Online Appendix for "Reacting to Neighborhood Cues? Political Sophistication Moderates the Effect of Exposure to Immigrants"

Table of Content

Section 1: Overview of survey material  2
Section 2: Comparing responders and non-responders  3
Section 3: Measures  4
Section 4: Is political sophistication time-invariant?  6
Section 5: Using alternate measures of political sophistication  7
Section 6: The potential role of income  9
Section 7: The potential role of ideology  10
List of References  12
Section 1: Overview of survey material

Table S1 shows the number of respondents who participated in the various rounds of the European Social Survey (ESS) as well as the number of respondents from each round of ESS who were invited for and participated in the second wave of the survey. Whereas all participants from ESS1 and 4 were invited for re-interview, only a random sample of ESS 2 participants were invited for re-interview (due to resource constraints).

Table S1: Number of respondents across waves and rounds

| Year               | ESS 1 | ESS 2 | ESS 3 | ESS 4 | Total |
|--------------------|-------|-------|-------|-------|-------|
| First wave of survey | 1506  | 1487  | 1505  | 1610  | 3230  |
| 2002/2003          |       |       |       |       |       |
| 2004/2005          |       |       |       |       |       |
| 2006/2007          |       |       |       |       |       |
| 2008/2009          |       |       |       |       |       |
| Second wave of survey | 1210  | 498   | 0     | 852   | 1743  |
| 2011/2012          |       |       |       |       |       |
| - Invited for re-interview | |   | |   |   |
| - (Partly) completed re-interview | 624  | 267   | 0     | 1524  | 3230  |
Section 2: Comparing responders and non-responders

Tables S2 compares respondents who participated in the second wave of the panel (responders) to respondents who participated in the first wave, but declined to participate in the second wave (non-responders). It shows that the responders are slightly better educated, more politically interested and more supportive of immigration compared to non-responders.

Table S2: Comparing responders and non-responders

| All ESS-respondents (round 1, 2 and 4) | ESS-respondents who were sampled, but did not participate in the second wave of the panel | Respondents included in the analysis |
|---------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------|
| Pro-immigration attitudes (average on the 0-10 scale) | 4.97 | 4.82 | 5.17 |
| Share of unemployed individuals | 4.7 % | 4.81 % | 1.96 % |
| Income (Danish kroner) | 151,347 | 142,919 | 182,583 |
| Education (Share who completed high school) | 42 % | 36 % | 50 % |
| Political interest | | | |
| - Not interested | 4.80 % | 5.25 % | 2.29 % |
| - Marginally | 28.06 % | 30.50 % | 23.39 % |
| - Somewhat interested | 50.08 % | 50.86 % | 50.05 % |
| - Very interested | 17.07 % | 13.38 % | 24.27 % |
| Male | 49.8 % | 49.7 % | 51.5 % |
| Age (years) | 47.8 | 47.1 | 51.1 |
| Share of non-Western immigrants | | | |
| - Within 130m | 4.48 % | 4.70 % | 4.02 % |
| - Within 1,000m | 5.54 % | 5.56 % | 5.99 % |
| - Within 2,000m | 5.76 % | 5.66 % | 6.49 % |

Note: To enable comparison, the reported values are based on the answers reported in the first wave of the panel.
Moreover, parallel to the analysis, the comparison is based on individuals of Danish origin.
Section 3: Measures

Immigration attitudes
See description in the article.

Political sophistication
Political sophistication is measured with a scale based on the following items/sub-scales:
1. How often would you say you discuss politics and current affairs? 1 "Every day"; 2 "Several times a week"; 3 "Once a week"; 4 "Several times a month"; 5 "Once a month"; 6 "Less often"; 7 "Never" (answer categories were reversed in the analysis).
2. How often do you follow politics via television, radio, newspapers or the internet? 1 "Never"; 2 "Less than once a month"; 3 "Once a month"; 4 "Several times a month"; 5 "Once a week"; 6 "Several times a week"; 7 "Every day".
3. A political knowledge sub-scale measured using a scale for whether the respondent answered each of the following questions correctly: (a) the number of individuals in the Danish parliament, excluding the representatives from Greenland and the Faroe Islands; (b) the parties represented in the current government coalition; (c) whether the "Danish Social-Liberal Party" is hostile towards immigrants and refugees; and (d) whether the Danish party "Liberal Alliance" is hostile towards tax cuts. The scale displays reasonable internal consistency (alpha=0.61; principal component factor analysis based on polychoric correlations supports that the items load on one factor).

Both items and the political knowledge sub-scale were rescaled to a 0-10 point scale before they were added together to create a scale, which was then rescaled to 0-10 (alpha=0.62; a principal component factor analysis based on polychoric correlations sustains that the items load on one factor).

While some scholars advocate using merely political knowledge to measure political sophistication (Rhee & Cappella 1997), we follow the approach of others (Fiske, Lau, and Smith 1990; Kumlin 2002; Lau and Redlawsk 2001) and complement the knowledge items with behavioral questions that are also considered to reflect individuals' ability to comfortably navigate in and engage with the political world. Hence, we obtain a more comprehensive measure that better discriminates respondents' level of political sophistication. Though left-skewed, the sample distribution contains both very low and very high values and has a mean value of 7.23 (std. dev. = 2.01).

Neighborhood exposure to ethnic minorities
This measure is described in detail in the article. Following Statistics Denmark, our definition of immigrants and descendants includes refugees and asylum seekers with permanent residency in Denmark. Hence, throughout the paper, the term “immigrant” also refers to the latter two groups. Individuals with at least one parent who was born in Denmark and holds Danish citizenship are classified as native Danes irrespective of whether they were actually born in Denmark and/or holds Danish citizenship themselves. Individuals, who do not meet these criteria, are considered (first generation) immigrants if they were born outside Denmark and as descendants if their parents were born outside Denmark (second generation immigrants). For immigrants and descendants, the country of origin is defined as the mother’s country of birth; if the mother cannot be identified, the father’s country of birth is considered to be the country of origin. If neither parent can be identified, the country of origin is classified according to the immigrant’s own statements. Immigrants and descendants are considered non-Western if they do not originate from the EU-15, Iceland, Norway, Switzerland, the European micro-states, the United States of America, Canada, Australia, or New Zealand.

Additional variables
Details on the control variable are found in Table S3, below.
Table S3: Details on control variables

| Variable                      | Description                                                                                                                                 |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| **Individual characteristics**|                                                                                                                                             |
| Personal income              | Disposable yearly income measured in DKK millions (adjusted to the value in year 2000).                                                   |
| Unemployment                  | The respondents are considered unemployed if they have received unemployment benefits more than 50 % of the calendar year of the survey. |
| **Contextual characteristics (all measured in the area within which share of immigrants is also measured)** |                                                                                                                                             |
| Population                    | The number of individuals living within each respondent’s proximate neighborhood. Measured in thousands.                                     |
| Educational level             | The percentage of individuals within the neighborhood who have completed high school.                                                        |
| Income level                  | Mean disposable yearly income measured in DKK millions (adjusted to the value in year 2000) within the neighborhood.                        |
| Unemployment rate             | The percentage of individuals within the neighborhood who have received unemployment benefits more than 50 percent of the calendar year of the survey. |
| Single-parent households      | The percentage of individuals within the neighborhood who live in single-parent households.                                              |

Note: All contextual variables as well as respondents’ income and employment status are measured using data from Statistics Denmark.
Section 4: Is political sophistication time-invariant?

Central for our analyses is the assumption that political sophistication is time-invariant. First, due to data limitations (questions about sophistication were not asked in the first wave of the survey), we had to rely on a measure of political sophistication that is based on questions asked in the second wave of the survey. Measuring sophistication in the second wave could be problematic if political sophistication is not time-invariant because the theoretical argument stipulates that people react differently to changes in their context depending on their level of sophistication. If, on the other hand, sophistication is time-invariant the measure is a perfect proxy for our theoretical variable. Second, and relatedly, if sophistication is not time-invariant it may change as a result of changes in people’s context or changes in immigration attitudes, which would introduce post treatment bias or endogeneity bias to the estimate of the context effect. Again, time-invariance would eliminate this concern. Third, time-invariance would also imply that selection into political sophistication is unlikely. If political sophistication is a durable trait, it is not affected by unobserved time-variant characteristics. This would imply that bias due to unobserved characteristics affecting both sophistication and immigration attitudes is limited.

The assumption that political sophistication is time-invariant is supported by longitudinal studies concluding that political knowledge—along with related features such as political interest—is to a large extent time-invariant at least from when individuals enter adulthood (Jennings 1996; Prior 2010; Zaller 1992, 22). Thus, Jennings concludes that “factual knowledge (therefore) follows well-established patterns of solidification and crystallization in young adulthood,” and though finding modest changes over the course of 32 years, Highton (2009, 1573) concludes that the most important factors for political sophistication are cognitive ability, parental characteristics, and pre-adult political engagement. Moreover, evidence suggesting a strong relationship between political sophistication and personality (Gerber et al. 2011; Mondak and Halperin 2008) provides further reason for assuming that political sophistication as stable.

Ideally we could also investigate this question with the data employed in our analyses. Since the items included in the political sophistication index were unfortunately only part of the second wave of the survey, we are unable to assess the over-time stability of the relevant political sophistication measures. However, as a second best option, we investigated the related aspect of political interest, which was measured for all respondents in both rounds of the panel. This variable was measured by an item asking respondents “How interested would you say you are in politics? Are you (a) very interested; (b) quite interested; (c) hardly interested; (d) not at all interested?” As expected, political interest is found to be quite stable over time: The intraclass correlation coefficient is 0.64 (p<0.001), which is relatively high given the coarseness of the measure and other potential errors of measurement. This auxiliary analysis of the related phenomenon of political interest thus provides at least an indication that the assumption about the time-invariance of political sophistication is reasonable.

Additionally, we tested whether the changes that do occur in political interest are related to changes in immigration attitudes or changes in the ethnic composition of the neighborhood. We found no indication that changes in immigration attitudes correlates with changes in political interest (b=.003; se=.010), and while there is a slight tendency for increasing shares of ethnic minorities to generate less political interest, the effect is not significant at conventional levels (b=.010; se=.006; p=.117).

In sum, the existing empirical literature and analyses on our own data indicates that the assumption about time-invariance of political sophistication is to a large extent plausible.

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1 The correlation between political interest and political sophistication in the second wave is .68.
Section 5: Using alternate measures of political sophistication

To assess whether the results are sensitive to the particular operationalization of political sophistication, we carry out the analysis using two alternative measures, namely educational level (completion of high school and/or higher education versus less education) and political interest (cf. Section 4). Using these two measures also allows for measuring sophistication in the first wave of the survey, so this robustness analysis also serves to check if the results are robust when including initial levels of sophistication (which is the theoretical construct) rather than subsequent levels of sophistication (cf. the discussion in the measurement section of the article).

Educational level is measured using a dummy variable denoting whether the respondents have completed high school and/or higher education, which is based on self-reported measures of educational level from the first round of the panel.

Political interest is measured using the following question: "How interested would you say you are in politics? Are you (a) very interested; (b) quite interested; (c) hardly interested; (d) not at all interested?". The measure is dichotomized (“Not at all interested”/”hardly interested” = 0; “Quite interested”/”Very interested” = 1) because only very few individuals respond “Not at all interested.”.

Previous studies consider education a useful proxy for political sophistication (Petersen and Aarøe 2013; Sniderman, Brody, and Tetlock 1991), and the results with the education measure reported in Table S4, Model 1 strongly parallel the findings obtained in the primary analysis using the political sophistication scale: While no effect of exposure to non-Western immigrants is identified among individuals with a high-school degree and/or higher education, exposure is significantly related to pro-immigration attitudes among individuals with less than a high school degree.

Using political interest as a proxy of political sophistication gives parallel results: Exposure to non-Western immigrants generates pro-immigration attitudes among individuals with low political interest, while we identify no effect among individuals with high political interest. As would be expected when using a second best measure, the effects based on political interest are less robust (specifically, the level of significance is more sensitive to changes in the context specification), but the general pattern corresponds to the analyses based on the political sophistication measure. Altogether, these robustness tests indicate that the findings are not sensitive to the particular operationalization of political sophistication, and thus additionally strengthen our confidence in the robustness of the results.
| Model                  | (1)            | (2)            |
|------------------------|----------------|----------------|
| Radius (meters)        | 130            | 130            |
| b                      |                |                |
| (SE)                   |                |                |
| Percentage of non-Western immigrants | 0.067* (0.028) | 0.071* (0.032) |
| Percentage of non-Western immigrants X education dummy (level) | -0.098** (0.038) |                |
| Percentage of non-Western immigrants X political interest dummy (level) |                | -0.071# (0.039) |

**Individual-level controls**

|                        |                |                |
|------------------------|----------------|----------------|
| Personal income (million DKK) | -0.133 (0.184) | -0.178 (0.181) |
| Personal unemployment  | -0.380 (0.286) | -0.378 (0.284) |

**Context controls**

|                        |                |                |
|------------------------|----------------|----------------|
| Population (thousands) | -2.251 (3.164) | -3.519 (3.126) |
| Average income (million DKK) | -6.774* (2.696) | -6.783* (2.699) |
| Unemployment rate      | -0.003 (0.019) | -0.003 (0.019) |
| Educational level      | 0.011 (0.016)  | 0.017 (0.016)  |
| Percentage of single parent households | -0.007 (0.019) | -0.007 (0.019) |
| Constant               | 0.276# (0.151) | 0.263# (0.152) |

Round dummies                         Yes               Yes

N                                    918               919

Regression coefficients (based on the first difference estimator) with robust standard errors in parentheses. Using a continuous measure of education (respondents self-reported number of years of education/schooling) gives substantively similar results.

# p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001 (two sided tests).
Section 6: The potential role of income

Table S5 shows the regression estimates of the robustness test examining whether the relationship between political sophistication, exposure, and immigration attitudes is moderated by individuals’ personal income. If self-selection drives the results regarding the interaction between exposure to non-Western immigrants and political sophistication reported in Table 1 of the article, the effect of exposure to non-Western immigrants on immigration attitudes would presumably be more negative for individuals who are financially restrained. The rationale is, that more financially constrained individuals, who are presumably less economically capable of moving, are less likely to self-select out of a neighborhood if they are unhappy with increasing shares of non-Western immigrants. However, three-way interaction analyses (with income level as the third term in the interaction) do not indicate such differential effects depending on individuals’ financial situation.

Table S5: Including the interaction with personal income in the model

| Model | (1) |  |
|-------|-----|---|
| Radius (meters) | 130 | b (SE) |
| Percentage of non-Western immigrants | 0.284* (0.121) |  |
| Percentage of non-Western immigrants X political sophistication (level) | -0.034** (0.013) |  |
| Percentage of non-Western immigrants X political income (level) | -0.941 (0.878) |  |
| Percentage of non-Western immigrants X political sophistication (level) X political income (level) | 0.104 (0.094) |  |

*individual-level controls

| Personal income (million DKK) | -0.241 (0.410) |  |
| Personal unemployment | -0.389 (0.286) |  |

*context controls

| Population (thousands) | -8.160 (3.108) |  |
| Average income (million DKK) | -6.706* (2.744) |  |
| Unemployment rate | -0.004 (0.019) |  |
| Educational level | 0.016 (0.016) |  |
| Percentage of single parent households | -0.008 (0.019) |  |
| Constant | 0.275# (0.152) |  |

Round dummies | Yes |  |
| N. | 919 |  |

Regression coefficients (based on the first difference estimator) with robust standard errors in parentheses. The measure of personal income is the mean value of the respondent’s personal income at the time of the first round of survey and at the time of the second round of survey. 

# p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001 (two sided tests).
Section 7: The potential role of ideology

Corresponding to arguments within the symbolic politics and motivated reasoning literatures, much research document, that individuals’ political orientations and behaviors are in many ways affected by predispositions of which individuals’ ideological standpoint is an important conceptualization (Hawley 2011; Karreth, Singh, and Stojek 2015; Sears, Hensler, and Speer 1979; Sears et al. 1980; Taber and Lodge 2006). Thus, an important concern regards whether ideology confounds and/or moderates the relationship between sophistication, exposure and attitudes. To examine this possibility, we carried out several auxiliary analyses. First, since ideology may affect individuals’ news consumption and media sources, one aspect concerns whether differences in political sophistication in reality reflect differences in information sources resulting from different ideologies. To examine this, we reran the analyses with an interaction term between ‘ideology’ and ‘share of non-Western immigrants’ instead of the interaction between political sophistication and share of non-Western immigrants.² As shown in Table S6, Model S1, the coefficient for this interaction term is insignificant (p=0.33), which ascertains that the significant moderating effect of political sophistication does not reflect ideological differences.

Second, to test whether individuals’ ideological position structures the moderating effect of political sophistication, we performed three-way interaction analyses term (with ‘Ideology’ as the third term in the interaction). The three-way interaction term is insignificant (p=0.40; see Table S6, Model S2), and thus the analysis does not indicate that ideological position structures the moderating effect of political sophistication. Finally, we considered the possibility that ideology affects immigration attitudes (which may then confound the results of interest). Assuming that ideology is time-invariant (an assumption adopted in many studies that explicitly concern the effects of individuals’ ideology (e.g., Hawley 2011; Karreth, Singh, and Stojek 2015), ideology is controlled for by the first difference estimator: Since it does not change over time, the first difference estimator partials out the variable. However, in order to allow for the opportunity that ideology is not stable, we reran the analyses controlling for changes in ideology. The coefficient for the sophistication by context-interaction term is virtually unchanged (−0.0195 vs. −0.0209), and although it is estimated somewhat less precisely, the interaction term is still significant at the .10-level (p=.058) in a two-sided test. Given the insensitivity of the interaction term to controlling for political ideology, we feel more confident that this variable does not confound political sophistication and its interaction with residential choice.

² As a measure of ideology, we used the following item from the first round of survey: “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?” (direction was reversed in the analyses).
Table S6: Including ideology in the model

| Model | (1) | (2) | (3) |
|-------|-----|-----|-----|
| Radius | 130 | 130 | 130 |
| % non-Western immigrants | 0.051 (0.047) | 0.349* (0.175) | 0.147# (0.077) |
| X ideology (level) | -0.009 (0.010) | -0.040 (0.036) | \[0.004 (0.005)\] |
| % non-Western immigrants X ideology (level) | -0.040# (0.022) | -0.020# (0.010) | \[0.004 (0.005)\] |
| % non-Western immigrants X political sophistication (level) | -0.004 (0.018) | -0.007 (0.019) | -0.006 (0.019) |
| % non-Western immigrants X political sophistication (level) X ideology (level) | 0.004 (0.005) | 0.008 (0.006) | \[0.004 (0.005)\] |
| Ideology (change) | 0.031 (0.037) | 0.031 (0.037) | \[0.031 (0.037)\] |

**Individual-level controls**

| | (1) | (2) | (3) |
|-----------------|-----|-----|-----|
| Personal income (million DKK) | -0.199 (0.177) | -0.140 (0.189) | -0.173 (0.191) |
| Personal unemployment | -0.400 (0.299) | -0.421 (0.500) | -0.441 (0.299) |

**Context controls**

| | (1) | (2) | (3) |
|-----------------|-----|-----|-----|
| Population (thousands) | -2.922 (3.164) | -2.835 (3.171) | -3.946 (3.083) |
| Average income (million DKK) | -6.576* (2.664) | -6.634* (2.681) | -5.911* (2.620) |
| Unemployment rate | 0.002 (0.018) | 0.003 (0.018) | 0.004 (0.019) |
| Educational level | 0.011 (0.016) | 0.012 (0.016) | 0.010 (0.016) |
| Percentage of single parent households | -0.004 (0.018) | -0.007 (0.019) | -0.006 (0.019) |
| Constant | 0.258# (0.153) | 0.270# (0.154) | 0.229 (0.150) |

Round dummies | Yes | Yes | Yes |
N | 893 | 893 | 872 |

Regression coefficients (based on the first difference estimator) with robust standard errors in parentheses.

# p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001 (two sided tests).
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