Sociology Faculty Publications   Sociology

6-2013

Too Many Immigrants?: Examining Alternative Forms of Immigrant Population Innumeracy

Daniel Herda
Merrimack College, herdad@merrimack.edu

TOO MANY IMMIGRANTS? EXAMINING ALTERNATIVE FORMS OF IMMIGRANT POPULATION INNUMERACY

DANIEL HERDA
University of California, Davis

ABSTRACT: *The tendency to overestimate immigrant population sizes has garnered considerable scholarly attention for its potential link to anti-immigrant policy support. However, this existing innumeracy research has neglected other forms of ignorance, namely underestimation and nonresponse. Using the 2002 European Social Survey, the current study examines the full scope of innumeracy for the first time. Results indicate that underestimation and nonresponse occur commonly across twenty-one countries and that overestimation is far from ubiquitous. Nonresponders in particular are found to represent a distinct innumeracy form associated with low cognitive availability and high negative affect. Multilevel models indicate that underestimation associates with greater opposition to anti-immigrant policy, while overestimation and nonresponse associate with greater support. Much of these associations are explained by affective factors. However, significant under- and overestimation coefficients remain net of controls, suggesting that innumeracy may be more important than initially thought. Overall, the results highlight the multifaceted character of innumeracy.*
Keywords: innumeracy, immigrants, anti-immigrant policy, heuristics, intergroup conflict, attitudes

In many countries the issues of immigration and immigrants' rights are emotionally charged and controversial (Pettigrew 1998a; Semyonov, Raijman, and Gorodzeisky 2006; Winant 2001). Legislation like Arizona's SB 1070, the vigilante groups guarding the U.S.-Mexico border, electoral successes of anti-immigrant political parties, and incidents of violence all highlight the desire of many to exclude or restrict the rights of immigrants (Koopmans and Olzak 2004; Legge 2003; Strabac and Listhaug 2007). But how can we account for these desires?

Recent scholars have found a possible explanation in the inability of many to estimate immigrant population sizes with accuracy, a phenomenon known as innumeracy (Alba, Rumbaut, and Marotz 2005; Citrin and Sides 2008; Nadeau, Niemi,

and Levine 1991; Paulos 1988; Sigelman and Niemi 2001). Several researchers have found positive associations between inflated perceptions and anti-immigrant policy support (Alba et al. 2005; Hjerm 2007; Semyonov, Raijman, and Gorodzeisky 2008; Semyonov, Raijman, Tov, and Schmidt 2004; Sides and Citrin 2007). The general logic holds that overestimation reflects a heightened level of perceived threat from immigrants, which generates a push for exclusion among the native-born population. These feelings of threat are unfounded given that immigrants are not as numerous as perceived. Thus, reducing innumeracy may be an effective way to promote the acceptance of foreigners (Alba et al. 2005; Nadeau et al. 1991; Sides and Citrin 2007; Sigelman and Niemi 2001).

While informative, this literature overlooks the fact that overestimation is not the only form of innumeracy. Individuals can also underestimate the immigrant population size or not know and fail to provide an estimate. These omitted forms of ignorance have potential implications for anti-immigrant policy positions, but have never been analyzed. They also suggest that innumeracy may be more nuanced and multifaceted than portrayed in the existing literature. An understanding of the full scope of innumeracy is necessary before we can establish firmly a connection with anti-immigrant positions. Thus, the current analysis considers three research questions: (1) What is the extent of underestimation and innumeracy nonresponse? (2) What factors distinguish underestimators and non-responders from overestimators? And (3) are these alternative innumeracy forms associated with support for anti-immigrant policies?

Using data from the 2002 European Social Survey (ESS), I consider innumeracy beyond overestimation. First, I offer an alternative descriptive analysis showing that the phenomenon is far more nuanced than presented in the existing literature. Then, through bivariate analyses and multinomial logistic regression, I characterize the various types of innumeracy with a focus on Herda's (2010) hypothesized cognitive and emotional innumeracy predictors. In the process I strengthen his theoretical framework through the integration of heuristic decision-making. Finally, using multilevel regression, I examine the associations between the various innumeracy forms and two hypothetical anti-immigrant policy positions.

OUT-GROUP SIZE AND NEGATIVE ATTITUDES

Researchers have long considered the true out-group population size to be a source of negative sentiment, which can generate support for anti-immigrant policies (Blalock 1967; Key 1949; Quillian 1995; Taylor 1998). A relatively large out-group is thought to increase interethnic competition for resources. This competition fuels prejudice and antagonism especially when resources are scarce (Blalock 1967). The process is understood as part of the group threat framework, which views a minority presence as threatening to dominant group control over societal resources (Blumer 1958; Bobo 1983; Bobo and Hutchings 1994; LeVine and Campbell 1972). Prejudice arises as dominant group members attempt to defend these threatened interests.

Among whites in the United States, studies have confirmed that a large proximate African-American population is associated with more negative racial attitudes and less support for policies designed to help minorities (Fossett and

Kiecolt 1989; Giles 1977; Glaser 1994; Quillian 1996; Taylor 1998). Similarly, among a representative sample of Europeans, Quillian (1995) found a positive association between minority population size and prejudice, net of intergroup contact and demographic factors. Several recent studies confirm this association with minority and immigrant populations throughout Europe (Ceobanu 2010; Kunovich 2002; Scheepers, Gijsberts, and Coenders 2002; Schneider 2008; Semyonov et al. 2008).[1]

MISPERCEPTIONS OF REALITY

However, research on innumeracy shows that American and European perceptions of out-group sizes far overestimate realities (Alba et al. 2005; Citrin and Sides 2008; Gallagher 2003; Nadeau et al. 1991; Sigelman and Niemi 2001). To illustrate, using the 2000 General Social Survey, Alba et al. (2005) found that, on average, whites perceived African-Americans as comprising 29.1 percent of the U.S. population, which was more than double the actual census figure. They also overestimated Hispanic, Asian, and Native American populations, while underestimating the white population. Europeans similarly overestimate immigrant population sizes (Citrin and Sides 2008; Herda 2010; Semyonov et al. 2008). Using data from the 2002 ESS, Herda (2010) found that on average native-born Hungarian, Italian, Polish, Portuguese, and Spanish estimates tripled the actual number of foreign-born residents within their country.

Given the aforementioned links between actual group size and racial hostility (Blalock 1967; Quillian 1995), many have hypothesized that innumeracy in the form of overestimation will associate positively with negative attitudes and support for anti-immigrant/minority policies. Early studies confirmed that more accurate knowledge was associated with reduced antiforeigner sentiment (Legge 2003; Wilson 2001). However, Alba et al. (2005) were the first to thoroughly explore this connection using several attitudes and policy preferences regarding blacks, Hispanics, and immigrants in the United States. They found that net of demographic factors, inflated size perceptions were associated with more negative attitudes, stereotypes, and support for restricting immigration.

Researchers have found similar associations in European samples. Using the 2002 ESS, Hjerm (2007), Sides and Citrin (2007), and Semyonov et al. (2008) found positive associations between innumeracy and "xenophobia," "subjective threat posed by immigrants," and "foreigners' impact on society," respectively, net individual- and country-level controls. While using different names, all three outcomes consisted of the same items measuring how foreigners impact the culture, economy, health and welfare services, crime, jobs, and the nation as a whole. Other authors have considered such items as measuring perceived threat from foreigners, which has a well-established association with anti-immigrant prejudice and policy support (Bobo 1999; Ceobanu and Escandell 2010; Green 2009; Gorodzeisky 2010; Schneider 2008; Semyonov et al. 2004; Semyonov and Glickman 2009).

Researchers have also used innumeracy to predict Europeans' support for hypothetical immigrant-related policies, including how many should be permitted in the country (Sides and Citrin 2007) and whether they should be granted political, economic, and equal rights (Semyonov et al. 2004). Using the ESS and the German General Social Survey, respectively, both studies found that innumeracy associated

positively with exclusionary policy positions net of controls. Semyonov et al. (2004) also found that the association was mediated completely after controlling for a measure of perceived threat. Although their data were cross-sectional, the authors concluded that a chain relationship exists in which all of the consequences of innumeracy work through their effects on threat perceptions, which drive exclusionism.

EXPANDING THE SCOPE OF INNUMERACY

These studies have been valuable for assessing the extent, causes, and consequence of inflated size perceptions. However, this is not the only possible form of innumeracy. For one, underestimators exhibit a distinct, negative innumeracy that is yet to be considered in detail. In order to bring underestimation into focus, the current study views an individual's level of innumeracy as the result of equation (1), which yields three meaningful outcomes:

$$Innumeracy_{ij} = Estimated\ Size_{ij} - Actual\ Size_{j}. \tag{1}$$

When subtracting the actual immigrant population size in country, j, from the size estimate of each individual, i, a score of zero suggests an exactly correct response (estimated size and actual size are equal). When the difference is greater than zero, the estimate is larger than the actual size, indicating overestimation or positive innumeracy. Alternatively, a negative difference indicates underestimation or negative innumeracy. Thus, innumeracy extends in two opposing directions. While overestimation is discussed extensively in the literature, we know considerably less about those who underestimate.

The existing literature also omits consideration of those who fail to provide an estimate. When focusing on incorrect responses to a question of fact, "I don't know" becomes a potentially meaningful result. Over- and underestimators similarly do not know the correct answer. The only difference is that some guess while others do not. In U.S. data, the percentages not providing size estimates have ranged from about 6.5 percent (Alba et al. 2005) to about 16 percent (Nadeau et al. 1991; Sigelman and Niemi 2001). In Europe, nonresponse ranges from about 6 percent to more than 40 percent (Citrin and Sides 2008). Despite this variation and the fact that nonresponse is a form of innumeracy, it has not been analyzed in detail.

The current article seeks to characterize these understudied innumeracy forms and to examine their associations with anti-immigrant policy support. Herda's (2010) theoretical framework provides a useful guide for these endeavors. He offers a set of hypothesized innumeracy antecedents that can distinguish between innumeracy types. With the goal of explaining why the phenomenon exists in the first place, Herda examined innumeracy among more than 30,000 ESS respondents in twenty-one countries. He concluded that innumeracy should be understood through two distinct sets of antecedents: cognitive and emotional. I build upon this framework by focusing on how these factors explain underestimation and innumeracy nonresponse. I then test whether these factors account for the associations between innumeracy and anti-immigrant policy leanings.

First, however, I argue that Herda's work can be strengthened theoretically through the integration of heuristic decision making. Heuristics are mental

shortcuts or rules of thumb that individuals use to make decisions, provide judgments, or solve problems (Gigerenzer and Gaissmaier 2011; Tversky and Kahneman 1974). Respondents likely employ such strategies when formulating size estimates. Since heuristics are often based on personal experience and are used to reach answers through minimal effort, they are subject to a great deal of bias (Shah and Oppenheimer 2008). I focus on the availability and affect heuristics as they correspond to Herda's (2010) cognitive and emotional factors.

Tversky and Kahneman (1973:208) introduced the *availability heuristic*, which is used whenever an individual "estimates frequency or probability by the ease in which instances or associations could be brought to mind." In other words, personal experiences regarding the problem in question are used as evidence to bring one to an answer. For example, one may overestimate the rate of divorce if one has many examples among acquaintances (Tversky and Kahneman 1973, 1974). Immigrant population size estimates are responses to a similar question of fact. Availability heuristics, which correspond to Herda's (2010) cognitive factors, include interpersonal contact and mass media exposure. These sources of evidence guide respondents in the formulation of their estimates.

In countries dominated by native-born citizens, immigrants are more noticeable to native-born respondents, making overestimation a likely byproduct of increased contact (Gustofson 2008; Herda 2010; Jackson, Thoits, and Taylor 1995; Kanter 1977). Herda found that neighborhood contact in particular associated positively with overestimation. Further, the mass media may act as an important source of information, especially for those with limited interpersonal contact. Portrayals of immigrants and messages either intended or unintended will likely help respondents formulate estimates (Downs 1957; Gallagher 2003; Zaller 1992). Herda (2010) found that overestimation was greater among television watchers, but lower among newspaper readers. The opposing effects were thought to result from varying information quality and television's passive and visual nature.

Others have identified the importance of affect for judgment and decision making (Damasio 2005 Zajonc 1980). According to Zajonc (1980), when one encounters a stimulus, an affective reaction, either positive or negative, occurs first and guides subsequent processing and judgment. This led Finucane, Alhakami, Slovic, and Johnson (2000) to introduce the *affect heuristic* as another mental shortcut driven by an individual's feelings associated with particular representations. In a manner similar to cognitive availability, affective impressions can help individuals reach decisions or judgments. Affect heuristics correspond to Herda's (2010) emotional factors. These attitudinal and ideological elements included perceived threat, traditional prejudice, and political conservatism, which associated positively with overestimation.[2]

RESEARCH QUESTIONS

Herda's hypothesized antecedents provide a useful starting point for understanding the predictors and consequences of underestimation and innumeracy nonresponse. Using them as a guide, the current study seeks to advance the existing literature through a focus on three research questions:

1.   What Is the Extent of Immigrant Population Innumeracy Across Europe?

I focus on the broad definition of innumeracy that includes overestimation, underestimation, and nonresponse. My focus on the proportions falling into each category represents a departure from previous descriptive assessments that rely on mean size estimates (Citrin and Sides 2008; Herda 2010; Semyonov et al. 2008). While these suggest that overestimation is nearly ubiquitous, such measures obscure underestimation by combining all size perceptions into a single statistic. These are also sensitive to outlying observations. Further, existing summaries ignore the extent of nonresponse, often dropping or imputing such cases (Citrin and Sides 2008; Herda 2010; Sides and Citrin 2007).

2.   What Factors Distinguish Underestimators, Nonresponders, and Correct Guessers from Overestimators?

I focus on Herda's (2010) hypothesized availability and affect heuristics, but also consider several individual- and country-level controls. Through an examination of bivariate means and multivariate multinomial logistic regression, I characterize individuals within each innumeracy category. Given the focus on overestimators in the literature, there is little with which to base expectations regarding underestimators and nonresponders. Since previous research indicates that television exposure, neighborhood contact, and negative affect predict more extreme overestimation, I expect levels of each to be highest among overestimators (Herda 2010). It is possible that since they express the smallest size perceptions, underestimators will be opposite relative to overestimators on all heuristic factors. In other words, wherever overestimators score high, underestimators will score low and vice versa. However, this remains untested. Similarly, it is unclear whether nonresponse is completely random in character or if it represents a meaningful innumeracy category.

3.   To What Degree Are the Various Forms of Innumeracy Associated with Anti-Immigrant Policy Support?

Given literature's exclusive focus on inflated size perceptions, we know little about how underestimation and nonresponse associate with anti-immigrant policy support. I test for possible connections using multilevel regression models predicting support for two hypothetical policy outcomes. In shifting innumeracy from a dependent variable to an independent variable, I advance Herda's (2010) work by assessing whether his heuristic factors can account for the observed innumeracy associations. For example, since previous research has found media exposure to be associated with prejudice and opposition to race-related policies (Coltrane and Messineo 2000; Gilliam, Valentino, and Beckmann 2002; Vergeer, Lubbers, and Scheepers 2000), it may explain innumeracy's associations. Further, in their German sample, Semyonov et al. (2004) found that affective factors accounted completely for their significant innumeracy coefficient.[3] The current study tests whether this is the case among all forms of innumeracy across multiple national contexts.

DATA

The current study examines the 2002 ESS, which combines nationally representative surveys from twenty-two nations.[4] Data collection occurred separately in each country between 2002 and 2003 utilizing similar procedures (Jowell 2005). The sampling universe consists of individuals over the age of fifteen living in private residences. Strict random probability sampling methods were employed in all countries, allowing for a nonzero chance of selection for nearly all eligible respondents (Jowell 2005). The mean response rate across countries was 60.57 percent. The final analytical sample consists of 36,615 native-born respondents in twenty-one countries. The appendix provides question wordings for all variables considered. While the ESS is cross-sectional, thereby inhibiting my ability to make causal claims, the survey is valuable for its multiple items assessing opinions about immigrants as well as a detailed assessment of perceived immigrant population size.

MEASURES

Innumeracy

Innumeracy is the variable of focus throughout the analysis. It is derived from an item asking: "Out of every 100 people living in [country], how many do you think were born outside [country]?" Respondents recorded an estimate between 0 and 100. From these I subtracted the actual immigrant population size in the respondents' country.[5] Scores ranged from –32.9 to 97.2. With both positive and negative values indicating over- and underestimation and a meaningful zero point, the continuous version is problematic. Higher scores for underestimators indicate greater accuracy, while higher scores for overestimators indicate greater innumeracy. Categorizing innumeracy based on over-, under-, and correct-estimation addresses this problem and permits consideration of the aforementioned research questions. Given that respondents are allowed to guess in whole numbers only, I define a correct guesser as having an innumeracy score between –1 and 1 percentage points. Overestimators are those who guess beyond 1 percentage point above correct, while underestimators have scores below –1. I also include a category for those not providing an answer. Slightly less than half (49.92 percent) overestimate, indicating that a plurality hold inflated immigrant population size perceptions. Underestimation is the next largest category (22.94 percent), followed by nonresponse (17.63 percent), and correct estimation (9.52 percent).

The single percentage point correctness criterion is one of many definitions of "correct" considered by the current analysis. Broader intervals such as 2 and 5 percentage points yield regression results that are largely similar to those presented (not shown but available on request). However, I present a more conservative definition of correctness to avoid reducing the number of overestimators artificially in the descriptive results and because broader intervals make underestimation impossible in countries with few immigrants. For example, in Poland where the percent immigrant was only 1.6 in 2002 (SourceOECD 2007), underestimation is impossible when defining correctness as above or below 2 percentage points.

I also considered definitions of "correct" based on the magnitude of innumeracy relative to the actual immigrant population size. For example, if one's innumeracy score was between 10 percent above or below the actual immigrant population size within their country, he or she was considered correct. I constructed similar measures using 20, 25, and 50 percent correctness intervals. This strategy results in a measure of correctness that is stricter in countries with few immigrants and wider in countries with many. The regression results using these alternative operationalizations were consistent with those presented (not shown, but available on request).

Support for Anti-Immigrant Policy

I predict support for two hypothetical anti-immigrant policies: social exclusion and willingness to deport (Gorodzeisky and Semyonov 2009). The former combines four items measuring how many immigrants ought to be allowed in the country. These include (1) immigrants of a different race than the majority, (2) immigrants of the same race as the majority, (3) immigrants from poor European countries, and (4) immigrants from poor non-European countries. All are measured on 4-point scales ranging from "allow many" to "allow none." Deportation combines two items asking about the circumstances under which immigrants should be expelled. These include (1) unemployment and (2) after committing criminal acts. The items are measured on 5-point scales ranging from "disagree strongly" to "agree strongly." I combined these items into mean scales in which higher scores indicate greater support for anti-immigrant policy.[6] The scales represent hypothetical yet potentially realistic national policies in the countries considered.

I present weighted confidence intervals for both scales within each country in Figure 1. The vertical broken lines represent the full sample means of 1.45 for social exclusion and 3.29 for willingness to deport. The outcomes have standard deviations of .82 and 1.11, respectively, across the full sample. On average, Swedish respondents express the lowest levels of both outcomes, while Greeks and Hungarians exhibit the highest.

Availability and Affect Heuristic Sources

I use availability and affect heuristics to understand innumeracy and explain its associations with anti-immigrant policy support. Availability heuristics constitute the information respondents use to reach an estimate. One source, immigrant contact, is measured with three dichotomous variables indicating whether the respondent has immigrant friends, neighbors, or coworkers. All are coded as 1 for some/many and 0 otherwise. The second source, media exposure, includes four items measuring time spent watching television, reading political newspapers, listening to political radio, and using the internet. Responses range from 0 to 7 on the three former items, with 0 indicating no time and 7 indicating over three hours. Internet use ranges from 0, indicating no use, to 6, indicating daily use. Table 1 presents weighted means and standard deviations for all independent variables used in the analysis.
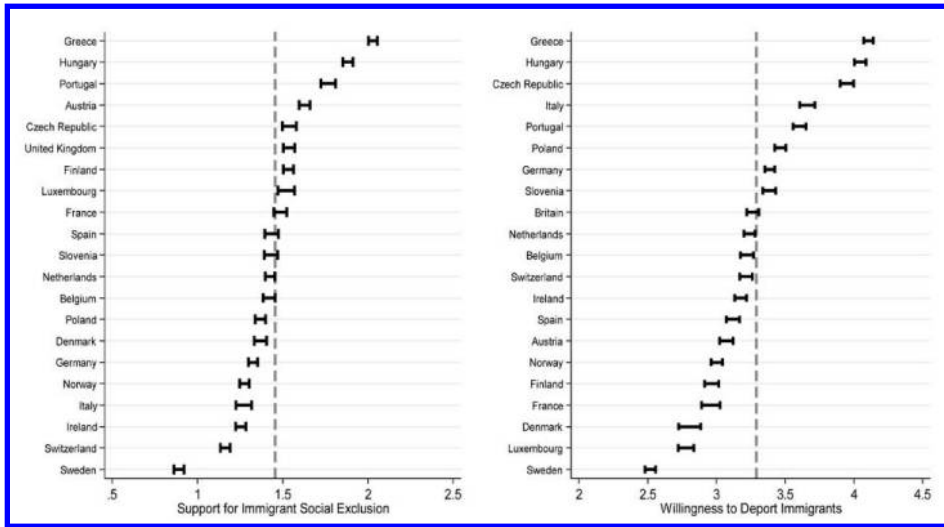
FIGURE 1

Weighted 95 Percent Confidence Interval Around Support for Immigrant Exclusion
and Willingness to Deport Immigrants Across Countries (Broken Lines Represent the
Full Sample Means)

Affect heuristics include the attitudes toward immigrants and immigration that may generate faulty size estimates. Political conservatism, which is related to opposition to immigration (Semyonov et al. 2006), ranges from 0 to 10, with higher values indicating more conservative views.[7] I consider both classical prejudice and perceptions of threat, which previous research views as two distinct concepts (Bobo 2000; Gorodzeisky 2010). Immigrant social distance is a form of traditional prejudice, which is viewed as socially learned and based on faulty generalizations rather than having a rational economic basis (Allport 1954/1979). The variable is a mean scale based on two items measuring how bothered one would be to have an immigrant become one's boss or marry into one's family. Responses range from 0 to 10, with higher values indicating greater social distance. Perceived threat measures a sense of competition between groups for economic, cultural, and social resources. Individuals exhibit threat when they believe that out-groups affect dominant group interests adversely.[8] The variable is a mean scale of six items measuring the effects of immigrants on various aspects of society including culture, jobs, the economy, welfare services, crime problems, and the country as a whole. All are coded such that 0 indicates less threat and 10 indicates more.[9]

Controls

I also consider several demographic, socioeconomic, and country-level controls. Age and education are measured in years. Income is measured on a twelve-category scale. I include indicators of sex, marital status, city residence, minority

TABLE 1

Weighted Full Sample Mean and Standard Deviations
for Independent Variables

	M	SD
Availability heuristics		
Television exposure	4.39	3.12
Radio exposure	1.24	2.31
Newspaper exposure	0.84	1.41
Internet exposure	1.81	4.12
Immigrant neighbors	0.52	.25
Immigrant friends	0.43	.25
Immigrant coworkers	0.28	.20
Affect heuristics		
Political conservatism	4.93	4.14
Perceived threat	5.54	2.60
Social distance	3.35	4.83
Country-level controls		
Foreign-born population	7.89	1.67
Gross national product	25.32	6.77
Individual-level controls		
Age	45.89	28.83
Sex	0.53	.25
Ethnic minority	0.02	.02
Education level	11.69	6.76
Married	0.57	.25
City residence	0.16	.13
Second-generation immigrant	0.07	.07
Unemployment experience	0.27	.19
Manual laborer	0.27	.19
Income	5.99	4.67
Observations	36,615	

status, second-generation immigrant status (at least one foreign-born parent), manual labor status, and unemployment experience in the last three months. At the country level, I control for the actual percentage of foreign-born residents and per capita gross national product (GNP).

ANALYTIC STRATEGY

I begin by examining the extent of innumeracy across Europe using the categorical operationalization described above. I then attempt to characterize the different types of innumeracy through an examination of bivariate means and multinomial logistic regression. I focus my interpretations on Herda's (2010) heuristic factors. Finally, I use innumeracy to predict anti-immigrant policy support with multilevel
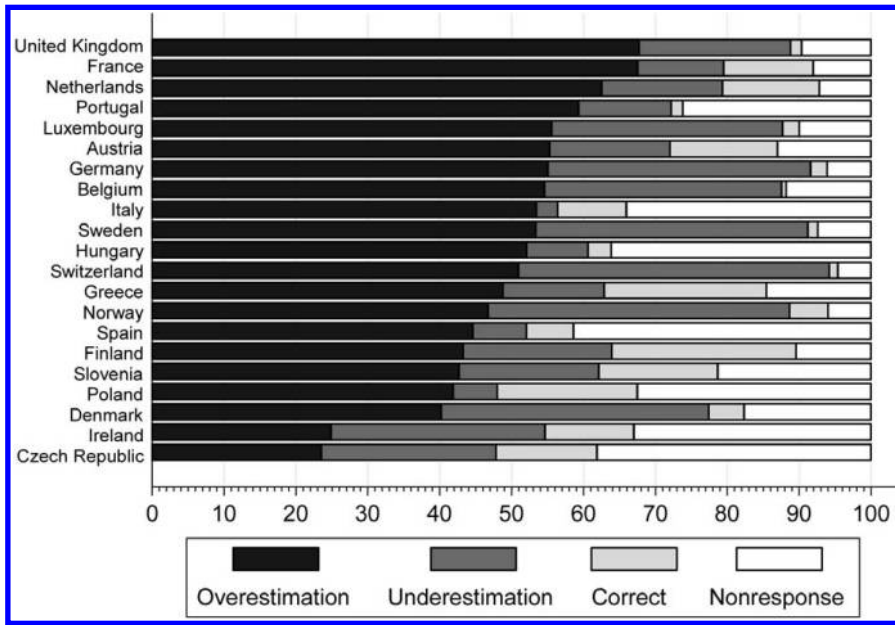
FIGURE 2

Percentages Overestimating, Underestimating, and Providing Nonresponse When
Prompted to Estimate the Immigrant Population Size across Countries

regression models. This modeling strategy relaxes the assumption of indepen-
dence, which is violated by the clustering of individuals into countries. It does
so by estimating individual- and country-level equations simultaneously with
unique error terms (Raudenbush and Bryk 2002). Given the small number of coun-
tries in the sample, only the intercept is allowed to vary across Level 2 units. In all
analyses I estimate robust standard errors to counteract possible heteoskedasticity,
replace missing values[10] via multiple imputation, and apply sample design and
country weights to ensure that the data are representative.

RESULTS

I summarize the levels of overestimation, underestimation, correct response, and
nonresponse within each country in Figure 2. Previous studies using innumeracy
means find that overestimation characterizes all countries (Citrin and Sides 2008;
Herda 2010; Hjerm 2007; Semyonov et al. 2008; Sides and Citrin 2007). Following
this, the current data show that a majority overestimate in twelve of the twenty-
one nations, with more than two-thirds overestimating in the United Kingdom
and France. However, in nine countries, overestimation occurs among less than a
majority. In Ireland and the Czech Republic, overestimation is less common than
underestimation. Thus, overestimation occurs frequently, but is not as ubiquitous
as previously suggested.

Among the other categories, providing an exactly correct response is generally the least common. Fewer than 2 percent know the correct answer in Belgium, Switzerland, the United Kingdom, Portugal, and Sweden. Respondents in Greece and Finland provide the most accurate responses, with more than one-fifth guessing correctly. Underestimation is common in several countries. More than one-third do so in Switzerland, Germany, Denmark, Norway, and Sweden. Conversely, less than 10 percent underestimate in Spain, Hungary, Italy, and Poland. In these latter countries, nonresponse seems to be more common. For example, in Spain, more than 42 percent provide no estimate, which is nearly equal to the percent overestimating. Conversely in the countries where underestimation is most common, nonresponse appears to be rarest. For example, less than 5 percent of Swiss respondents provide no estimate. Characterizing those who fall in each category based on Herda's (2010) heuristic factors may elucidate this apparent connection between underestimation and nonresponse.

I present weighted means and standard deviations for each of the independent variables considered across innumeracy categories in Table 2, indicating significant ($p < .05$) differences relative to over- and underestimators. Interestingly, nonresponse seems to constitute a unique innumeracy category. For one, these individuals exhibit the lowest levels of all types of immigrant contact. Aside from television, nonresponders also experience significantly less media exposure. Thus, they have fewer sources of cognitive availability with which to formulate estimates. This may explain their reticence to provide an answer. Despite minimal contact, these individuals perceive the most threat from immigrants compared to all other groups, including overestimators. On average, nonresponders are also older, more likely to be female, have less education, less income, and live in countries with few immigrants and a lower GNP compared to the other categories.

Underestimators are also unique as they watch the least amount of television, but have the most internet and political newspaper exposure. While they experience less neighborhood contact compared to overestimators, they have more immigrant friends and coworkers. Further, these individuals exhibit perceived threat and social distance levels that are significantly lower than all other groups. They also have the highest socioeconomic levels with the most years of education, the most income, and least unemployment experience. Underestimators also tend to live in countries with higher GNP and larger immigrant populations.

I test whether these patterns hold net of controls using multilevel multinomial logistic regression in Table 3. This single model estimates separately the log odds of guessing correctly, underestimating, and providing no response, each versus a base category: overestimation.[11] In each column, a positive coefficient indicates that an independent variable predicts a greater likelihood of overestimating versus one of the other categories. It is clear that the limited cognitive availability of nonresponders serves to differentiate them from overestimators. Increasing levels of all three forms of contact are associated with a greater likelihood of overestimation versus nonresponse. While Table 2 suggested that negative affect was higher among nonresponders, net of controls their threat levels are on par with overestimators, while social distance levels are lower.[12]

TABLE 2

Weighted Means and Standard Deviations among Overestimators, Underestimators, Correct Responders, and Nonresponders

	Overestimators		*Underestimators*		*Correct Guessers*		*Nonresponse*	
	M	SD	M	SD	M	SD	M	SD
Availability heuristics								
Television exposure	4.46	3.1	4.10	3.12*	4.27	3.1*†	4.49	3.01†
Radio exposure	1.23	2.25	1.43	2.37*	1.25	2.39†	1.06	2.26*†
Newspaper exposure	.84	1.38	1.02	1.42*	.93	1.52*†	.66	1.34*†
Internet exposure	1.86	4.05	2.52	6.74*	1.90	4.11†	.90	3.27*†
Immigrant neighbors	.57	.25	.49	.25*	.49	.25*	.41	.24*†
Immigrant friends	.46	.25	.50	.25*	.45	.25†	.26	.19*†
Immigrant coworkers	.30	.21	.35	.23*	.26	.19*†	.14	.12*†
Affect heuristics								
Political conserva-tism	4.94	3.65	4.85	3.46	5.03	3.63	4.96	4.96
Perceived threat	5.61	2.53	5.20	2.41*	5.34	2.39*†	5.77	2.68*†
Social distance	3.45	4.74	2.88	4.60*	3.21	4.97*†	3.54	5.21†
Individual-level controls								
Age	44.00	27.62	46.41	27.59*	45.95	28.16*	50.95	31.07*†
Female	.55	.25	.42	.24*	.44	.25*†	.60	.24*†
Ethnic minority	.02	.02	.02	.02	.02	.02	.02	.02
Education level	11.80	6.17	13.04	6.19*	12.23	7.10*†	9.85	7.55*†
Married	.54	.25	.60	.24*	.63	.23*	.57	.25
City residence	.16	.14	.14	.12	.20	.16*†	.13	.11*
Second-generation immigrant	.08	.07	.06	.06*	.05	.05*	.04	.03*†
Unemployment experience	.28	.20	.22	.17*	.28	.20†	.27	.20†
Manual laborer	.28	.20	.21	.16*	.23	.18*	.31	.21*†
Income	6.14	4.03	6.81	4.22*	5.73	4.21*†	4.90	4.90*†
Country-level controls								
Foreign-born population	8.23	6.34	10.28	5.49*	6.33	6.49*†	5.26	5.05*†
Gross National Product	25.97	5.78	27.07	5.44*	23.11	9.67*†	22.66	8.18*†
Observations	18,279		8,398		3,484		6,454	

*Statistically significant difference from overestimators ($p < .05$); †Statistically significant difference from underestimators ($p < .05$).

Net of controls, immigrant friends, immigrant neighbors, and increasing negative affect are all associated with a greater likelihood of overestimation compared to underestimation. This is true particularly for perceptions of threat. Conversely, underestimation is more likely with increased internet exposure. In comparing underestimators to correct guessers, significant differences are larger and more common for the former, suggesting that they differ more substantially from overestimators. In an alternative model (not shown) where underestimators were

TABLE 3

Multinomial Logistic Regression Models Predicting Overestimation Versus
Underestimation Correct Estimation and Nonresponse

	Over vs. Correct	*Over vs. Under*	*Over vs. D/K*
Availability heuristics			
Television exposure	.027	.038*	.036**
	(.016)	(.015)	(.013)
Radio exposure	.032**	−.011	.023
	(.014)	(.019)	(.012)
Newspaper exposure	−.049	−.007	.101
	(.040)	(.030)	(.055)
Internet exposure	−.035*	−.048***	.037**
	(.017)	(.014)	(.013)
Immigrant neighbors	.183	.379***	.308**
	(.098)	(.094)	(.107)
Immigrant friends	−.131	.115*	.256***
	(.100)	(.046)	(.021)
Immigrant coworkers	.055	.036	.161*
	(.098)	(.054)	(.074)
Affect heuristics			
Political conservatism	−.010	.013	.014
	(.017)	(.018)	(.013)
Perceived threat	.079**	.124***	−.030
	(.026)	(.030)	(.029)
Social distance	.022	.038***	.052***
	(.018)	(.009)	(.010)
Country-level controls			
Foreign-born population (2002)	.095*	−.122***	.185***
	(.048)	(.026)	(.020)
Gross National Product (2002)	.041	.020	.006
	(.023)	(.018)	(.011)
Constant	.215	1.595***	−.931*
	(.645)	(.410)	(.400)
Variance (U_0)		.154***	
Log-likelihood		−35,125.16	
AIC		70,390.34	
Observations		36,615	

Note: D/K = don't know. Robust standard errors in parentheses. Models also control for age, female, ethnic minority status, education, marital status, city residence, second-generation immigrant status, unemployment experience, manual labor status and household income.
*$p < .05$. **$p < .01$. ***$p < .001$.

the base category, only the greater perceived threat of correct guessers significantly differentiated these categories. Thus, underestimators and correct guessers are similar in terms of availability, but differ in terms of affect, net of controls.

In the country-level equation, only the actual immigrant population size is associated significantly with innumeracy, net of individual-level factors. Following

the descriptive patterns in Table 2, more immigrants in one's country predicts a greater likelihood of overestimation versus nonresponse and guessing correctly. However, more immigrants are also associated with a greater likelihood of underestimation. Thus, a larger immigrant population does not simply lead to inflated perceptions. The country-level variance component (U_0) suggests that a significant amount of between-country variation remains net of GNP and immigrant population size. However, the variables included account for roughly half of the total variation from a base model without controls (not shown).

Keeping these patterns in mind, I consider the association between innumeracy and support for immigrant social exclusion and deportation in Table 4 using multi-level regression. I treat the innumeracy categories as independent variables with correct estimation acting as the reference category.[13] The initial models focus on the innumeracy associations net of the individual and country controls, which are included in all models. I then add availability heuristic controls to assess their explanatory power over the innumeracy coefficients. Finally, I include affect heuristic controls, which are likely to explain much of the differences between innumeracy categories.

Looking at the individual- and country-level variance components (r and U_0), the overwhelming majority of the total variation in exclusion (nearly 95 percent) occurs between individuals. However, the country-level equation indicates that support for exclusion decreases with greater GNP but increases with a larger immigrant population, net of individual-level controls. This follows Blalock (1967), who claimed that a large out-group population (many immigrants) competing for scarce resources (low GNP) would generate intergroup hostility (Quillian 1995). While significant, these factors explain little of the small country-level variance component relative to a base model without controls (not shown).[15]

Net of individual and country controls, underestimators exhibit support for immigrant exclusion about .07 points lower than correct guessers. In terms of magnitude, this corresponds to about one-tenth of a standard deviation on the exclusionism scale.[14] Alternatively, overestimators and nonresponders both express greater support for exclusionism relative to correct guessers. While the overestimator coefficient is slightly larger than that of nonresponders, the two are statistically equivalent ($\chi^2 = .83$, $p = .36$).

The addition of availability controls in the next model results in minimal change to the over- and underestimator coefficients. This suggests that while media exposure and contact can account for some of the existence in innumeracy, the resulting faulty estimates are of little consequence for the endorsement of social exclusion. Conversely, availability accounts for about one-third of the nonresponse coefficient magnitude. This suggests that the lack of cognitive availability, particularly immigrant contact, contributes to the association between nonresponse and greater support for exclusion.

The inclusion of the affect heuristic controls in the next model pushes this non-responder coefficient to zero. They also explain the significant overestimation coefficient and account for more than four-fifths of its magnitude.[16] However, a significant difference between underestimators and correct guessers remains net of all controls. While the coefficient is reduced by about 40 percent from the previous model, its robustness suggests that negative innumeracy may associate directly with reduced immigrant exclusion.[17]

TABLE 4

Multilevel Regression Models Predicting Support for Immigrant Social Exclusion and
Willingness to Deport Immigrants

	Immigrant Exclusion			*Willingness to Deport*		
Innumeracy						
Underestimators	−.071**	−.067**	−.041**	−.090**	−.108**	−.010
	(.022)	(.021)	(.013)	(.030)	(.034)	(.031)
Overestimators	.080***	.078***	.015	.164***	.143***	.106***
	(.015)	(.013)	(.015)	(.030)	(.025)	(.032)
Nonresponders	.072***	.047*	−.003	.104**	.053	.033
	(.019)	(.022)	(.017)	(.033)	(.029)	(.034)
Availability heuristics						
Television exposure		.017***	.008*		.026***	.019***
		(.005)	(.004)		(.006)	(.004)
Radio exposure		−.011*	−.005		−.011	.001
		(.005)	(.003)		(.012)	(.008)
Newspaper exposure		−.041***	−.024***		−.046**	−.024
		(.008)	(.006)		(.017)	(.016)
Internet exposure		−.025***	−.010***		−.043***	−.024***
		(.004)	(.003)		(.007)	(.004)
Immigrant neighbors		−.058***	−.031***		−.075***	−.041**
		(.010)	(.009)		(.020)	(.015)
Immigrant friends		−.202***	−.079***		−.252***	−.106***
		(.017)	(.018)		(.030)	(.016)
Immigrant coworkers		−.058***	−.024		−.031	.010
		(.014)	(.014)		(.022)	(.021)
Affect heuristics						
Political conservatism			.019***			.033***
			(.005)			(.005)
Perceived threat			.177***			.247***
			(.010)			(.017)
Social distance			.044***			.051***
			(.004)			(.005)
Country-level controls						
Foreign-born population	.018***	.016***	.011***	−.001	−.010	−.022***
	(.002)	(.001)	(.002)	(.006)	(.008)	(.002)
Gross National Product	−.015***	−.005*	−.004***	−.028***	−.010**	−.009**
	(.001)	(.002)	(.001)	(.005)	(.004)	(.003)
Constant	1.982***	1.828***	.381***	4.310***	3.994***	2.030***
	(.059)	(.058)	(.077)	(.121)	(.103)	(.131)
Variance (r)	.474***	.456***	.345***	.898***	.863***	.662***
Variance (U_0)	.026***	.038***	.027***	.192***	.114***	.131***

(Continued)

TABLE 4

Multilevel Regression Models Predicting Support for Immigrant Social Exclusion and
Willingness to Deport Immigrants   (Continued)

	Immigrant Exclusion			*Willingness to Deport*		
Log-likelihood	−36,433.40	−35,983.71	−30,866.06	−47,526.02	−46,857.92	−43,824.20
AIC	72,902.79	71,556.09	61,788.11	95,088.03	93,765.84	84,532.60
Observations	36,615	36,615	36,615	36,615	36,615	36,615

Note: Robust standard errors in parentheses. All models control for age, female, ethnic minority status, education, marital status, city residence, second-generation immigrant status, unemployment experience, manual labor status, and household income.
*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

The next set of models predicting willingness to deport displays greater variation between countries, although the majority (more than 80 percent) exists between individuals. GNP and immigrant population size are both associated with less restrictive policy positions, although the latter is not significant until the final model. Combined, these factors explain roughly 30 percent of the country-level variance component (U_0) relative to models without controls (not shown).

The innumeracy patterns are initially similar to those for exclusion. All innumeracy categories are significantly different than correct guessers, with overestimators and nonresponders expressing a greater willingness to deport and underestimators expressing less. With the addition of availability controls in the next model, the nonresponse coefficient loses significance and about half of its magnitude. This again is due largely to the limited sources of available information with which nonresponders can formulate estimates. The over- and underestimator coefficients decrease and increase by about 15 percent, respectively, net of availability. The slight suppression among underestimators is due to their higher mean level of friendship contact, which is associated negatively with willingness to deport.

The addition of affect controls in the final model accounts for the significance of the underestimation coefficient. Thus, unlike support for social exclusion, willingness to deport is equal between underestimators and correct guessers net of perceived threat and social distance. Conversely, the difference between overestimators and correct guessers remains highly significant and maintains more than three-quarters of its magnitude from the previous model.

DISCUSSION AND CONCLUSION

Many citizens respond negatively to the presence of immigrants. This often results in support for restrictive laws like Arizona's SB 1070 or anti-immigration political parties. The current study's focus on innumeracy regarding immigrants as one possible contributing factor to such political positions provides multiple contributions that advance the existing literature.

The Distribution of Innumeracy Regarding Immigrant Populations Is More Nuanced Than Indicated in Existing Studies

Rather than simply being synonymous with overestimation, substantial percentages either underestimate or provide no response in all of the countries considered. This finding does not change the fact that overestimation is common throughout much of Europe. Rather, it indicates that inflated perceptions are not as ubiquitous as portrayed in many existing studies (Alba et al. 2005; Herda 2010; Hjerm 2007; Semyonov et al. 2008; Sides and Citrin 2007). Thus, the innumeracy literature has advanced without full consideration of the entire spectrum of this phenomenon. All three forms represent factual ignorance that may have implications for immigrant-related policy positions or other outcomes. Thus, innumeracy is a multidirectional and multifaceted phenomenon. Future research should incorporate the alternative operationalization presented when describing the extent of innumeracy.

The Integration of Heuristic Decision-Making Into Herda's (2010) Framework Advances the Theoretical Understanding of the Innumeracy Phenomenon

The availability and affect heuristics provide an established social psychological justification for the hypothesized innumeracy predictors, which strengthen Herda's assertions. These factors acted as a guide for characterizing underestimators and nonresponders and a means to understand the association between innumeracy and anti-immigrant policy positions. The strengthened theoretical framework will be useful for orienting future considerations of innumeracy.

However, there is still room for growth. I do not claim to capture all of the relevant heuristic strategies or components, but hope to provide a foundation upon which future research can build. For example, contact outside of one's neighborhood or anecdotal accounts from significant others were not considered in the ESS. Future studies should examine additional availability and affective measures that may promote innumeracy of all varieties.

Availability and Affect Heuristics Distinguish Underestimators and Nonresponders from Overestimators

The current results confirm high levels of television exposure, neighborhood immigrant contact, and negative affect among overestimators (Herda 2010). Underestimators differ in that they display greater internet exposure, immigrant friendship, and coworker contact, but low negative affect. They also tend to rank highly in terms of socioeconomic status. The affect patterns suggest that negative views of immigrants are associated with overestimation, while positive views are associated with underestimation. The availability patterns are less consistent in that some sources are associated with overestimation and others with underestimation. This may result from variation in information quality across different sources (Herda 2010). The disparate patterns indicate a need for further research as the current study cannot assess the quality of information observed. In particular, it would be useful to identify the reasons why television

and internet associate with opposing biases. Such an analysis may lead to strategies to improve the messages emanating from the mass media with the goal of a better informed public.

Further, nonresponders represent a unique form of innumeracy characterized by low levels of all forms of cognitive availability, save for television and high levels of negative affect. The lack of retrievable evidence regarding immigrants likely explains their reticence to estimate. Limited contact seems particularly important as it serves to differentiate nonresponders from both over- and underestimators. The contact hypothesis views intergroup interaction as a way to promote understanding of out-groups, which may also be necessary for respondents to feel confident enough to offer size estimates (Allport 1954/1979; Miller and Brewer 1984; Pettigrew 1988b). Regardless, the findings suggest that nonresponders are unique and should be considered by future innumeracy studies alongside over- and underestimators.

Innumeracy Is Associated with Support for Anti-Immigrant Policy, but in Opposing Directions

Following existing research (Alba et al. 2005; Semyonov et al. 2008; Sides and Citrin 2007), overestimation is associated with greater anti-immigrant policy support in initial models. This is true of nonresponders as well, before introducing the full list of availability and affect controls. Conversely, underestimators express comparatively less support for both outcomes. This unique finding suggests that innumeracy is associated both with negative and positive immigrant policy orientations, depending on its direction. This again highlights that innumeracy is more nuanced and multifaceted than portrayed in the existing literature.

While availability heuristics serve to differentiate over- and underestimators (Herda 2010), they explain little of the over- and underestimator associations with policy support. This suggests that the faulty estimates that result from contact or the mass media have little implication for policy orientations. Instead, availability heuristics seem to be more important for leading respondents to offer an estimate. They account for much of the significant nonresponse coefficients likely because nonresponders lack the understanding regarding immigrants that would come from interpersonal contact.

The current results support Herda (2010) and Semyonov et al. (2004) in that affect heuristics are most effective in explaining the association between innumeracy and anti-immigrant policies. Building on this finding, it appears that both the negative perceptions of overestimators and the positive perceptions of underestimators work to explain these innumeracy associations. However, the significant innumeracy slopes remaining net of all controls are contrary to Semyonov et al. (2004), whose coefficients were explained completely by threat perceptions. The lingering associations in the current study suggest that overestimation is associated directly with an increased willingness to deport, while underestimation is associated directly with a decreased willingness to exclude. This possibility suggests that innumeracy may be more consequential than indicated by the previous literature. However, given existing findings to the contrary

and the possibilities of measurement error and social desirability bias, further research is necessary to establish firmly a direct link between innumeracy and policy positions.

A direct link would provide further evidence for the often recommended strategy of disseminating correct information (Alba et al. 2005; Nadeau et al. 1991; Sides and Cirtin 2007; Sigelman and Niemi 2001). The logic of these researchers being that the truth will eliminate innumeracy and subsequently reduce anti-immigrant sentiment and exclusionary orientations. However, this policy recommendation should be considered cautiously as the entire innumeracy literature, the current study included, suffers from causal ordering assumptions that cannot be verified with cross-sectional data. Of particular importance is whether innumeracy causes negative affect or if negative affect causes innumeracy. The current study assumes the latter, but the former is common in the literature. Assuming the former, correct information will likely remedy negative affect and reduce support for anti-immigrant policy. However, assuming the latter, it is doubtful that correcting innumeracy will change the affect that underlies faulty perceptions. Another point to consider given the current findings is the potential changes in policy preferences among those who underestimate. What will happen to their threat perceptions if they are brought to the realization that the immigrant population is much larger than they perceived? Similarly, among nonresponders it is impossible to know whether the truth will allay or exacerbate their threat perceptions.

Thus, a necessary next step for innumeracy research is to ascertain the true causal patterns. Experimental and longitudinal analyses hold the most promise for new findings. The former may be used to determine the changes, if any, to orientations toward immigrants after correcting innumeracy. The latter will be useful to examine the temporal relationship between innumeracy and attitudes. It can be used to explore changes in innumeracy relative to fluctuations in the actual percent immigrant or in the wake of highly publicized immigrant-related news events. Such studies require that future surveys continue to measure respondents' immigrant and minority size perceptions.

Nevertheless, there is increasing interest in innumeracy about immigrant populations and the degree to which it explains support for legislation like Arizona's SB1070 or the success of anti-immigrant parties in Europe. The current study provides valuable results that expand our understanding of innumeracy, both theoretically and empirically. Future research should continue to view the phenomenon as both highly nuanced and multidirectional.

APPENDIX

Variable Descriptions

Variable	Description
Immigrant social exclusionism	
Allow different immigrants	To what extent do you think [country] should allow people of a different race/ethnicity than the respondent should be allowed in [country]? (1 = many; 4 = none)
Allow similar immigrants	How about people from a different race or ethnic group than most [country] people? (1 = many; 4 = none)
Allow poor European immigrants	To what extent do you think [country] should allow people from poorer countries in Europe to come and live here? (1 = many; 4 = none)
Allow poor non-European immigrants	To what extent do you think [country] should allow people from poorer countries outside Europe to come and live here? (1 = many; 4 = none)
Willingness to deport immigrants	
Send back criminal immigrants	If people who have come to live here commit any crime, they should be made to leave. (1 = strongly disagree; 5 = strongly agree)
Send back unemployed immigrants	If people who have come to live and work here are unemployed for a long period, they should be made to leave. (1 = strongly disagree; 5 = strongly agree)
Innumeracy	
Perceived immigrant group size	Out of every 100 people living in [country], how many do you think were born outside [country]?
Percent foreign born	Based on OECD and NSAS estimates
Correct estimators	Between –1 and 1 points around the actual percent foreign born
Underestimators	Less than or equal to 1 point below the actual percent foreign born
Overestimators	More than or equal to 1 point above the actual percent foreign born
Nonresponders	Provided no estimate of the actual percent foreign born
Perceived threat	
Jobs	Would you say that people who come to live here have generally take jobs away from workers in [country], or generally create new jobs?
Health and welfare	Most people who come to live here work and pay taxes. They also use health and welfare services. On balance, do you think people who come here take out more than they put in or put in more than they take out?
Economy	Would you say that it is generally bad or good for [country]'s economy that people come to live here from other countries?

(Continued)

APPENDIX

Variable Descriptions

(Continued)

Variable	Description
Culture	Would you say that [country]'s cultural life is generally undermined or enriched by people coming to live here from other countries?
Country	Is [country] made a worse or better place to live by people coming to live here from other countries?
Crime	Are [country]'s crime problems made worse or better by people coming to live here from other countries?
Immigrant social distance	
Boss	How much would you mind or not mind if someone like this was appointed your boss?
Marriage	How much would you mind or not mind if someone like this married a close relative of yours?
Political conservatism	In politics people sometimes talk of "left" and "right." Using this card, where would you place yourself on this scale? (0 = left; 10 = right)
Immigrant contact	
Immigrant friends	Do you have any friends who have come to live in [country] from another country? (0 = no, none at all; 1 = yes, a few/many)
Immigrant neighbors	How would you describe the area where you currently live? (0 = an area where almost nobody is of a different race or ethnic group from most [country] people; 1 = some/many people are of a different race or ethnic group)
Immigrant coworkers	Do you have any colleagues at work who have come to live in [country] from another country? (0 = no, none at all; 1 = yes, several/a few)
Media exposure	
Television time	On an average weekday, how much time, in total, do you spend watching television? (0 = no time at all; 7 = more than 3 hours)
Political newspaper time	How much of your time reading the newspaper is spent reading articles about politics and current affairs? (0 = no time at all; 7 = more than 3 hours)
Political radio time	How much of your time listening to the radio is spent listening to news or programmes about politics and current affairs? (0 = no time at all; 7 = more than 3 hours)

(Continued)

APPENDIX

Variable Descriptions

(Continued)

Variable	Description
Internet use	How often do you use the internet, the World Wide Web, or e-mail – whether at home or at work – for your personal use? (0 = no access/never; 6 = every day)
Demographics	
Age	Year of birth subtracted from the survey year 2002
Female	Biological sex of respondent (female = 1)
Education	How many years of full time education have you completed?
Ethnic minority status	Do you belong to a minority ethnic group in [country]? (ethnic minority = 1)
Second-generation status	Was your mother/father born in [country]? (0 = mother and father native born; 1 = immigrant mother or father)
Unemployment experience	Have you ever been unemployed and seeking work for a period of more than three months? (unemployed = 1)
Income	If you add up the income from all sources, which letter describes your household's total net income?
Married	Could I ask about your current legal marital status? Which description best apples to you? (married = 1)
City residence	Which best describes the area where you live? (city residence = 1)
Manual labor	Skilled and semi-unskilled laborer = 1

NOTES

1. This pattern is not universal, as others find the opposite or no association (Dixon and Rosenbaum 2004; Oliver and Wong 2003; Taylor 1998; Wagner, van Dick, Pettigrew, and Christ 2003; Wagner, Christ, Pettigrew, Stellmacher, and Wolf 2006). Such patterns are understood through the contact hypothesis (Allport 1954/1979; Miller and Brewer 1984; Pettigrew 1988b). However, no studies have found an analogous association for innumeracy.

2. Affective factors occurring causally prior to innumeracy is a break from most studies, which assume that innumeracy causes perceived threat (Hjerm 2007; Semyonov et al. 2004; Semyonov et al. 2008; Sides and Citrin 2007). Since all studies have been cross-sectional, the correct order is unknown. Note, however, that the ESS asks fifty-five political and attitudinal questions about immigrants before soliciting population size estimates. Thus, all respondents are prompted to make affective judgments before formulating estimates (Zajonc 1980, 1984).

3. Despite opposing causal assumptions between the current study and Semyonov et al. (2004), my expectation is the same: no association between innumeracy and policy outcomes net of affect.

4. These include Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. I exclude Israel because of its unique immigration history.

5. Data are from the Organisation of Economic Cooperation and Development and the National Statistic Archive of Slovenia (2002).

6. The scale has Chronbach's alpha values of .90 and .70, respectively.

7. Conservatism is considered an affect heuristic because most recent anti-immigrant rhetoric has emerged from the political right (Semyonov et al. 2006). Left-right orientation is a useful affective indicator that does not mention immigrants.

8. I assume that affect is causally prior to policy positions. While this cannot be determined with cross-sectional data, the logic follows decades of research using threat or prejudice to predict race-based policy positions (Bobo 1983, 1999; Bobo and Hutchings 1994; Bobo and Tuan 2006; Ceobanu and Escandell 2010; McLaren 2003; Semyonov et al. 2004).

9. The scales have Chronbach's alphas of .84 and .83. A maximum likelihood factor analysis indicates that these and each of the anti-immigrant policy components load highly onto four latent factors (χ^2 = 5,021.94, df = 33) corresponding to the variable constructions presented.

10. Innumeracy has no missing observations since nonresponse is considered meaningful. Among other variables, income had the most missing (32 percent), followed by conservatism (12 percent) and internet use (11 percent). The vast majority had less than 5 percent missing. Models estimated with only nonimputed cases or only imputed cases were similar to those presented.

11. Overestimation acts as the reference because it is the category of focus in the literature.

12. In an alternative model where underestimators were the base category, nonresponders had significantly less immigrant friends and internet, but more perceived threat.

13. Correct estimators are the reference for these models because their lack of innumeracy provides a natural contrast to the varying forms of innumeracy.

14. This relatively small magnitude is due in part to the grouping of underestimators of all degrees into a single category. In an alternative model with only correct guessers and underestimators, the effects of a continuously measured innumeracy variable suggested that support for exclusion and deportation decreased significantly with greater negative innumeracy.

15. Some of the Level 2 variance components in Table 4 increase with the introduction of individual-level controls. This unusual pattern is possible in multilevel models and results from a correlation between individual-level variables and country-level errors (Gelman and Hill 2007).

16. In models that further categorized overestimators into low, medium, and high degrees, the significant coefficients were explained similarly through affect controls.

17. With over 30,000 respondents, it is possible that these associations are matter of statistical significance over substantive importance. As a check, I stratified each model on the various individual-level controls. The patterns presented held in the majority of subsamples considered.

REFERENCES

Alba, Richard, Ruben G. Rumbaut, and Karen Marotz. 2005. "A Distorted Nation: Perceptions of Racial/Ethnic Group Sizes and Attitudes Toward Immigrants and Other Minorities." *Social Forces* 84:901–19.

Allport, Gordon W. 1954 [1979]. *The Nature of Prejudice*. Reading, MA: Addison.

Blalock, Hubert M., Jr. 1967. *Toward a Theory of Minority-Group Relations*. New York: Wiley.

Blumer, Herbert. 1958. "Race Prejudice as a Sense of Group Position." *Pacific Sociological Review* 1:3–7.

Bobo, Lawrence. 1983. "Whites' Opposition to Busing: Symbolic Racism or Realistic Group Conflict?" *Journal of Personality and Social Psychology* 45:1196–210.

———. 1999. "Prejudice as Group Position: Microfoundations of a Sociological Approach to Racism and Race Relations." *Journal of Social Issues* 55:445–72.

———. 2000. "Race and Beliefs about Affirmative Action: Assessing the Effects of Interests Group Threat, Ideology, and Racism." Pp. 137–64 in *Racialized Politics: The Debate about Racism in America*, edited by D. O. Sears, J. Sidanus, and L. Bobo. Chicago: University of Chicago.

——— and Vincent L. Hutchings. 1994. "Perceptions of Racial Group Competition: Extending Blumer's Theory of Group Position to a Multiracial Social Context." *American Sociological Review* 61:951–72.

——— and Mia Tuan. 2006. *Prejudice in Politics: Group Position, Public Opinion, and the Wisconsin Treaty Rights Dispute*. Cambridge, MA: Harvard University Press.

Ceobanu, Alin M. 2010. "Usual Suspects? Public Views about Immigrants' Impact on Crime in European Countries." *International Journal of Comparative Sociology* 52: 114–31.

——— and Xaier Escandell. 2010. "Comparative Analysis of Public Attitudes Toward Immigrants and Immigrations Using Multinational Survey Data: A Review of Theories and Research." *Annual Review of Sociology* 36:309–28.

Citrin, Jack and John Sides. 2008. "Immigration and the Imagined Community in Europe and the United States." *Political Studies* 56:33–56.

Coltrane, Scott and Melinda Messineo. 2000. "The Perpetuation of Subtle Prejudice: Race and Gender Imagery in 1990s Television Advertising." *Sex Roles* 42:363–89.

Damasio, Antonio. 2005. *Descartes' Error: Emotion, Reason and the Human Brain*. New York: Penguin.

Dixon, Jeffrey and Michael S. Rosenbaum. 2004. "Nice to Know You? Testing Contact, Cultural, and Group Threat Theories of Anti-Black and Anti-Hispanic Stereotypes." *Social Science Quarterly* 85:257–80.

Downs, Anthony. 1957. *An Economic Theory of Democracy*. New York: Harper.

Finucane, Melissa L., Ali Alhakami, Paul Slovic, and Stephen M. Johnson. 2000. "The Affect Heuristic in Judgments of Risks and Benefits." *Journal of Behavioral Decision Making* 13:1–17.

Fossett, Mark A. and K. Jill Kiecolt. 1989. "The Relative Size of Minority Populations and White Racial Attitudes." *Social Science Quarterly* 70:820–35.

Gallagher, Charles A. 2003. "Miscounting Race: Exploring Whites' Misperceptions of Racial Group Size." *Sociological Perspectives* 46:381–96.

Gelman, Andrew and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. New York: Cambridge University Press.

Gigerenzer, Gerd and Wolfgang Gaissmaier. 2011. "Heuristic Decision Making." *Annual Review of Psychology* 62:451–82.

Giles, Michael W. 1977. "Percent Black and Racial Hostility: An Old Assumption Revisited." *Social Science Quarterly* 58:412–17.

Gilliam, Franklin D., Jr., Nicholas A. Valentino, and Matthew N. Beckmann. 2002. "Where You Live and What You Watch: The Impact of Racial Proximity and Local Television News on Attitudes, Race and Crime." *Political Research Quarterly* 55:755–80.

Glaser, James M. 1994. "Back to the Black Belt: Racial Environment and White Racial Attitudes in the South." *The Journal of Politics* 56:21–41.

Gorodzeisky, Anastasia. 2010. "Focus Groups as a Tool in the Construction of Questionnaires: The Case of Discriminatory Attitudes." *Quality and Quantity*. Published Online, Jan. 7, 2010. doi: 10.1007/s11135-009-9287-y.

——— and Moshe Semyonov. 2009. "Terms of Exclusion: Public Views towards Admission and Allocation of Rights to Immigrants in European Countries." *Ethnic and Racial Studies* 32:401–23.

Green, Eva G. T. 2009. "Who Can Enter? A Multilevel Analysis on Public Support for Immigration Criteria across 20 European Countries." *Group Processes and Intergroup Relations* 12:41–60.

Gustofson, Joseph L. 2008. "Tokenism in Policing: An Empirical Test of Kanter's Hypothesis." *Journal of Criminal Justice* 36:1–10.

Herda, Daniel. 2010. "How Many Immigrants? Foreign Born Population Innumeracy in Europe." *Public Opinion Quarterly* 74:674–95.

Hjerm. 2007. "Do Numbers Really Count? Group Threat Theory Revisited." *Journal of Ethnic and Migration Studies* 33:1253–75.

Jackson, Pamela Braboy, Peggy A. Thoits, and Howard F. Taylor. 1995. "Composition in the Workplace and Psychological Well-Being: The Effects of Tokenism on America's Black Elite." *Social Forces* 74:543–57.

Jowell, R. and the Central Coordinating Team. 2005. *European Social Survey 2002/2003: Technical Report*. London: Centre for Comparative Social Surveys, City University. French Specific Data. Norwegian Social Sciences Data Services [distributor]. Available at http://ess.nsd.uib.no/.

Kanter, Rosabeth Moss. 1977. "Some Effects of Proportions of Group Life: Skewed Sex Ratios and Responses to Token Women." *American Journal of Sociology* 83:965–90.

Key, V. O. 1949. *Southern Politics in State and Nation*. New York: Knopf.

Koopmans, Ruud and Susan Olzak. 2004. "Discursive Opportunities and the Evolution of Right-Wing Violence in Germany." *American Journal of Sociology* 110:198–230.

Kunovich, Robert M. 2002. "Social Structural Sources of Anti-Immigrant Prejudice in Europe." *International Journal of Sociology* 32:39–57.

Legge, Jerome S., Jr. 2003. *Jews, Turks and Other Strangers: The Roots of Prejudice in Modern Germany*. Madison: University of Wisconsin.

LeVine, Robert A. and Donald T. Campbell. 1972. *Ethnocentrism: Theories of Conflict, Ethnic Attitudes and Group Behavior*. New York: Wiley.

McLaren, Lauren M. 2003. "Anti-Immigrant Prejudice in Europe: Contact, Threat Perception, and Preferences for the Exclusion of Migrants." *Social Forces* 81: 909–36.

Miller, Norman and Marilyn B. Brewer. 1984. *Groups in Contact: The Psychology of Desegregation*. New York: Academic.

Nadeau, Richard, Richard G. Niemi, and Jeffrey Levine. 1991. "Innumeracy About Minority Populations." *The Public Opinion Quarterly* 57:332–47.

National Statistical Archive of Slovenia. 2002. "Foreign Population in Slovenia by Country of Citizenship and Sex, 31.12.2002." Statistical Office of the Republic of Slovenia. Retrieved March 18, 2007 from http://www.stat.si.

Oliver, J. Eric and Janelle Wong. 2003. "Intergroup Prejudice in Multiethnic Settings." *American Journal of Political Science* 47:567–82.

Paulos, John Allen. 1988. *Innumeracy: Mathematical Illiteracy and its Consequences*. New York: Hill & Wang.

Pettigrew, Thomas F. 1998a. "Reactions toward the New Minorities of Western Europe." *Annual Review of Sociology* 24:77–103.

———. 1998b. "Intergroup Contact Theory." *Annual Review of Psychology* 25:65–85.

Quillian, Lincoln. 1995. "Prejudice as a Response to a Perceived Group Threat: Population Composition and Anti-Immigrant and Racial Prejudice in Europe." *American Sociological Review* 60:586–611.

———. 1996. "Group Threat and Regional Change in Attitudes toward African-Americans." *American Journal of Sociology* 102:816–60.

Raudenbush, Stephen W. and Anthony S. Bryk. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods.* Thousand Oaks, CA: Sage.

Scheepers, Peer, Merove Gijsberts, and Marcel Coenders. 2002. "Ethnic Exclusionism in European Countries: Public Opinion to Civil Rights for Legal Migrants as a Response to Perceived Ethnic Threat." *European Sociological Review* 18:17–34.

Schneider, Silke L. 2008. "Anti-Immigrant Attitudes in Europe: Outgroup Size and Perceived Ethnic Threat." *European Sociological Review* 24:53–67.

Semyonov, Moshe and Anya Glickman. 2009. "Ethnic Residential Segregation, Social Contacts, and Anti-Minority Attitudes in European Societies." *European Sociological Review* 25:693–708.

Semyonov, Moshe, Rebecca Raijman, and Anastasia Gorodzeisky. 2006. "The Rise of Anti-Foreigner Sentiment in Europe." *American Sociological Review* 71:426–48.

Semyonov, Moshe, Rebecca Raijman, and Anastasia Gorodzeisky. 2008. "Foreigners' Impact on European Societies: Public Views and Perceptions in a Cross-National Comparative Perspective." *International Journal of Comparative Sociology* 49:5–29.

Semyonov, Moshe, Rebecca Raijman, Anant Yom Tov, and Peter Schmidt. 2004. "Population Size, Perceived Threat and Exclusion: A Multiple-Indicators Analysis of Attitudes Toward Foreigners in Germany." *Social Science Research* 33:681–701.

Shah, Anuj K. and Daniel M. Oppenheimer. 2008. "Heuristics Made Easy: An Effort-Reduction Framework." *Psychological Bulletin* 137:207–22.

Sides, John and Jack Citrin. 2007. "European Opinion About Immigration: The Role of Identities, Interests and Information." *British Journal of Political Science* 37:477–504.

Sigelman, Lee and Richard G. Niemi. 2001. "Innumeracy about Minority Populations: African Americans and Whites Compared." *The Public Opinion Quarterly* 65(1):86–94.

SourceOECD. 2007. "Stocks of Foreign-Born Population in Selected OECD Countries." Organization for Economic Cooperation and Development. Retrieved March 19, 2007 from http://www.titania.sourceoecd.org.

Strabac, Zan and Ola Listhaug. 2007. "Anti-Muslim Prejudice in Europe: A Multilevel Analysis of Survey Data from 30 Countries." *Social Science Research* 37(1):268–86.

Taylor, Marylee C. 1998. "How White Attitudes Vary with the Racial Composition of Local Populations: Numbers Count." *American Sociological Review*. 4:512–35.

Tversky, Amos and Daniel Kahneman. 1973. "Availability: A Heuristic for Judging Frequency and Probability." *Cognitive Psychology* 5:207–32.

Tversky, Amos and Daniel Kahneman. 1974. "Judgment Under Uncertainty: Heuristics and Biases." *Science* 185:1124–31.

Vergeer, Maurice, Marcel Lubbers, and Peer Scheepers. 2000. "Exposure to Newspapers and Attitudes Toward Ethnic Minorities: A Longitudinal Analysis." *Howard Journal of Communications* 11:127–43.

Wagner, Ulrich, Oliver Christ, Thomas F. Pettigrew, Jost Stellmacher, and Carina Wolf. 2006. "Prejudice and Minority Proportion: Contact Instead of Threat Effects." *Social Psychology Quarterly* 69:380–90.

Wagner, Ulrich, Rolf van Dick, Thomas F. Pettigrew, and Oliver Christ. 2003. "Ethnic Prejudice in East and West Germany: The Explanatory Power of Intergroup Contact." *Group Processes and Intergroup Relations* 6:22–36.

Wilson, Thomas C. 2001. "Americans' Views on Immigration Policy: Testing the Role of Threatened Group Interests." *Sociological Perspectives* 44:485–501.

Winant, Howard. 2001. *The World is a Ghetto: Race and Democracy Since World War II*. New York: Basic.

Zajonc, Robert B. 1980. "Feelings and Thinking: Preferences Need No Inferences." *American Psychologist* 35:151–75.

———. 1984. "On the Primacy of Affect." *American Psychologist* 39:117–23.

Zaller, John. 1992. *The Nature and Origins of Mass Opinion*. New York: Cambridge.