (0.27)	-0.35 (1.11)	-1.13 (0.29)
Norway	3.16 (0.32)	3.29 (0.29)	2.66 (0.19)	2.22 (0.4)	0.38 (0.24)	0.70 (0.24)	0.54 (0.26)	0.42 (0.2)	-0.30 (0.38)	-0.07 (0.33)	-0.29 (0.17)	-0.97 (0.47)
Poland	0.29 (0.37)	0.98 (0.35)	0.15 (0.54)	-0.83 (0.3)	1.03 (0.49)	1.11 (0.47)	1.19 (0.74)	1.00 (0.48)	3.19 (0.32)	3.23 (0.35)	2.72 (0.71)	3.06 (0.43)
Portugal	0.48 (0.36)	0.40 (0.34)	0.50 (0.32)	0.10 (0.34)	0.26 (0.36)	0.26 (0.35)	0.35 (0.53)	0.30 (0.39)	1.47 (1.32)	1.69 (1.05)	2.47 (1.07)	1.74 (1.68)
Spain	2.49 (0.52)	2.06 (0.53)	2.52 (0.56)	2.89 (0.6)	1.71 (0.77)	1.89 (0.77)	1.65 (0.83)	1.78 (0.76)	2.51 (0.17)	2.73 (0.17)	2.87 (0.11)	2.90 (0.17)
Sweden	4.00 (0.34)	3.64 (0.33)	3.84 (0.21)	3.47 (0.34)	1.01 (0.07)	1.23 (0.08)	1.52 (0.2)	1.16 (0.12)	0.18 (0.13)	0.73 (0.14)	-0.80 (1.35)	0.12 (0.22)

Switzerland	4.38 (0.19)	2.54 (0.2)	4.38 (0.47)	4.38 (0.14)	0.32 (0.76)	0.47 (0.7)	-0.59 (0.65)	0.26 (0.6)	3.04 (1.68)	3.02 (1.65)	1.42 (1.32)	2.84 (1.24)
UK	2.25 (0.71)	1.25 (0.7)	2.03 (0.8)	2.24 (0.71)	2.59 (0.55)	2.65 (0.53)	1.70 (0.68)	2.59 (0.56)	1.29 (0.88)	1.44 (0.91)	1.29 (0.93)	1.05 (0.9)
US	7.57 (0.61)	4.67 (0.63)	6.15 (0.46)	6.30 (0.45)	2.96 (0.47)	3.01 (0.51)	0.69 (1.13)	3.34 (0.55)	4.96 (0.91)	5.18 (1)	4.54 (0.59)	3.42 (0.61)

Notes: Estimated education-polarization gradients with controls for mechanisms. Standard errors in parentheses. Columns (1), (5), (9) include a binary indicator for being at extreme ends of the political ideology spectrum. Columns (2), (6), (10) include controls for the value-ideology sorting score. Columns (3), (7), (11) include controls for political participation. Columns (4), (8), (12) include controls for internet use. See Section 6 for methodology.

Figure D2: General dominance analysis results



Note: Each bar presents the percentage contribution of a set of variables (e.g. education and ideology) to the overall variation in attitudes. “Educ + Ideo” denotes education, ideology, and its interaction. “Demog” denotes the baseline covariates. “Ideo strength” is a binary indicator for extreme political ideology. “Value-ideology” is the value-ideology sorting score. “Pol participation” is a binary indicator for having voted in the last national election. “Internet” is a measure of internet use. See Section 6 of the main paper for more details.