

# Trust in a Time of Increasing Diversity: On the Relationship between Ethnic Heterogeneity and Social Trust in Denmark from 1979 until Today

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This article examines the impact of ethnic diversity in Danish municipalities on citizens' social trust over the last three decades. During this period, Danish society has grown increasingly ethnically diverse, and this begs the question whether this has influenced trust in others negatively. Existing evidence from the Anglo-Saxon countries would suggest that this is the case, whereas evidence from the European continent mainly suggests that no link exists between ethnic diversity and social trust. The empirical analysis uses individual-level data on social trust from several surveys in Denmark in the period from 1979 to 2009 coupled with diversity at the municipality level. Individual-level measures of trust over time enable estimation of the impact of changes in ethnic diversity within municipalities on social trust and, it is argued, thereby a more precise estimate of the effect of ethnic diversity on trust. The results suggest that social trust is negatively affected by ethnic diversity. The article concludes by discussing this result and suggest avenues for further research.

## Introduction

The question of whether ethnic diversity has detrimental consequences for social trust has recently risen to academic prominence (e.g., Putnam 2007; Uslaner 2012). The topic draws attention as a consequence of increased immigration and ethnic diversity in Western societies and because social trust – the belief that the generalized other one may potentially interact with will behave decently – promotes a number of desirable outcomes including high levels of civic duty, cooperation and pro-social behaviour (Almond & Verba 1963; Sønderskov 2011). Moreover, trust is often seen as a constituent part of the popular, but somewhat elusive, concept of

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‘social capital’, which has been seen as a key ingredient for a thriving civil society (Putnam 1993; 2000). Hence, the question of whether ethnic diversity erodes social trust has repercussions far beyond academic circles as it basically concerns the wider issue of whether increasing ethnic diversity and immigration result in decreased public-spiritedness and widespread withdrawal from the public sphere, thereby making the provision of public goods more difficult and democratic government less successful.

In the early analyses of the relationship between ethnic diversity and trust, diversity was measured at the country level (see Knack & Keefer 1997; La Porta et al. 1997; Bjørnskov 2008; Gesthuizen et al. 2009; Hooghe et al. 2009). Recent research has increasingly been oriented toward the intra-country level, examining whether national variation in ethnic diversity across regions, neighbourhoods or schools is related to variation in social trust. These intra-country studies have primarily been conducted in Anglo-Saxon countries, the United States and the United Kingdom in particular, but more recent studies have also analyzed the relationship between ethnic diversity and trust on the European continent. While ethnic diversity has generally been found to depress trust in the Anglo-Saxon contexts, the pattern on the European continent is much more mixed with most studies pointing to no impact.

Against the backdrop of the previous studies, this article makes two distinct contributions to the literature about the impact of ethnic diversity on social trust. First, it analyzes the relationship between ethnic diversity and social trust across local communities (municipalities) in Denmark – a country which has only recently experienced mass immigration, and which is distinguished by a large welfare state and concomitant extensive economic redistribution and high economic equality, which may moderate the impact of ethnic diversity on trust. Second, as the first intra-country analysis, we study how increasing ethnic diversity in local communities over the last thirty years is related to social trust at the individual level. This approach has the important advantage over earlier analyses in that it allows for holding constant the overall national trend in trust as well as various time-invariant factors pertaining to the municipalities, thereby allowing for stronger inference with regard to the impact of ethnic diversity on trust.

In the following, we first elaborate on the relationship between ethnic diversity and trust by discussing the theoretical mechanisms linking the two phenomena, reviewing earlier empirical work on the topic and highlighting the potentially moderating effect of the Danish context. Next, we describe the data, measures and statistical models employed in the analysis. Then we present the results of the empirical analysis before concluding with a discussion of our findings.

## Ethnic Diversity and Social Trust in the Scandinavian Welfare State

In the literature, two broadly conceived mechanisms have been proposed to link ethnic diversity to lower trust, and to lower social cohesion more generally. One perspective emphasizes the widespread tendency for homophily: the fact that people prefer being around people who appear similar to themselves on a number of characteristics including ethnicity (McPherson et al. 2001). Homogeneity eases communication and reduces cultural distance, which, in turn, increases predictability in behaviour (Alesina & Ferrara 2005; Forbes 1997; Messick & Kramer 2001). In other words, when the surroundings consist of people like oneself, whose cultural codes are intelligible, trusting others is easier. The second mechanism emphasizes ethnic group conflict and posits that increased ethnic diversity spurred by immigration will evoke conflicts over material resources, social status and/or cultural identity between natives and immigrants (Blumer 1958; Bobo & Hutchings 1996; Forbes 1997; Paxton & Mughan 2006; Quillian 1995). Increasing ethnic diversity implies more out-group members and more exposure to and contact with other ethnic groups. This, in turn, induces intergroup competition and a sense of threat from the other groups, ultimately diminishing trust in the generalized other who is more likely to be ethnically different the greater the level of ethnic diversity.

While these perspectives predict a negative effect of diversity, other lines of research provide arguments that predict no relationship or a positive relationship between diversity and trust. Research on interethnic attitudes and prejudice emphasizes how interethnic exposure and contact may reduce interethnic conflict and negative racial stereotyping (Allport 1954; Pettigrew 1998; Pettigrew & Tropp 2006), which may, in turn, moderate the impact of diversity on social trust (Marschall & Stolle 2004; Stolle et al. 2008) or even turn the relationship into a positive one (Uslaner n.d.). Similarly, Kurzban et al. (2001) have shown that humans' tendency to notice other people's race is not a stable trait, which implies that racial homophily does not necessarily apply in all situations. Again, this suggests that ethnic diversity may not have a marked impact on social trust.

### *Previous Findings*

Despite ambiguous theoretical predictions, the cross-national evidence mainly supports the negative perspective: most analyses find a (small) negative effect of diversity on social trust. The same picture emerges from intra-country studies conducted in Anglo-Saxon countries, primarily the

United States (Alesina & Ferrara 2002; Dincer 2011; Fieldhouse & Cutts 2010; Putnam 2007; Stolle et al. 2008; Uslander n.d.), but also Canada (Phan 2008; Stolle et al. 2008; Uslander n.d.), the United Kingdom (Fieldhouse & Cutts 2010; Laurence 2011; Letki 2008; Sturgis et al. 2011; Uslander n.d.) and Australia (Leigh 2006; Uslander n.d.). While the strength of the relationship and a number of issues remain debated, it is fair to say that most studies in the Anglo-Saxon countries have pointed to a negative impact of ethnic diversity on trust and related phenomena. A smaller number of analyses have been conducted in European countries (other than the United Kingdom) with more recent experiences of mass immigration (Dinesen 2011a; Gijssberts et al. 2012; Ivarsflaten & Strømsnes 2010; Lancee & Dronkers 2011; Reeskens & Hooghe 2009; Uslander n.d.). Interestingly, the studies on the European continent generally show little or only a very limited negative impact of ethnic diversity on trust. This raises the question of what may account for these differences in findings between the countries, including potentially moderating factors. In the Danish context, the welfare state is an obvious candidate.

### *The Potentially Moderating Context of the Welfare State*

The countries on the European continent – particularly Denmark and the other Scandinavian countries – differ markedly from the Anglo-Saxon countries in having larger welfare states with greater levels of redistribution and income equality, which is likely to moderate the impact of ethnic diversity on trust. It is well-known in the literature on trust that income inequality – presumably because of undermining a sense of shared fate or an accentuation of economic conflict – has a direct negative impact on trust (see, e.g., Rothstein & Uslander 2005; Uslander 2002), but both mechanisms may also moderate the influence of ethnic diversity on trust. When income inequality is low and a strong sense of shared fate and low levels of economic conflict exist, people are more likely to see immigrants as a part of their moral community and less of a threat and are therefore less likely to react to ethnic diversity by losing trust in others in general. This is supported by recent cross-country evidence, which suggests that low income inequality may reverse the negative impact of ethnic diversity on trust (Kesler & Bloemraad 2010). However, the generous social benefits, which lead to low economic inequality, may also have the opposite effect on trust. Generous benefits may make interaction with natives (e.g., in the workplace) less of a necessity and, as such, lead to isolation of immigrants in parallel societies rather than integration with natives (Crepaz 2008, 57–58). This is, in turn, likely to lead to a lower sense of shared fate across ethnic boundaries and thereby lower trust in others. Hence, the encompassing Scandinavian welfare state may also work to reinforce or even deepen cleavages between

natives and immigrants and thus exacerbate the negative effect of ethnic diversity on trust. In sum, the general prediction from the literature is that of a negative impact of ethnic diversity on trust, but empirical evidence as well as theoretical considerations suggest that this is not necessarily so in the Danish context.

## Research Design: Ethnic Diversity across Municipalities and Over Time in Denmark

Previous intra-country analyses have been conducted measuring ethnic diversity at levels of aggregation ranging from states and regions to municipalities, neighbourhoods and schools. Generally, the analyses at the various levels of aggregation are all important in their own right, especially since research has shown that the impact of interethnic exposure on interethnic relations often differs across levels of aggregation (Forbes 1997). In this article, we focus on ethnic diversity at the municipality level in Denmark. With the average Danish municipality size being slightly below 20,000 inhabitants in most of the period surveyed, the municipalities represent local contexts in which citizens are exposed to ethnic diversity if it exists. Moreover, municipalities are the most important sub-national political units in Denmark. This means that municipalities are salient political contexts because policy responses to ethnic diversity (e.g., in terms of public expenditures and taxes) are also, in part, municipality-based. This implies that our analysis is conducted in a setting that potentially involves both interethnic contact and political struggles over resources.

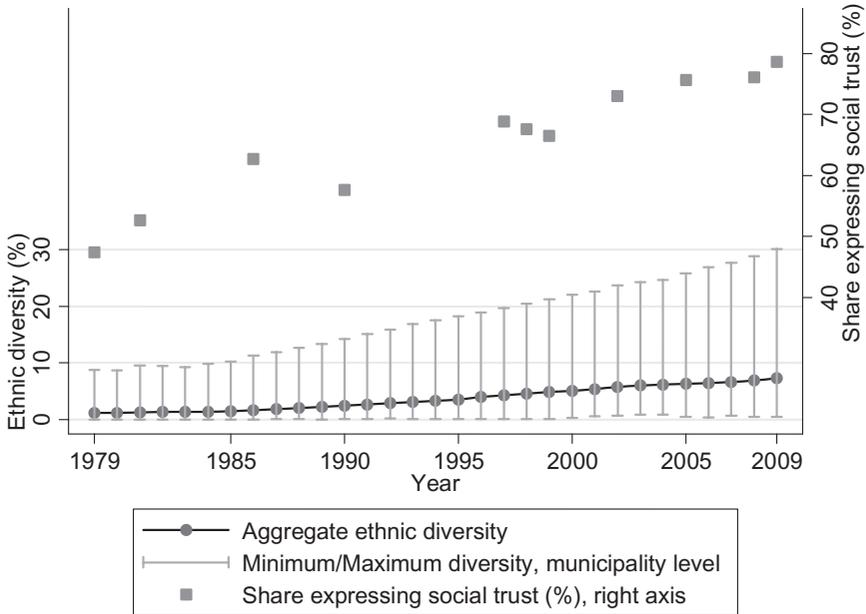
In contrast to the previous intra-country studies, which examine the relationship between ethnic diversity and trust using cross-sectional data, we examine the relationship between ethnic diversity and trust over time, which holds at least two important advantages.<sup>1</sup> First, cross-sectional studies are vulnerable to unobserved factors confounding the relationship between ethnic diversity and trust. Municipalities with certain characteristics that depress social trust (e.g., various forms of social deprivation) may, for example, attract more immigrants than other municipalities because of, say, affordable public housing. Studying the relationship over time enables us to control for any unobserved time-invariant differences between municipalities, which may confound the impact of ethnic diversity on trust. Second, the number of observations as well as the variation in ethnic diversity is greatly increased by including data from different municipalities over a period of time during which the level of ethnic diversity has increased substantially. This gives us more leverage in estimating the effect of ethnic diversity on trust than in previous studies.

*Data*

The dataset consists of six pooled, cross-sectional representative surveys of Danish residents conducted in 1979, 1990, 1997, 1999, 2002 and 2009, yielding a sample size of 9,529 respondents sampled across almost all Danish municipalities (see Note 9).<sup>2</sup> Additional surveys with comparable measures of social trust exist, but only these six surveys contain information on the municipality of the respondents, which is necessary to link measures of ethnic diversity at the municipality level to each respondent. For that reason, we use only these six surveys in the analysis of the impact of ethnic diversity at the municipality level on trust, while we build on all available surveys when describing the overall trend in trust in Denmark over time (See Figure 1). The six surveys also include a number of comparable socio-economic variables, which we include in the models that estimate the effect of ethnic diversity on trust. All of the surveys used in the analyses are listed in Appendix Table A.

The data for ethnic diversity as well as control variables at the municipality level (described below) were all retrieved from the statistical portal

Figure 1. Ethnic Diversity and Social Trust in Denmark, 1979–2009.



*Note:* Refer to the operationalizations section for description of measures and sources. The data for social trust are from all surveys listed in Appendix Table A.

‘Statistikbanken’ at Statistics Denmark.<sup>3</sup> The municipality-level variables only go back to 1980/81/83 and not 1979 when the first survey was conducted. This was handled by imputing the missing data from a regression of the five consecutive data points within a given municipality.<sup>4</sup>

### *Operationalizations and Specifications*

The dependent variable, social trust, is measured using the standard question: ‘Generally speaking, would you say that most people can be trusted, or that you can’t be too careful in dealing with people?’ The respondents were asked to answer in the affirmative or the negative. Although using a more fine-grained measure of trust building on several items would be preferable (cf. Reeskens & Hooghe (2008), but see Uslaner (2002, Chapter 3) for the opposite view), we have to rely on the dichotomous question because this maximizes coverage over time. The wording of the trust question varies slightly between surveys. ‘Generally speaking’ is, for example, omitted in some surveys, but the deviations are marginal and should not lead to biased estimates.<sup>5</sup> Moreover, as described below, we include time fixed-effects in some models, which should capture any differences caused by the minor variation in wording.

The main independent variable, ethnic diversity at the municipality level, is constructed as the share of non-Western immigrants and descendants in a given municipality. ‘Non-Western’ is defined as people from outside EU–15, Iceland, Norway, Switzerland, the European micro-states, North America, Australia and New Zealand. Although not measuring ethnic diversity per se, the Western/non-Western distinction is arguably the most salient ethnic dividing line in Denmark, both in terms of visibility and in the public debate.<sup>6</sup>

In addition to ethnic diversity, we include several individual- and municipality-level control variables in order to assess the potential confounding of the relationship between ethnic diversity and trust by other differences between individuals and municipalities. As emphasized by Letki (2008) and Phan (2008), ethnic diversity and social trust co-vary with the broader socioeconomic environment, and for that reason, controlling for various socioeconomic factors is paramount in order to isolate the impact of ethnic diversity on trust. Interestingly, a number of recent intra-national analyses find that the impact of socioeconomic variables such as income, income inequality and socioeconomic deprivation (Leigh 2006; Letki 2008; Phan 2008; Sturgis et al. 2011) tend to overshadow and even wash out the (negative) impact of ethnic diversity on trust and related phenomena. Given these results, we include a number of socioeconomic variables in order to examine whether it is socioeconomic characteristics of the local environment rather than ethnic diversity (or both) that shape trust. Specifically, we include three socioeconomic variables at the municipality level: the share of

single-parent households, the unemployment rate and the mean income per capita. The specific coding of these variables can be found in Appendix Table B. In line with earlier results (Letki 2008; Sturgis et al. 2011), the three socioeconomic variables at the municipality level are correlated ( $0.03 < |r| < 0.59$ ) as well as correlated with ethnic diversity ( $0.01 < |r| < 0.72$ ), but not at levels precluding simultaneous inclusion of the variables given the relatively large sample size at the municipality level. In addition to these controls, we also control for time-invariant differences between municipalities by including municipality fixed-effects as described below.

All specifications also include individual-level control variables in order to ascertain that any impact of ethnic diversity on trust is not simply a reflection of compositional differences (i.e., that individuals with certain characteristics related to trust tend to live in municipalities with certain levels of ethnic diversity). This also helps reduce potential random noise generated by the small samples in some municipalities. In addition to gender and age, we were able to construct comparable measures of individual income and education across the six surveys. Income is measured categorically as the relative placement within the income distribution with four categories: below the 25<sup>th</sup> percentile, within the interquartile range (IQR), above the 75<sup>th</sup> percentile, and non-response as a residual category. The maximum number of observations falling in the non-response category on the income measure is 859 across the various models. The income measure is relative and will therefore not capture the effect of across-time variation in income. The effect of absolute differences in income across time is, however, captured by year dummies in some models (see below). Education is measured in the following four categories: no high school, completed high school, completed college and a residual category of non-responses. The maximum number of respondents in the non-response category on the education variable is 117 in any model.

Ideally, we would have been able to include more individual-level variables, but these do not exist across the six surveys. We would especially have liked to be able to control for the respondent's ethnic background (immigrants versus native Danes) as a negative relationship between ethnic diversity and trust may be ascribed to immigrants with lower levels of trust living in more diverse municipalities, rather than a decline in trust in response to living in diverse surroundings. We return to this issue in the analysis below.

### *Estimation Techniques*

In order to examine the relationship between ethnic diversity at the municipality level and social trust over time, we regress individual-level social trust on municipality-level ethnic diversity for a given year using logistic regression. Each observation is thus nested within a combination of

a municipality and a survey year. An initial analysis suggests that some autocorrelation is present as social trust varies significantly between the possible combinations of municipality and year of survey ( $p < 0.001$ ; see Model 0 in Table 1). As a remedy to the autocorrelation, we employ two different estimators: a crossed random-effects estimator (RE) and a (double) fixed-effects estimator (FE). The crossed random-effects estimator treats each respondent as nested in a combination of municipality and time of survey and thus handles the autocorrelation between observations within the same municipality/time combination. However, it rests on the assumption that any omitted variable is uncorrelated with the explanatory variables, which may very well be unrealistic. The alternative is the double fixed-effects estimator including a time fixed-effect and a municipality fixed-effect. The time fixed-effects remove over-time variation in social trust and thus leads to an estimation of the effect of variation in ethnic diversity across municipalities while controlling for any time-specific variation that affects all respondents equally, including national-level (as opposed to municipal-level) variation in ethnic diversity, income, economic equality, institutional fairness and any other factors that may be related to trust. The municipality fixed-effects remove any time-invariant variation between municipalities and thus control for, say, geographical factors (some municipalities are more likely immigrant destinations than others due to their location in the country) that may confound the relationship between ethnic diversity and trust, as argued earlier. Hence, with municipality and time fixed-effects, we can estimate the impact of municipality-level ethnic diversity on trust while controlling for almost every possible confounder. This specification is therefore likely to provide a less biased estimate of the causal effect of ethnic diversity compared to the RE estimator. However, because of fewer degrees of freedom in the FE specification, the FE estimator is less efficient than the RE estimator. To adjudicate between the random- and the fixed-effects estimator, we employ the Hausman specification test, which indicates whether the RE specification is biased because of omitted variables.

## Analysis

Figure 1 gives a first clue about the relationship between diversity and social trust. It shows the aggregate level of diversity in Denmark – that is, the share of non-Western immigrants and their descendants of the total Danish population, as well as the level of trust. From the bottom half of the figure, it is evident that the ethnic composition of Danish society has changed considerably over the past thirty years; in 1980, the share of non-Western immigrants and descendants was close to zero (1.2 percent) while it had grown to more than 7 percent in 2009. On average, the share of immigrants has

Table 1. Social Trust and Ethnic Diversity at the Municipality Level – Part I

Estimator	Model I		Model II	
	RE	FE	RE	FE
<i>Individual-level variables</i>				
Gender [females relative to men]				
Age	1.05 (1.12)	1.05 (1.13)	1.05 (1.12)	1.05 (1.11)
Education	1.00 (-1.37)	1.00 (1.61)	1.00 (-1.41)	1.00* (-1.65)
Less than high school				
High school	2.36*** (11.48)	2.25*** (10.68)	2.36*** (11.51)	2.25*** (10.70)
College	2.92*** (12.00)	2.81*** (11.36)	2.94*** (12.03)	2.82*** (11.38)
No information	0.82 (-1.00)	0.79 (-1.15)	0.82 (-0.99)	0.79 (-1.14)
Income				
Below IQR				
Within IQR	1.44*** (6.33)	1.41*** (5.79)	1.44*** (6.28)	1.41*** (5.76)
Above IQR	2.16*** (11.00)	2.10*** (10.33)	2.16*** (11.01)	2.10*** (10.32)
No information	1.02 (0.19)	1.01 (0.06)	1.01 (0.17)	1.00 (0.05)
<i>Municipality-level variables</i>				
Ethnic diversity [%]				
N [individuals]	9,529	9,529	9,529	9,529
N [municipalities]	323	323	323	323
Hausman test, $\chi^2$ [df]	-	22.1 [8]***	-	25.1 [9]***
Residual variance				
Between years	0.20***	0.15***	0.16***	-
Between municipalities	0.06***	0.03***	0.03***	-

Note: Odds ratios with z-statistics in parentheses. \*\*\*p < 0.01; \*\*p < 0.05; \*p < 0.10. RE: Crossed random effects (estimated with Stata's xtmeologit using seven integration points). FE: Municipality and time fixed-effects.

increased by 6.4 percent annually in this period. The spikes on the aggregate level of diversity display the minimum and maximum levels of ethnic diversity in the municipalities in a given year and provide additional information about the transformation of Danish society. It shows that the level of diversity varies considerably between municipalities, and increasingly so over the years. In some areas, the share of non-Western immigrants is close to zero even today, while other municipalities have grown quite diverse, with around 30 percent immigrants living there.

The upper half of the figure shows the aggregate development in social trust. The data points are the share of respondents answering in the affirmative to the question about whether most people can be trusted. The figure tells us that Denmark has experienced a quite remarkable development with respect to social trust. Contrary to the general trend across the globe, social trust has been steadily increasing over the past thirty years (from around 50 percent to 80 percent on our measure) (see also Dinesen & Sønderskov 2012),<sup>7</sup> and the Danes are – along with the other Scandinavians – the most trusting people in the world at present. The global tendency is either negative or status quo (Bjørnskov 2007; Delhey & Newton 2005; Dinesen & Sønderskov 2012; Inglehart & Welzel 2005).<sup>8</sup>

Figure 1 thus shows a parallel marked increase in ethnic diversity and social trust from 1979 to 2009 and hence suggests a positive effect of diversity on trust. However, such a conclusion based on the bivariate aggregate relationship is premature. It is very likely that other variables affect both immigration and social trust, and it may also be that social trust has fallen in the most diverse municipalities and gone up in the more homogenous ones. Either way, a systematic analysis is necessary before concluding on this matter. This is what we present in Tables 1 and 2. As mentioned earlier, we report the results estimated both by the random-effects and the fixed-effects estimators (except for in one case). It is noteworthy that the estimates differ substantially between the two estimators with some of the independent variables, including ethnic diversity and average municipality-level income, changing signs. This is in itself an indication that the RE estimator is invalid because of omitted variables, and this is supported by the specification test. In all cases, the tests indicate that the RE models are misspecified, and hence the results from the FE models are more valid. We therefore focus on the results obtained with the fixed-effects estimator, but to give an idea about the substantial differences between the two estimators, we report the results based on both.

The first model in Table 1 (model 0) – a so-called ‘null model’ without independent variables – shows that social trust varies significantly between municipalities and survey years and hence calls for models that handle autocorrelation.<sup>9</sup> Model I includes only individual-level variables, and the results correspond to previous research: education and income are

Table 2. Social Trust and Ethnic Diversity at the Municipality Level – Part II

Estimator	Model III		Model IV		Model V	
	RE	FE	RE	FE	RE	FE
<i>Individual-level variables</i>						
Gender [females relative to men]	1.05 (1.02)	1.05 (1.07)	1.03 (0.70)	1.03 (0.71)	1.05 (1.06)	1.06 (1.10)
Age	1.00 (-1.55)	1.00 (-1.57)	1.00* (-1.86)	1.00* (-1.81)	1.008 (-1.83)	1.00* (-1.77)
<i>Education</i>						
Less than high school						
High school	2.37*** (11.28)	2.25*** (10.71)	2.38*** (11.29)	2.32*** (10.78)	2.36*** (10.43)	2.28*** (9.90)
College	2.83*** (11.74)	2.83*** (11.39)	2.99*** (11.87)	2.95*** (11.42)	2.75*** (10.97)	2.72*** (10.58)
No information	0.79 (-1.17)	0.80 (-1.09)	0.76 (-1.23)	0.78 (-1.11)	0.51** (-1.99)	0.55* (-1.78)
<i>Income</i>						
Below IQR						
Within IQR	1.43*** (6.10)	1.41*** (5.75)	1.41*** (5.80)	1.38*** (5.39)	1.37*** (4.98)	1.35*** (4.72)
Above IQR	2.07*** (10.36)	2.10*** (10.32)	1.99*** (9.70)	2.01*** (9.60)	1.99*** (9.20)	2.00*** (9.12)
No information	0.99 (-0.09)	1.01 (0.08)	0.99 (-0.12)	1.00 (0.01)	0.98 (-0.22)	0.99 (-0.11)
<i>Municipality-level variables</i>						
Ethnic diversity [%]	1.00 (0.35)	0.95** (-2.04)	1.01 (0.63)	0.95*** (-1.99)	1.01 (0.65)	0.94** (-2.12)
Unemployment rate [%]	0.96 (-1.89)	0.99 (-0.24)	0.95*** (-2.15)	0.99 (-0.30)	0.97 (-1.22)	0.99 (-0.19)
Single-parent households	0.99 (-1.28)	0.96* (-1.78)	0.99 (-1.46)	0.95* (-1.90)	0.99 (-1.42)	0.95** (-2.01)
Income per capita	1.01*** (9.35)	0.99* (-1.83)	1.01*** (9.79)	0.99* (-1.67)	1.01*** (8.21)	0.99* (-1.93)
N [individuals]	9,529		9,320		8,152	
N [municipalities]	323		323		264	
Hausman test: $\chi^2$ [df]	25.8 [12]**		22.5 [12]**		20.5 [12]**	
<i>Residual variance</i>						
Between years	0.00	-	0.00	-	0.00	-
Between municipalities	0.02***	-	0.03***	-	0.02***	-

Note: Odds ratios with z-statistics in parentheses. \*\*\*p < 0.01; \*\*p < 0.05; \*p < 0.10. RE: Crossed random effects (estimated with seven integration points). FE: Municipality and time fixed-effects. Model IV excludes non-native Danes from the 1997 and 2009 surveys and non-Danish citizens from the 1999 survey. Model V excludes respondents from the 2009 survey.

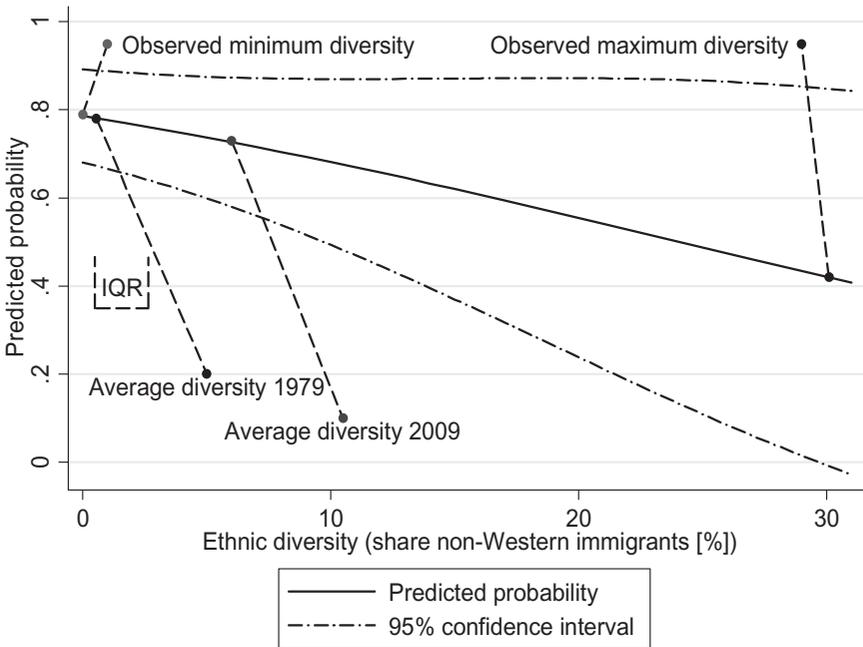
important explanations of social trust, while gender and age are less important. In Model II, the diversity variable is added. While the coefficient is negatively signed, it is insignificant.

In Model III in Table 2, which is arguably the most valid specification, the control variables at the municipality level are added. Interestingly, the negative impact of ethnic diversity on social trust becomes significant after including these variables, indicating that the impact of ethnic diversity is to some extent suppressed by the socioeconomic variables at the municipality level. Ethnic diversity is coded so it reflects the percentage of non-Western immigrants and descendants, which implies that the odds ratio for diversity can be interpreted as the odds of expressing trust – all else being equal – decreases 5.3 percent when diversity increases by 1 percentage point. To give a more intuitive interpretation of the impact of change in ethnic diversity, we calculated the predicted probability of expressing social trust for an ‘average’ person living in an ‘average’ municipality, while varying the level of diversity (see the notes to Figure 2).

Figure 2 shows the predicted probabilities (along with confidence intervals) over the observed range of municipality-level diversity. If the average person were living in an average municipality with a level of diversity corresponding to the least heterogeneous municipality in our sample (with 0.0 percent non-Western immigrants) the predicted probability of expressing social trust is 0.79, while it is substantially lower (0.42) if the level of diversity corresponds to the most heterogeneous municipality with 30.1 percent non-Western immigrants. The drop in predicted probability is quite large and it shows that diversity at the municipality level has a considerable impact on social trust when looking over the full range of diversity in the municipalities. On the other hand, the figure also shows that the variation in trust that can be ascribed to differences in diversity is quite low between most municipalities. Since the majority of municipalities have low levels of diversity in most years in our sample, the drop in predicted probability over the interquartile range of diversity is merely 0.02 (from 0.78 to 0.76), while the difference in predicted probability is 0.05 when comparing the average level of diversity in 1979 with that of 2009. Thus, on the one hand, ethnic diversity has a substantial effect on social trust when looking over the full range of diversity, but the predicted difference in social trust between most municipalities is small due to limited variation in diversity.

The negative effect of diversity is perhaps surprising in light of Figure 1. Ethnic diversity at the national level has increased during the last thirty years and, as such, seems to move in tandem with national levels of trust. However, it is important to keep in mind that our models focus exclusively on how variation in ethnic diversity at the municipality level is related to trust controlling for any overall national trend in trust. Hence, it is in

Figure 2. Predicted Possibilities of Expressing Social Trust for an 'Average' Person.



Notes: We have calculated the predicted probability for a 45 year-old female in 1997 with a high school diploma, a relative income within the interquartile range and living in an average municipality in terms of income, single-parent households, unemployment and aggregate level of social trust. IQR: Interquartile range of ethnic diversity.

principle possible that opposite effects of ethnic diversity on trust can be found at the national and the municipality levels, although we find it more likely that the correlation between ethnic diversity and trust at the national level over time is caused by other coinciding developments having taken place at the same time.

As for the control variables at the municipality level, we found that the share of single-parent households and municipality-level income are significantly related to trust, while the share of unemployed is not. The share of single-parent households is negatively associated with social trust (at the 0.1 level of significance), which is in line with our expectations. A change over the interquartile range (approximately from 8 to 15 percent) on this variable corresponds to a change in the predicted probability of trusting from 0.79 to 0.74.<sup>10</sup> This is slightly higher than the negative impact of ethnic diversity on trust. Average municipality-level income is also negatively related to trust (again at the 0.1 level of significance), which

runs counter to our expectation and earlier findings from the literature showing that higher average income increases social trust.<sup>11</sup> Again, while national income and social trust seems to be positively (bivariately) associated at the national level, it is important to remember that our results show how variation in municipality-level income is related to trust, discounting for any national trends in trust. A shift over the interquartile range on the income variable for the average person corresponds to a change in predicted probability of trust from 0.80 to 0.72. Hence, the impact of municipality-level income on trust is somewhat stronger than that of ethnic diversity.

### *Issues of Compositional Effects, Extreme Observations and Self-selection*

In order to safeguard and nuance the results, we conducted three additional analyses. First, we address the issue of compositional effects. As noted earlier, we are not able to control for the respondent's ethnic background (immigrants versus native Danes) as this information is unavailable in most of the surveys used. This implies that we are in principle not able to adjudicate between two potential causes underlying the negative relationship between ethnic diversity and trust: more immigrants with lower levels of trust living in more diverse municipalities (a compositional effect), or reduced trust – primarily among natives – in response to living in more diverse surroundings. For two reasons we think that our findings primarily reflect the latter. First, it is possible to go some way in addressing the issue of compositional effects in the analyses as three of the most recent surveys (from 1997, 1999 and 2009) contain information about immigrant status or citizenship status of the respondents. Given that these surveys are from the last part of the period when more immigrants are present in the municipalities (and hence the surveys), excluding non-natives and non-Danish citizens in these surveys should reduce the impact of ethnic diversity on trust if the negative effect is driven by low trust among immigrants living in more diverse municipalities. As can be seen from model IV in Table 2, excluding people indicated to be non-natives and non-Danish citizens in these surveys yields results identical to that of the model with all respondents (model III) and this strengthens our confidence that the negative impact of ethnic diversity is primarily due to a drop in trust among natives. A second piece of evidence supporting this contention is the finding by Dinesen (2011b; 2012) that immigrants in Denmark to a considerable extent (although not completely) catch up with the trust levels of native Danes. The relatively limited trust differences between native Danes and immigrants render it unlikely that the observed negative effect of ethnic diversity is primarily driven by lower levels of trust of immigrants living in more diverse municipalities.

As a second issue, we address the sensitivity of our analysis to observations that are extreme in various regards. First, to see if the relationship between ethnic diversity and trust is sensitive to inclusion of the amalgamated and often substantially enlarged municipalities after the municipality reform in 2007 (see Note 9), we tried running the analysis without including data from the 2009 survey (the only survey after the reform). The results are displayed in model V in Table 2 and show that the negative impact of ethnic diversity still holds up when excluding the 2009 data. Hence, the inclusion of the larger, amalgamated municipalities is not driving the negative impact of ethnic diversity in Danish municipalities on trust. Second, we have also estimated a model without municipalities with high levels of diversity (>15 percent) to check if municipalities with high levels of diversity drive our results. Despite dropping observations and limiting variation in the independent variable, ethnic diversity remain significant at the 0.1 level and the odds ratio is similar to that estimated from the full model (results not shown, but are available from the authors upon request).

The third and final robustness check concerns the issue of self-selection, which is a major challenge for any study focusing on residential context effects on individual attitudes and behaviour, as people can freely choose where to live. In our case, this would occur if individuals select their municipality of residence based on their level of trust. Given the negative impact of ethnic diversity on social trust reported above, this would most likely occur from more resourceful people, who are also more trusting, choosing to live in ethnically less diverse municipalities. While we cannot fully address the potential problem of self-selection here, we conducted one analysis building on individual-level panel data from the Danish section of the European Values Survey from the years 1990 and 1999, which can at least shed some light on this issue (see Dinesen & Sønderskov (2012) for a description of the panel with regard to social trust). Specifically, we examined whether the respondent's level of trust in 1990 (measured with the same question as used in the analyses above) is related to having moved to a different municipality in 1999 and, furthermore, whether social trust is related to the ethnic diversity of the chosen municipality for those who did move. With the caveat that they build on relatively few observations, the analyses show no evidence that either of these phenomena occur (results available from the authors upon request), and this is tentative evidence that people do not choose their municipality of residence based on their level of trust and, hence, an indication that the negative relationship between ethnic diversity and trust is not the result of self-selection. Taken together, the robustness tests strengthen our confidence that citizens' perception of the trustworthiness of the generalized other is negatively affected by ethnic diversity.

## Discussion and Conclusion

This article has explored whether ethnic diversity at the municipality level has affected social trust in Denmark in the period between 1979 and 2009. That is, we have scrutinized the relationship between ethnic diversity and trust at an intermediate level of aggregation in an economically equal society, which began experiencing mass immigration with a concomitant increase in ethnic diversity in the period under study. The results show that while trust at the national level has increased to very high levels over this period of increased ethnic diversity in the country, ethnic diversity at the municipality level in fact has a negative impact on social trust when taking into account the overall national trend and unobserved time-invariant characteristics of the municipalities analyzed. However, the negative impact is relatively limited in size, and for that reason, it seems an exaggeration to speak of ethnic diversity being a great threat to social cohesion in Denmark – at least at present levels of diversity. Although the level of trust may have increased even further in the past thirty years given lower levels of ethnic diversity, the level of trust in Denmark have in that period increased to around 80 percent of the population indicating to trust others, which is a unique trend and an unprecedented level in any country but the Nordic nations.

While the negative impact of ethnic diversity detected is in line with findings from the majority of studies in the Anglo-Saxon countries, they are at odds with most previous studies on the European continent. This is somewhat surprising, as it seems plausible that the pattern in Denmark would be more similar to the neighbouring countries in continental Europe. This may reflect a real difference in the relationship between ethnic diversity and trust between the countries in Europe, but it may also reflect methodological differences between the studies. In contrast to the previous studies, our analysis builds on a large number of respondents in Danish municipalities surveyed over the last thirty years – a period in which ethnic diversity has grown substantially in Denmark. Apart from maximizing variation on the independent variable of the study, ‘ethnic diversity’, this design holds the important quality of enabling us to take into account time-invariant, unobserved characteristics of the municipalities, which may confound the relationship between ethnic diversity and trust. We believe this is a strong design for detecting an impact of ethnic diversity on trust, and as shown in the analyses, taking these time-invariant unobserved characteristics into account yields a very substantial difference in the results. Hence, it would be interesting to see the results of similar analyses in other countries, including those on the European continent, in which no relationship between ethnic diversity and trust has been found.

While we believe that the municipality level is an important level of analysis, especially given the political importance of this unit, it would be

interesting to analyze the relationship between ethnic diversity and trust at lower levels of aggregation in the future. For example, it may be that ethnic diversity of the immediate local context, where people interact with other people (or choose not to), is more important for social trust. The ethnic composition of one's immediate neighbourhood, school or workplace may shape perceptions of the generalized other far more than the composition of the municipality (although see Dinesen (2011a) for mixed evidence with regard to the effect of ethnic diversity in primary school on social trust and interethnic trust). One possibility in this regard is relying on survey-based measures of diversity of the immediate context. For instance, in the 2009 International Social Survey Programme (ISSP) survey, respondents were asked to indicate the share of non-Western immigrants in their local neighbourhood. This measure turns out to be only modestly correlated with diversity at the municipality level ( $r = 0.39$ ), which may indicate intramunicipality variation in experienced diversity and, thus, an argument in favour of lowering the levels of analysis to better grasp the impact of exposure to ethnic diversity on trust. However, it is important to point out that the validity of survey-based measures of ethnic diversity is arguably low because the response to such items is likely to be affected by, for instance, attitudes towards immigrants. For that reason, following the approach by Sturgis et al. (2011), merging census-based data from official registers with survey data on trust seems more fruitful. In future work, such data should be used for creating measures of ethnic diversity of the immediate context (perhaps of a few hundred households) in which each individual lives in order to provide new insights about how interethnic contact and exposure shape people's trust in the generalized other.

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#### NOTES

1. Note that Dincer (2011) also conducts an intra-country analysis over time. Measuring diversity at the state level in the United States at two periods in time, he finds a negative effect of diversity on trust.
2. A total of 471 respondents from the original surveys are excluded because they did not answer the question used to measure the dependent variable or the demographic variables gender and age. Additionally 76 respondents are excluded because the estimation technique (cf. the description in the text) omits respondents from municipalities without variation on the dependent variable in a given year.

3. <http://www.dst.dk/>.
4. In the case of per capita income – one of the control variables at the municipality level – the measurement of the variable was changed slightly over the time period, leading to higher values after the change. Fortunately, data for both measures are given for a few years around the break, enabling us to calculate a factor expressing the relative difference between the old and the new data series. Multiplying this factor by the original data series yields a reliable measure spanning the entire period. The measurement of each of the municipality-level variables and the procedures used for constructing a time-series for these data are found in Appendix Table B.
5. The precise wording in each survey is available from the authors upon request.
6. To validate this operationalization, we have rerun our main analysis (Model III in Table 2) using the share of Western immigrants as an alternative measure of diversity. The results showed that this type of diversity has no effect on social trust, thereby vindicating the notion that the salient ethnic dividing line in Denmark is between non-Westerners and the rest of the population, which in turn validates the operationalization of ethnic diversity employed.
7. The development is also statistically significant; regressing aggregate social trust on year yields a positive, significant relationship ( $p < 0.001$ ).
8. In passing, it is worth noting that the marked increase in trust suggests that Danish (or perhaps Nordic) exceptionalism (cf. Delhey & Newton 2005) in terms of very high levels of social trust is a relatively new phenomenon.
9. Readers familiar with the municipality structure in Denmark may wonder why the table reports 323 municipalities. This reflects changes in the Danish municipality structure throughout the period analyzed. Before January 2007, there were 271 municipalities in Denmark (reduced from 275 in 2003 due to amalgamations on the island of Bornholm), but an administrative reform reduced this number to 98 in 2007. The number of 323 instead of 373 (275 + 98) reflects the fact that some municipalities were left unchanged by the reform and that a few municipalities are excluded due to lack of survey data. See Lassen and Serritzlew (2011) for a description of Danish municipalities and the reform.
10. The effect of the control variables at the municipality level is calculated for a person with the same characteristic as in Figure 2, except that the level of diversity is held at its mean.
11. Note that including average municipality-level income as the only predictor at the municipality level also yields a negative relationship between this variable and trust. Hence, the negative effect of this variable is not driven by, for example, multicollinearity with the other variables at the municipality level.

Appendix Table A. Surveys Employed in the Analysis

Name	Survey year	Number of observations	Municipality of respondents
Political Values in Denmark	1979	1,478	Yes
European Value Survey, Wave 1	1981	1,182	No
Eurobarometer 25	1986	1,043	No
European Value Survey, Wave 2	1990	1,030	Yes
Citizens and the Law	1997	3,001	Yes
Democracy from Below	1998	2,032	No
European Value Survey, Wave 3	1999	1,023	Yes
Danish Election Survey	2002	2,026	Yes
Danish Election Survey	2005	2,264	No
European Value Survey, Wave 4	2008	1,507	No
International Social Survey Programme	2009	1,518	Yes

Appendix Table B. The Construction of Time-series Data for Municipality-level Indicators from Statistics Denmark

Variable	Measurement	Data availability	Years imputed
Ethnic diversity: share of non-Western immigrants (%)	(Immigrants and descendants from non-Western countries/total population in municipality)*100. Non-Western countries: All countries other than EU-15, Norway, Switzerland, Iceland, United States, Canada, Australia, New Zealand and the European micro-states	1980–2009	1979
Mean income per capita	Municipality Gross Income (thousands of Danish kroner/total population in municipality)	1983–2006/2009†	1979; (2009)†
Single-parent households (%)	(Children living with single parents/children in municipality)*100	1980–2009	1979
Unemployment rate (%)	(Number of unemployed/total population in municipality)*100	1981–2009	1979

Note: †Change in data accounts in 2006. See Note 4 for correction method.

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