

Media Monopolies Increase Misperceptions about Immigration: Evidence from German Local Newspapers

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Abstract

We examine how local news monopolies affect misperceptions about the size of the immigrant population in Germany. We propose a theoretical framework in which heterogeneous information from different local news outlets diffuses through social interactions. We posit that indirect exposure to information from multiple sources leads to more accurate beliefs in competitive markets. To causally identify the effect of local news monopolies on misperceptions, we exploit overlapping newspaper coverage areas as a source of exogenous variation in the number of available outlets. We estimate that local news monopolies increase misperceptions by 38%. We empirically demonstrate that the effect of media monopolies hinges on social interactions. For individuals with fewer close social contacts, misperceptions remain unaffected by local news monopolies. Our results suggest that consolidation in the market for news decreases constituents' knowledge about critical policy issues.

1 Introduction

Misperceptions about contentious policy issues, such as immigration, remain pervasive. Anti-immigrant sentiments are a key reason for the recent surge in populism across Europe and the US (Dinas et al. 2019). Yet, prior research shows that attitudes towards immigrants are often based on false beliefs. In both the US and in Europe, natives vastly overestimate the proportion of immigrants, both at the national and local level (Alesina, Miano and Stantcheva 2018; Hopkins, Sides and Citrin 2018). In a representative survey in 2018, Germans overestimated the proportion of Muslims in the country by more than a factor of four (IPSOS 2018). These misperceptions can have far-reaching consequences: in Europe, the perceived share of immigrants has been shown to be a better predictor of anti-immigrant sentiments and social cohesion than the true proportion of immigrants (Koopmans and Schaeffer 2016; Hooghe and de Vroome 2015; Gorodzeisky and Semyonov 2019). Fittingly, Alesina, Miano and Stantcheva observe that “the political debate about immigration takes place in a world of misinformation”.

Why do individuals hold biased beliefs about immigrants? Some prior work has investigated individual-level correlates of knowledge about immigrants (Herda 2010, 2013). Other studies have examined the effects of providing individuals with information treatments in lab or survey experiments (Sides and Citrin 2007; Lawrence and Sides 2014; Alesina, Miano and Stantcheva 2018). However, causal evidence on the sources of misperceptions in non-experimental settings remains scarce. In this paper, we examine the causal relationship between misperceptions and an institution that is central to the functioning of democracy: the news media. In particular, we focus on one feature that has recently received considerable attention: competition in the market for local news (see e.g. Dunaway 2008). We ask whether monopolies in the local media landscape affect misperceptions about immigrants. More specifically, we analyze whether beliefs about the size of the local immigrant population are less accurate in regions with local news monopolies, where individuals have access

to only one local news outlet. In doing so, we speak to the question of whether further consolidation in the market for news has negative implications for knowledge about salient policy issues.

We argue that local news monopolies affect misperceptions through information diffusion in social interactions. Local newspapers are a key source of information on local events and conditions, including the presence of immigrants. While German local news coverage of immigrants is, on average, factual (Maurer et al. 2019), coverage varies in terms of sentiment, frequency, and thematic content (Ruhrmann 2002; Wellbrock 2011). Although most individuals only subscribe to a single local news outlet, they may be indirectly exposed to information from other outlets through interactions with close contacts in their local area (Katz 1957; Masip, Suau-Martínez and Ruiz-Caballero 2018; Druckman, Levendusky and McLain 2018). We propose that interpersonal communication allows individuals to aggregate information from different sources (Degroot 1974; Chandrasekhar, Larreguy and Xandri 2020). Potentially, information obtained from multiple sources will, on average, be more accurate, as slanting is evened out across outlets. As a result, access to a greater number of news sources may lead to more accurate perceptions at the individual level.

To estimate how news monopolies affect misperceptions about immigrants, we rely on a large-scale survey that was fielded in Germany between October 2009 and April 2010 (see Koopmans and Schaeffer 2016). About 5,200 respondents reported their perceptions of the relative size of the combined first- and second-generation immigrant population in their neighborhood. Drawing on fine-grained census data, we operationalize misperceptions as the distance between perceptions and the true presence of immigrants at the local level. Akin to work by Ansolabehere, Snowberg and Snyder (2006), we identify the causal effect of local news monopolies on misperceptions by exploiting local-level differences in the number of available news outlets in neighboring zip code regions. Frequently, newspaper coverage boundaries overlap. As a result, some individuals may have access to multiple news outlets, while their neighbors may only be able to subscribe to one single outlet. Exploiting

overlapping market boundaries, we compare individuals in monopolistic news markets to neighboring respondents who have access to two or more news sources. We implement this identification strategy through a careful geographic matching algorithm. Our design ensures that individuals in treated and control groups are both physically close and similar with respect to background characteristics, minimizing the likelihood of confounding.

We find that local news monopolies reduce misperceptions of the size of the local immigrant population. In monopolistic media markets, misperceptions are about four percentage points higher than in segmented media markets. Depending on the specification, the effect size translates into a modest increase in misperceptions of about 0.2-0.3 standard deviations. Reassuringly, this result is robust to a number of individual-level controls, as well as controls for local population density, tax revenue, indicators of civic engagement, and unemployment rates. In addition, we show that the results remain unchanged across a variety of model specifications, model parameter choices as well alternative operationalizations of the independent variable and the outcome. Finally, we devise two empirical tests to rule out that our results are driven by spillovers across neighboring regions.

In a second step, we demonstrate that the effect of local newspaper monopolies on misperceptions may derive from indirect information aggregation through interactions with close social contacts in the neighborhood. Using an EDCAS survey item, we can precisely measure the number of local social connections of survey respondents. We show that the effect of news monopolies is strongest for individuals who have a large number of social connections in their neighborhood. This finding aligns with our model of information diffusion through interactions with social contacts, suggesting that individuals in monopolistic news markets are only exposed to heterogeneous information when they interact with a sufficient number of social contacts. We emphasize that our results on the mechanism require on stronger identification assumptions than the main results, and should therefore not be seen as definitive evidence for the process that links newspaper monopolies and misperceptions.

In addition to our main result, we document several descriptive facts. First, we show that survey respondents overestimate the proportion of immigrants in their local area by a factor of about 1.8.¹ Second, the perceived proportion of immigrants is strongly correlated with the true share of immigrants at the local level, indicating that perceptions do, to some extent, map on reality.

Our findings contribute to the literature in several ways. We present the first causal estimates of the relationship between local news monopolies and biased perceptions of immigrants. In doing so, we demonstrate that exposure to information from multiple outlets can induce changes in perceptions at the individual level. When individuals obtain information from a larger set of news sources, misperceptions are less pronounced. This finding complements experimental work that shows that information treatments can, to some degree, decrease misperceptions (see e.g. Hopkins, Sides and Citrin 2018; Lawrence and Sides 2014). While experimental treatments are frequently one-off interventions in a controlled setting, our study demonstrates the impact of continuous exposure to a highly trusted news source.

Second, we underscore the importance of traditional news outlets as sources of information and bias in perceptions. Our research is situated in a field that has recently attracted a large degree of attention, as concerns about the spread of false news (Vosoughi, Roy and Aral 2018) and partisan reporting (Haselmayer, Wagner and Meyer 2017) have become widespread. Our work speaks to growing concerns that changes in the media landscape can reduce constituents' political knowledge (De Vreese and Boomgaarden 2006; Hayes and Lawless 2015). We emphasize that misperceptions are not set in stone: rather, a competitive media landscape can counter false beliefs. Akin to King, Schneer and White (2017),

¹This aligns with previous studies that have examined the magnitude of misperceptions. Alesina, Miano and Stantcheva (2018) for example estimate that German natives overestimate the number of immigrants by a factor of two. It should, however, be noted that Alesina, Miano and Stantcheva (2018) ask respondents to estimate the number of immigrants at the national level, while our survey item asks for the immigrants on the local level.

we show that traditional news outlets shape perceptions, discussions, and behavior around salient national political issues.

Third, our research also speaks to debates surrounding the degree to which individuals can choose between different media outlets and the formation of filter bubbles (Bakshy, Messing and Adamic 2015). Faced with greater choice between news sources, individuals may select into consuming news that confirm their own prior beliefs, decreasing exposure to cross-cutting content (Zuiderveen Borgesius et al. 2016). While confirmation bias and self-selection likely operate at the individual level, our results show that greater choice between news outlets can nevertheless have positive effects: we demonstrate that a greater number of available news sources increases the accuracy of perceptions about immigration, a salient policy issue.

2 Research on misperceptions

Individuals frequently overestimate the size of out-groups. This holds both with respect to immigrants (Koopmans and Schaeffer 2016; Sides and Citrin 2007), as well as for minority populations more generally (Hopkins, Sides and Citrin 2018). In Germany, Herda (2010) estimates that natives overestimate the population share of immigrants by a factor of 1.5. Natives not only misperceive the number of immigrants, but also other factors such as their welfare dependence (Fertig and Schmidt 2001), legal status (Herda 2018; Blinder 2015), and countries of origin (Herda 2015).

A related line of research examines how misperceptions affect political preferences and attitudes. In observational settings, the perceived presence of immigrants has been found to be more predictive of attitudes and behavior than their actual presence. Hooghe and de Vroome (2015) consider the case of Belgium, and find that a greater perceived presence of immigrants increases natives' hostility towards immigrants, even after accounting for actual

contact with immigrants. Similarly, Koopmans and Schaeffer (2016) use data from Germany, the Netherlands, and France to show that the perceived presence of immigrants has a stronger effect on neighborhood cohesion than the true presence of immigrants. Finally, Gorodzeisky and Semyonov (2019) employ survey data from 17 European countries, including Germany, to show that “misperceptions of the size of the immigrant population play a more important role than factual reality in shaping public views and attitudes toward immigration”. In conclusion, research on misperceptions and anti-immigrant attitudes demonstrates that perceptions are a key driver of attitudes towards immigration.

The apparent gap between perceptions and reality has motivated researchers to experimentally examine how individuals react to correct information about immigration. These studies, however, have yielded mixed results: recent work by Hopkins, Sides and Citrin (2018), Lawrence and Sides (2014), and Sides and Citrin (2007) suggests that correcting misperceptions has little impact on attitudes toward immigration in the American context, even though it does reduce the perceived size of the immigrant population. Alesina, Miano and Stantcheva (2018) find that providing natives with information about the labor market behavior of immigrants does increase support for redistribution, whereas information on the true size and origin of the immigrant population does not. Finally, Facchini, Margalit and Nakata (2016) provide experimental evidence that information treatments, highlighting the potential economic and social benefits of immigration increased support for liberal immigration policy in the Japanese context.

How does the media affect misperceptions? A large body of research has examined the relationship between media coverage and attitudes towards immigrants (see e.g. Boomgaarden and Vliegenthart 2007; Vliegenthart, Boomgaarden and Spanje 2012; Schlueter and Davidov 2013; Blinder and Jeannet 2018). However, there is relatively little research on the relationship between media consumption and knowledge about immigrants. A major example is Herda (2010), whose findings can be described as ambiguous. Herda regresses Europeans’ misperceptions on self-reported measures of radio, newspaper, and TV consumption. While

media consumption is associated with misperceptions, the direction of the effect depends on the type of media that respondents consume. Regarding the consumption of newspapers, the literature offers similarly ambiguous findings. Both Vergeer, Lubbers and Scheepers (2000) and Arendt (2010) show that newspaper consumption affects perceived threat and implicit attitudes towards migrants. However, their conclusions on the consumption of multiple outlets diverge. Vergeer, Lubbers and Scheepers (2000) state that consuming multiple outlets makes individuals less likely to perceive immigrants as threatening. Arendt (2010), on the other hand, finds that reading more than one newspaper increases negative implicit attitudes towards immigrants. Our research builds on these valuable insights. We utilize a research design that exploits local-level differences in the structure of media markets. In doing so, we expand on prior research by explicitly accounting for self-selection in media consumption (Freddi 2017).

3 Local news in Germany

We measure misperceptions at the local level. Individuals in our sample report on the perceived share of immigrants in their neighborhood. Consequently, we analyze the local media environment as a potential source of misperceptions. While national news outlets like television, radio, or online sources likely also affect overall perceptions of immigrants, local news outlets “provide the informational backbone of what people know about social life in their city” (Leupold, Klinger and Jarren 2018, p.960).

German local newspapers are well-established and highly trusted. In 2011, local newspapers reached 55.8% of all adults in Germany. Although online news sources have become more important in recent years, their relevance was still limited when our data was collected. In a representative survey of the German adult population in 2010, only 16% of respondents indicated that they consumed online news (Bundesverband Deutscher Zeitungsverleger 2011). In the 2009 German Longitudinal Election Study survey, only 5.7% of respondents reported

reading a daily newspaper online (GLES 2016). Similarly, only about 7% of the German population were active users of the largest online social network, Facebook, in the year 2010 (Statista 2014). Local newspapers are also deemed considerably more reputable than online sources. In a representative survey from 2018, more than 70% of respondents viewed daily newspapers as trustworthy sources of information, compared to less than 10% for social networks such as Facebook (Kunert, Hofrichter and Simon 2018). According to a representative survey from 2018, Germans view local newspapers as more trustworthy than even the most reputable national newspapers (Nic et al. 2018, p. 81). When asked about the reasons for reading the local newspaper, respondents most frequently mention local news reports about the region (87%), edging out national and international news.

The coverage areas of local newspapers mainly follow from the local economic geography, rather than from political or administrative units. Local newspapers are frequently headquartered in cities that act as regional centers. The coverage area then includes other towns and communities that have economic ties to the regional center, e.g. through commuting, commerce, or trade. Partially, this stems from the fact that local advertisers use news outlets to reach their target audience, which may extend beyond the county or even state where the newspaper is headquartered (Blotevogel 1984).

Mirroring trends across a number of industrialized countries, traditional news outlets in Germany face declining readership numbers and market consolidation. Local newspaper readership has been in steady decline over the last two decades. The total circulation of local newspapers in Germany has decreased by over 38%, from 18.1 million in 1995 to 11.1 million in 2018, raising concerns about possible negative effects due to consolidation in the market for local news (Trappel et al. 2013). The total number of daily newspapers sold in Germany has declined by 11% between 2011 and 2018 (Bundesverband Deutscher Zeitungsverleger 2018). Similar trends in the market for local news in the UK and the US have sparked concerns that the decreasing number of outlets available at the local level may render citizens less informed about local events. Recent research suggests that access to fewer news outlets may

compromise the extent to which constituents can hold local officials accountable (Hayes and Lawless 2015; Ramsay and Moore 2016; Gao, Lee and Murphy 2020).

3.1 News coverage of immigrants

In this section, we establish three key facts about local news reporting in the German context that form the basis of our theoretical argument for how local news monopolies affect misperceptions.

First, German local newspapers frequently report on both first and second-generation immigrants (Müller 2005). Ruhrmann and Meißner (2000) and Delgado (1972) find that coverage often focuses on immigrant crime and labor market participation. In a large-N content analysis, Fick (2006) shows that local newspaper reporting on immigrants has become more positive in recent years.

Second, there is substantial variation in reporting across local news outlets. To show this, we draw on data from a large-scale quantitative study conducted by Wellbrock (2011). Specifically, experts rated 97 German local newspapers on a variety of dimensions including reporting slant (*‘Unparteilichkeit’*). We visualize the distribution of the slanting scores across outlets in a density plot in figure A.4. The distribution approximates a normal distribution. The data clearly shows that German local newspapers vary considerably in how they report.²

This general trend of variation in reporting across outlets also translates to the domain of reporting about immigration specifically: local newspapers vary in the degree to which they slant in their reporting about immigration. This assumption builds on evidence presented by Ruhrmann (2002). In an analysis of a random sample of 1,150 from four local newspapers in the state of Thuringia, Ruhrmann (2002) demonstrates that the *Thüringische Allgemeine* is

²Arnold and Wagner (2018) present evidence along the same lines. In a detailed content analysis of more than 18,000 articles sampled from over 100 local newspapers, Arnold and Wagner (2018) show that there is considerable variance in reporting across outlets.

about twice as likely to report on immigrants as the *Thüringische Landezeitung*. In addition to the amount of coverage, the thematic focus varies considerably across the four outlets. Of all articles covering immigrants, about 30% of those appearing in the *Thüringische Allgemeine* cover immigrant crime. For the *Thüringische Landezeitung*, the share of crime-related reporting is only 17.6%. This aligns with recent evidence collected by Hestermann (2020), who demonstrates that national outlets likewise vary considerably in how positively or negatively they report about immigrants. Variation in newspaper reporting with regards to the frequency of the coverage, thematic content, and sentiment is key for our theoretical framework.

Third, while there is variation in news coverage about immigrants, prior research has shown that local news outlets report factually on first- and second-generation immigrants. This assumption is supported by Maurer et al. (2019), who analyze over 4,000 news reports on immigrants across six German news outlets. They find that, as the number of immigrants increases after 2014, the mean number of reports across all outlets increases proportionally. On average, news coverage accurately reflected the composition of the immigrant population in terms of age, nationality, and gender. However, Maurer et al. (2019) likewise find that coverage between newspapers varies in frequency of reporting on immigrants and in terms of sentiment of the coverage. Taken together, the evidence described by Maurer et al. (2019) indicates that the German media landscape is, on average, factual in its coverage of immigrants.

Before moving on, we illustrate what reporting looks like using the example of an outlet that features prominently in our data. We conducted a supplementary descriptive analysis of local reporting on immigrants in the *Saarbrücker Zeitung* (for more information, see section A.2 in the appendix). We find that this local newspaper highlights different aspects of immigration, such as immigrant participation in the labor market, integration through educational programs, or human interest stories about the life of newly settled immigrants. What is more, the *Saarbrücker Zeitung* reports prominently on religious activities, such as

outreach activities of the local Muslim community.

4 Information aggregation through interactions with social contacts

In the previous section, we have described that German local newspapers generally report factually on immigrants. However, newspapers vary in the frequency and sentiment of reporting on immigrants. We now lay out a theoretical framework in which interactions with close contacts can enable individuals to aggregate information from different news sources, resulting in more accurate perceptions of the size of the immigrant population.

Individuals in competitive markets have access to a greater number of local news outlets than individuals in monopolistic markets. When reporting on immigrants differs between outlets, aggregating information from multiple outlets can lead to more accurate perceptions about the size of the immigrant population. This aggregation, we argue, is most likely to occur through indirect exposure, or what Katz (1957) terms the “two-step flow of communication”. Prior research has shown that information from a news outlet can diffuse through social interactions (see e.g. Druckman, Levendusky and McLain 2018; Carlson 2019). If people discuss the news they consume with others, information from a given newspaper may reach individuals beyond its direct audience.

Prior research shows that how a group is presented in the media can affect public perceptions of the size of that group (Gilens 1996; Herda 2010). As an example, Gallagher (2003) discusses how inflated reporting on African-American crime in the American news media induces biased perceptions of the size of the African-American population. In our context, the discussion in the previous section has highlighted that German local outlets likewise differ in how frequently they report about immigration, and what topics they cover (e.g. immigrant crime), even when they cover a similar geographic area (Ruhrmann and Meißner 2000). More

generally, consuming news from outlets that devote more space to immigration may increase readers’ subjective size of the immigration population (Nadeau, Niemi and Levine 1993). In addition to the amount of coverage, topical focus may also induce changes in perceptions, especially when coverage focuses on issues that (some) readers perceive to be threatening, such as crime or religion (Herda 2010). While differences in coverage may induce innumeracy about minority populations, we argue that exposure to coverage from multiple outlets should lead to more accurate perceptions than exposure to only one outlet. Importantly, this claim rests on the assumption that local news outlets do not all over- or under-report on immigration, such that differences across outlets can be evened out through aggregation. We believe this assumption to be reasonable, as there is evidence for variance, but not for consistent political or topical slanting in German local news coverage (see section 3.1). We note that our argument applies on average, but does not necessarily hold for all individual cases. It is possible to construct a scenario where, in a single coverage region, the monopoly outlet reports in a perfectly accurate manner. In this case, the addition of a second outlet would not lead to more accurate perceptions through social information aggregation.

In segmented markets, individuals may be directly or indirectly exposed to information from multiple outlets. While theoretically plausible, the direct channel of reading multiple outlets does not appear consistent with data on news consumption – we return to this point at the end of this section. Rather than direct exposure, we propose that social interactions with close contacts may *indirectly* expose individuals to information from news sources that they themselves do not consume (Ellison and Fudenberg 1995; Huckfeldt et al. 1995; Druckman, Levendusky and McLain 2018). Based on survey data, interpersonal discussion about immigration appears to be common. In the 2016 Eurobarometer survey, 88% of respondents indicated that they ‘often’ or occasionally discuss politics with their friends and family (Statista 2020). Given widespread worries about immigration, it seems likely that these discussions also touch on immigration.³ Assuming individuals consume news from

³In the 2010 wave of the German Socio-Economic Panel Survey (SOEP), 63 % of respondents expressed

local newspaper *A*, they may additionally be exposed to the reporting from newspaper *B* by discussing immigration with their social contacts who read said newspaper (Druckman, Levendusky and McLain 2018).

When individuals are exposed to multiple outlets through social interactions, they may aggregate different pieces of information, leading to more accurate perceptions. As we laid out in section 3.1, newspaper coverage of immigrants varies in terms of frequency, sentiment, and thematic focus. Through indirect exposure (Druckman, Levendusky and McLain 2018), individuals in segmented markets may consume one outlet and then be exposed to another outlet by discussing immigration with their social contacts. While the exact aggregation mechanism is not known, prior research points to relatively simple averaging as a common way to combine multiple pieces of information (Alatas et al. 2016; Chandrasekhar, Larreguy and Xandri 2020). As a result, aggregation through indirect exposure may induce more accurate perceptions in segmented compared to monopolistic markets. This leads us to the following hypothesis.

Hypothesis 1: Individual misperceptions about the size of the local immigration population are larger in monopolistic markets than in competitive markets.⁴

Information aggregation crucially depends on indirect exposure to heterogeneous information through interactions with close contacts. In the absence of such interactions, information aggregation cannot occur. As long as not all close contacts consume news from the same source, more close contacts will increase the likelihood that individuals are indirectly exposed to information from multiple outlets. Therefore, we expect the effects of monopolies to increase as the number of social connections becomes larger.

Hypothesis 2: The effect of local news monopolies on misperceptions depends on the number of close contacts. The effect is strongest for individuals with a large number of social ties at the local level.

that they were ‘very’ or ‘somewhat’ worried about immigration to Germany.

⁴The precise definition of misperceptions about the local immigration population is given in 5.1.

Before moving on, we discuss the possibility that aggregation of information from multiple outlets happens directly rather than through social interactions. Potentially, readers are exposed to multiple pieces of information by reading more than one newspaper. In this scenario, information aggregation would occur at the individual level, and social contacts would not mediate the effect of local news monopolies. While theoretically plausible, data on consumption behavior suggests that this mechanism only applies to a relatively small subset of the population. In a representative survey of more than 2,000 individuals conducted in 2009, 73% of respondents indicated that they regularly read one local newspaper, while only 7% reported reading multiple local outlets (GLES 2019). Given that most readers only consume one outlet, it appears unlikely that potential difference between monopolistic and segmented markets are caused by direct aggregation effects. However, we emphasize that our main survey data does not include information on news consumption. We can therefore not definitely disentangle direct and indirect effects of exposure to multiple outlets.

Summarizing our theoretical argument, we argue that local newspaper monopolies increase individual misperceptions about the size of the local immigrant population. We postulate that individuals are indirectly exposed to different pieces of information through their social interactions. Consequently, they may aggregate information from different sources, resulting in more accurate beliefs about immigrants.

5 Data and empirical strategy

To study the effect of news media monopolies on misperceptions, we combine survey data with fine-grained information on the coverage areas of all German newspapers in 2011. To measure misperception at the individual level, we draw on the *Ethnic Diversity and Collective Action Survey* (EDCAS). With an effective sample size of around 5,200, EDCAS is the largest and most comprehensive survey that measures individual perceptions of the size of the local immigrant population in a single European country. The EDCAS survey was conducted in

2009 and 2010 by Koopmans and Schaeffer (2016), who also provide more details on the design and sampling procedure of the survey (Schaeffer et al. 2011).

In addition to socio-economic and demographic information, EDCAS includes a large number of survey items related to attitudes towards immigrants, social capital, social cohesion, and trust. Most importantly, the EDCAS survey asks respondents to estimate the combined proportion of first- and second-generation immigrants in their local area, with more than 96% of all respondents answering this question. For each respondent, we also observe the zip code area where he or she resides. In conjunction with fine-grained data from the 2011 German Census on the true spatial distribution of immigrants across the country, this allows us to precisely measure the degree to which individuals under- or overestimate the local presence of immigrants. We combine this data with a comprehensive data set with comprehensive coverage data for all local newspapers in Germany. We obtained the proprietary coverage data from the media market research company *Zeitungsmarktforschung Gesellschaft* (ZMG). ZMG is a part of the “Federation of German Newspaper Publishers” (BdZV), the trade organization of German newspaper publishers. The newspaper coverage data enables us to measure the number of available local news outlets in each respondent’s zip code region.

5.1 Outcome: misperceptions

We define misperceptions as the absolute difference between individual estimates and the true presence of the first- and second-generation immigrant population. To measure misperceptions, we combine an EDCAS survey item with grid-square data from the 2011 German Census. In the EDCAS survey, respondents are asked to estimate the combined share of first- and second-generation immigrants in their neighborhood. The precise question is as follows:

How large is the percentage share of people with a migration background in your

neighborhood? Migration background refers to a person that was either not born in Germany, or a person with at least one parent born outside of Germany. Please indicate a number between 0 and 100 percent.⁵

The EDCAS survey item explicitly refers to “migration background”, an official concept used by German statistical agencies. Our survey item follows the official definition, in that a person has a migration background if either this person or one of his or her parents did not have German citizenship at birth. As of 2011, this population comprised 15.3 million individuals (19.2%). Throughout this paper, we use the terms ‘immigrants’, ‘immigrant population’, and ‘migrants’ interchangeably to refer to the population with a migration background as defined by the German state. It should be noted, however, that about one third of this population was born in Germany.

The survey item implies a relatively small geographic area. In multiple other parts of the survey, ‘neighborhoods’ are defined as areas within ten minutes walking distance from respondents’ homes. For data privacy reasons, we are not able to perfectly align this definition of ‘neighborhood’ with the geographic unit at which the true proportion of immigrants is measured. For each EDCAS respondent, we have information on the zip code region where she or he resides. There are 8,200 zip code regions in Germany. The median zip code covers an area of about 27 km² and contains 6,500 inhabitants.

As shown above, EDCAS respondents are explicitly asked to provide an estimate of the relative size of the combined first- and second-generation immigrant population. Consequently, we construct estimates of the combined share of first- and second-generation immigrants for all zip code regions in Germany. In doing so, we rely on population figures from the 2011 German census, which are provided at the 1 km² grid square level. For each grid cell, we observe the absolute number of natives and first-generation immigrants. We

⁵Translated from the original German survey item. Please see section A.7 in the appendix for the German wording.

proceed in two steps. First, we aggregate the grid cells to the zip code level by matching grid centroids to the closest zip code area centroid. This step gives us the share of first-generation immigrants in each zip code area. While the census does not distinguish between second-generation immigrants and natives, county-level figures for those two groups are available from the German Federal Statistical Office. In a second step, we therefore multiply the zip code level proportion of first-generation immigrants by the ratio of first-generation to total immigrant population at the county level.⁶ Based on the estimated proportion of immigrants at the zip code level, we then define misperceptions of individual i living in zip code region j as follows:

$$Y_{i,j} = |\text{Immigrants}_{i,j}^{\text{Perceived}} - \text{Immigrants}_j^{\text{True}}|$$

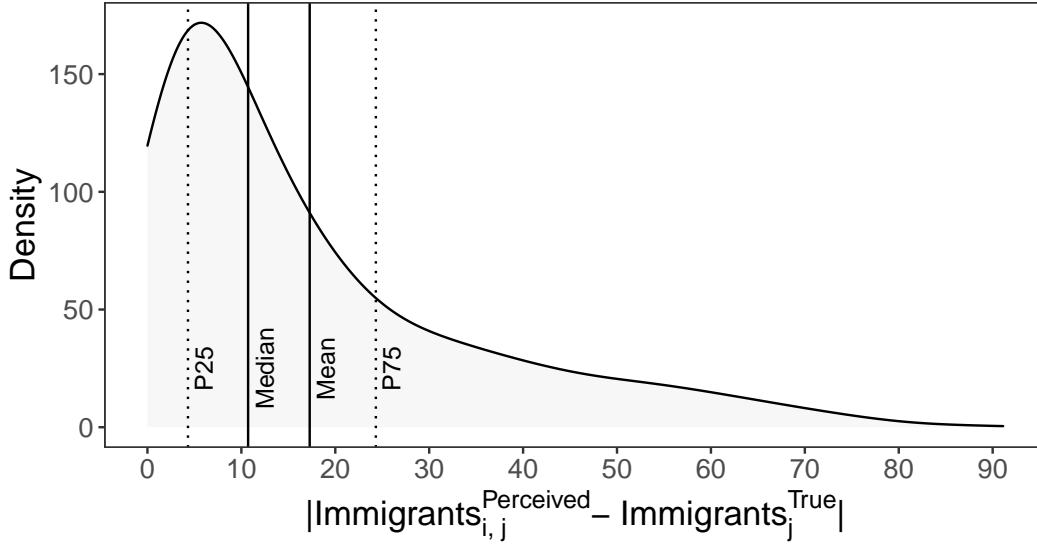
We operationalize misperceptions as the absolute difference between the perceived and true proportion of first- and second-generation immigrants. Our measure of misperceptions therefore incorporates both overestimation and underestimation of the true presence of immigrants.⁷ Since we use the absolute value, it is always positive and can be regarded as the distance between perceptions and reality. In figure 1, we visualize the distribution of our outcome variable. The figure shows that misperceptions are widespread: respondents misperceive the true proportion of immigrants by, on average, 17 percentage points. Given that the average size of the immigrant population across zip codes is merely 13.66%, misperceptions are sizable.

Before moving on, we discuss the difference between zip code areas and neighborhoods. For data privacy reasons, zip code areas are the smallest geographical to which we can link survey respondents. The relative difference in size between neighborhoods and zip code areas may appear large at first. However, we can use the census grid cell data to descriptively

⁶We assume that the ratio of first-generation immigrants to individuals with any migration background is constant within counties.

⁷We note that overestimation is much more common than underestimation. In section 6.2, we describe an additional specification that just looks at overestimation

Figure 1: Misperceptions about immigrants (first- and second-generation)



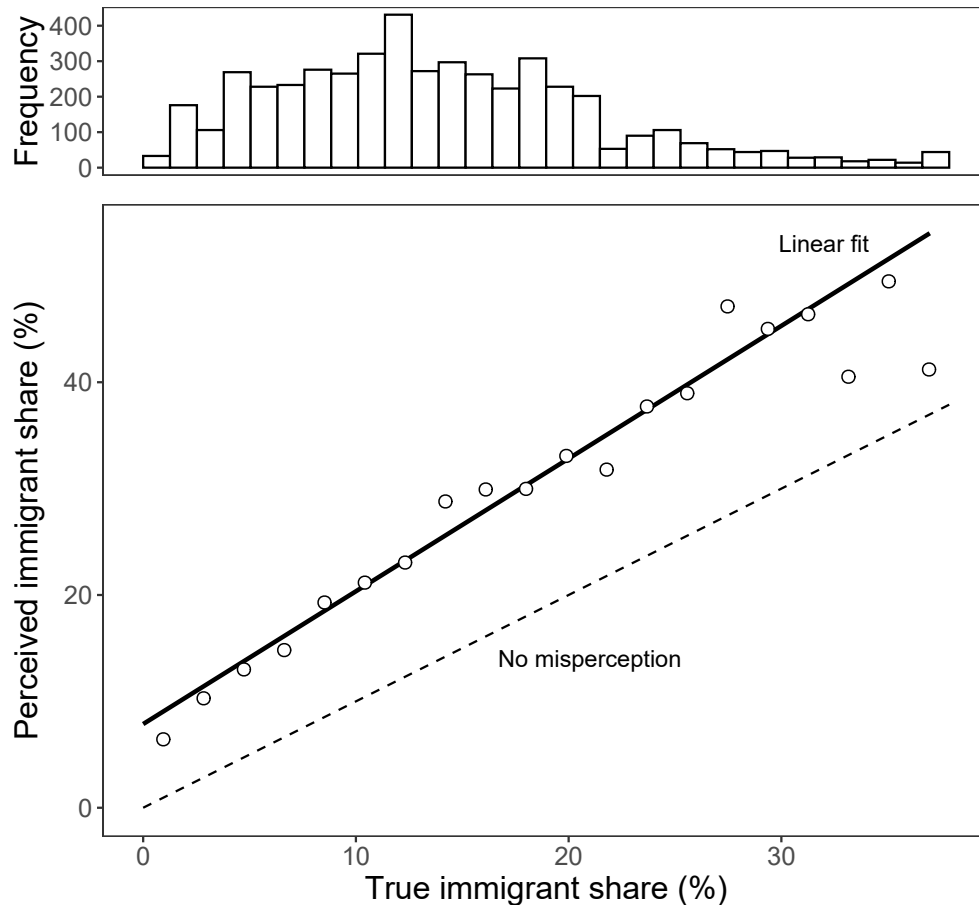
Note: Misperception is defined as the absolute difference between the perceived and true proportion of first- and second-generation immigrants for individual i living in zip code region j . The true proportion is measured at the level of the zip code area. The dotted vertical lines indicate the interquartile range, while the solid vertical lines indicate mean and median misperceptions among all survey respondents.

show that the resulting measurement error is likely unproblematic. As stated before, the definition of a neighborhood as given in the EDCAS survey suggests that neighborhoods are, on average, about 3 km² in size.⁸ While the median size of each zip code area is 27 km², two-thirds of its population live in an area of, on average, 4 km². Since our analysis only considers populated areas, the area at which perceptions are measured is therefore much closer to the area at which the immigrant population is observed. In addition, we show that the immigrant population is relatively evenly distributed within zip codes. Within zip code areas in Germany, the median standard deviation of the true share of immigrants stands at a mere 2.1 percentage points. While the problem of spatial mismatch between ‘neighborhoods’ and zip code areas remains, low variance within zip code areas suggests that the immigrant population in zip code areas can be seen as a reasonable proxy for the neighborhood-level presence of immigrants. However, we concede that an ideal measure would be based on a

⁸We are assuming that 10 minutes of walking corresponds to roughly 1 km distance in any direction. This gives a total neighborhood size of 3.14 km².

closer spatial alignment between perceptions and the true presence of immigrants.

Figure 2: Perceived and actual share of immigrants



Note: In the bottom panel, the x-axis shows the true immigrant share in each zip code area, and the y-axis shows the average perceived share of first- and second-generation immigrants. The binned scatter plot shows average perceptions conditional on levels of true immigrant shares. The dashed line illustrates a scenario in which perceptions are unbiased, i.e. where the true share on average equals the perceived share. The solid line displays predicted values from a linear regression model fitted to the EDCAS data. The top panel is a histogram of the true immigrant shares.

While respondents consistently fail to provide correct estimates of the true local immigrant proportion, perceptions do map to changes in the proportion of immigrants. In figure 2, we display the average perceived share of immigrants conditional on the true share in each zip code area. Although overestimation is pervasive, the average perceived share of immigrants increases with the true proportion of immigrants. We also descriptively explore the individual-level predictors of misperceptions. In figure A.2 in the appendix, we show the

bivariate correlations between misperceptions and a variety of individual-level characteristics. Misperceptions tend to be less pronounced for older respondents with higher incomes. A minority of EDCAS respondents are migrants themselves. Strikingly, we observe that misperceptions are particularly strong among these immigrant respondents. Possibly, immigrants interact more frequently with other immigrants, leading them to overestimate the presence of immigrants in their local area.

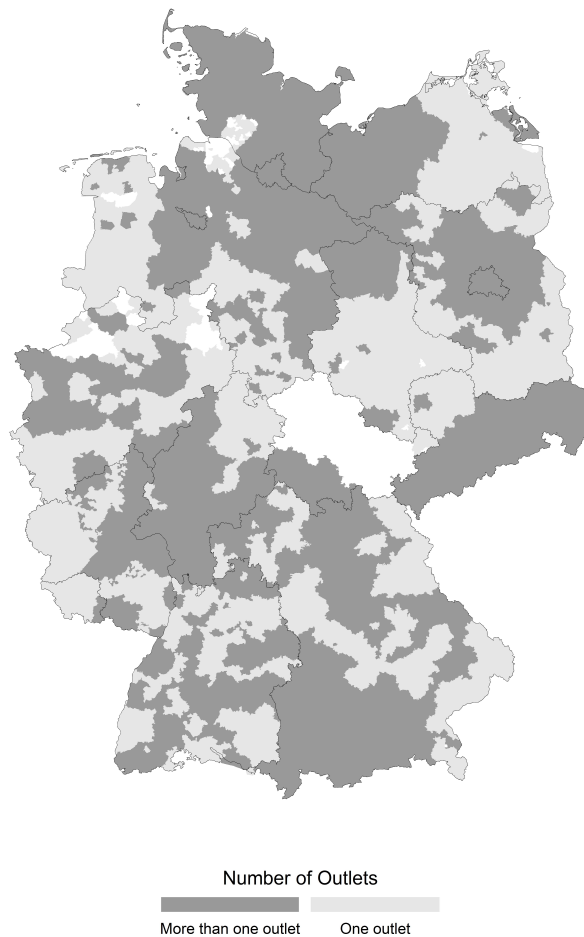
5.2 Treatment variable: local newspaper monopolies

We compare individuals in monopolistic news markets to individuals in neighboring segmented markets. Our main independent variable is a binary variable $T_{i,j}$, which is equal to one if an individual lives in a zip code region that is covered by only a single local newspaper and zero if multiple news outlets cover the area. In line with prior research, we argue that the effects of media consolidation are likely most pronounced when they lead to the formation of local monopolies (Gentzkow, Shapiro and Sinkinson 2011). As an additional check, we also discuss a specification that uses the absolute number of outlets, rather than the binary monopoly indicator, as the primary independent variable (see section 6.2).

There is considerable regional variation in the presence of newspaper monopolies. Figure 3 illustrates the spatial distribution of local news monopolies. In 44.1 % of German zip code regions, the market for local news is monopolistic. In figure A.1 in the appendix, we show the distribution of local newspaper monopolies by state. While local news monopolies are more common in less densely populated states, they can be found in all German states. For all empirical analyses in the following sections, we focus on within-state and within-county variance in local news monopolies.

Before moving on, we discuss the availability of local outlets outside of their core coverage areas as a potential source of measurement error in our data. It is possible that some individuals subscribe to a newspaper regardless of whether this outlet covers local news in

Figure 3: Local news monopolies in Germany



Note: The map shows the geographic distribution of local news monopolies in Germany. Darker shaded areas indicate regions where only one local news outlet is available. White areas are regions where data on the local news market is missing.

their residential area. Former residents of Berlin, for instance, may continue to subscribe to the *Berliner Zeitung* even after moving to a different state. Unfortunately, our ZMG media market data does not allow us to calculate the share of readers outside of the core coverage region for each individual newspaper. However, we collected additional data to examine the prevalence of news readership outside of coverage areas using the example of Berlin's largest daily newspaper *Tagesspiegel*. For this outlet, 85% of sales are made within Berlin. The state Brandenburg (the state bordering Berlin) accounts for about 13% of sales. We note that Brandenburg contains many commuters who work in Berlin. Only 1.4% of sales are

made to customers outside of the Berlin–Brandenburg metro area.⁹ However, we recognize that out-of-state subscriptions may lead us to falsely classify some monopolistic markets as segmented. We address this issue by discarding all outlets that account for less than 1% of all subscriptions in a given zip-code region. We emphasize that our results hold regardless of this coding procedure.

5.3 Empirical strategy

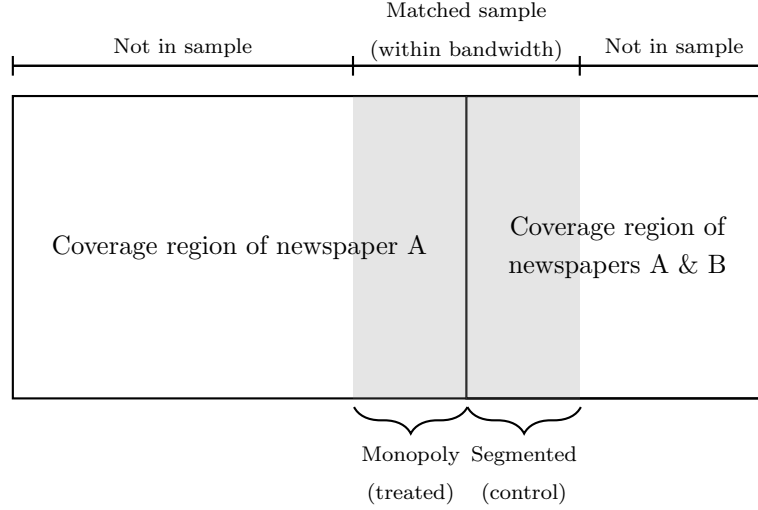
To identify the causal effect of local newspaper monopolies on misperceptions, we utilize plausibly exogenous variation created by overlap between adjacent media markets in small areas around these overlap regions. We compare individuals in news monopoly regions to individuals that are similar with respect to a variety of observable characteristics but are situated in neighboring segmented markets. Crucially, our analysis focuses on regions where the coverage regions of two newspapers overlap. This means that we always compare individuals who only are able to receive newspaper *A* with individuals who can receive newspaper *A* and newspaper *B*. Our key identification assumption is that the treatment (i.e. a local monopoly) is as good as randomly assigned at the intersection of the overlapping coverage areas of newspapers *A* and *B*.¹⁰

We implement our identification strategy through a matching algorithm. First, for each treated individual residing in a monopoly region, we identify all available control individuals within a radius of z kilometers. Control individuals have to live in regions covered by the treated individuals’ newspaper, and also by at least one additional outlet. The last condition allows us to specifically analyze regions where newspaper coverage areas overlap. Second,

⁹This calculation is based on our own ZMG data in conjunction with data on the total sales volume of the outlet in 2011 collected by IVW (2021).

¹⁰For illustrative purposes, we describe a scenario where the segmented market consists of two newspapers. With more than 78% of all cases, this is the most common scenario in our analysis. However, for a small number of cases, we compare monopolies to markets with three or more newspapers.

Figure 4: Visualization of the overlapping markets design



Notes: The figure visualizes our empirical strategy. The rectangles represent newspaper coverage areas. The shaded areas represent our matched sample, i.e. the region surrounding the boundary of the coverage area of newspaper B .

among the set of potential control units, we choose the M units that are closest to the treated unit, as measured by the Mahalanobis covariate distance. We visualize the matching procedure in figure 4, where the shaded areas indicate the region from which individuals that make up the final matched sample are selected.

In addition to physical distance, we match on individual migration background, gender, age, employment status, and education, as well as population density and the unemployment rate at the municipality level as covariates in this step. As recommend by Imbens and Rubin (2015, p. 451), we vary the maximum number of control units that are matched to each treated unit $M \in \{1, 2, 3, 4\}$ as an additional robustness check.¹¹ Finally, we also vary the maximum allowed distance between matched treated and control units z . We view matching as a nonparametric pre-processing step in our analysis (Ho et al. 2007; Iacus, King and Porro 2019). All treated units for which no match within a radius of z kilometers could be

¹¹The returns to increasing the number of control units matched to each treated unit with respect to reducing the sampling variance of the treatment effect estimate decrease rapidly beyond $M = 4$ (Rosenbaum 2020).

found are pruned. We also match with replacement, i.e. one control unit can be matched to multiple treated units. In doing so, we prioritize unbiasedness over variance reduction and do not artificially inflate our sample size by duplicating control observations. Each matched control unit enters the data set only once. All unused control units are removed from the data set.

Figure 5: Visualization of the matching procedure



Note: The figure depicts the southern part of the state of Baden Württemberg, Germany. Darker-shaded zip code regions are local news monopolies. The jittered white circles represent respondents that are part of the matched sample. Respondents are matched to each other when the circles are connected by dotted lines.

In figure 5, we show what the matching procedure looks like in practice. In the southern part of the state of Baden-Wuerttemberg, two local newspapers, the *Badische Zeitung* and the *Südkurier* are available in the city of Waldshut-Tiengen. However, only the latter newspaper covers the neighboring regions around the city of Lauchringen, creating a local

monopoly. We assume that the variance in the independent variable across geographically close regions within one single county is exogenous to our potential outcome of interest.

As laid out in figures 4 and 5, we generally compare individuals in monopolistic markets who live very close to individuals in regions with at least one additional news source. We assume that conditional on geographic proximity *and* conditional on covariates, the treatment assignment is independent of the potential outcomes for the control units¹²:

$$T_{i,j} \perp\!\!\!\perp Y_{i,j}(0) | X_{i,j}$$

In figure A.9 in the appendix, we present balance on observables before and after matching and at varying distance cutoffs z . Our matching algorithm considerably improves balance on observables, particularly with respect to zip code level characteristics. In figure A.8, we calculate the normalized difference between the treated and control units as a scale-invariant balance measure (Imbens and Rubin 2015, p. 361). We find good balance in our main matched sample using a distance caliper of 25km.

Our main results are derived from an OLS specification that can be described as follows:

$$Y_{i,j} = \alpha + \tau \text{Monopoly}_j + \varepsilon_{i,j}$$

Here, $Y_{i,j}$ measures the level of misperceptions of individual i in zip code area j , as defined in section 5. The main estimand in this study is τ , the effect of monopolistic local news markets on individual misperceptions. In addition to the intercept α , we include a vector of covariates $\mathbf{x}_{i,j}$ in some of our model specifications to adjust for any remaining covariate imbalance after

¹²We only require that the treatment assignment is independent of the potential outcomes for the control units. This is possible because (1) we estimate the average treatment effect on the treated (ATT) and (2) the sample moments of the distribution of $Y(1)$ among the treated units are observable (Heckman, Ichimura and Todd 1997, p. 611). As usual when implementing matching estimators, we also assume overlap for the control units, i.e. $0 < P(T_{i,j} = 1 | X_{i,j}) < 1$.

matching. We use the exact same covariates that we selected for the matching procedure, i.e. migration background, gender, age, employment status, education on the individual level, as well as population density and unemployment rates at the municipality level. For all models, we cluster standard errors at the zip code level.

Before moving on, we discuss three potential concerns with our empirical strategy. First, spillovers between areas with and without local monopolies could pose a problem. Returning to the example in figure 5, individuals in the monopolistic Lauchringen region may commute to Waldshut-Tingen, where the market for news is segmented. Second, some media market boundaries may coincide with other meaningful boundaries, such as administrative or political boundaries. In sections 6 and 6.2, we present qualitative and quantitative evidence to address the aforementioned issues. Taken together, the additional tests substantiate that our results are not driven by either spillovers or the fact that coverage area boundaries coincide with other borders. Finally, we note that local news monopolies may sometimes arise through newspaper mergers. When one newspaper is taken over by another, part of the editorial team of the exiting newspaper may continue to work for the new monopoly outlet. This could result in a shift of reporting, even if the remaining monopoly outlet nominally remains the same. However, we would like to point out that this mechanism likely does not drive the variation in local news monopolies we exploit in our study design. Our matching algorithm requires that the monopoly outlet is available in both of the neighboring zip-code regions we compare in our analysis. To the extent that the monopoly in the treated region was created through a merger, this merger likely also affected the control region. Newspaper mergers are unlikely to introduce systematic differences between the treated and control groups in our analysis.

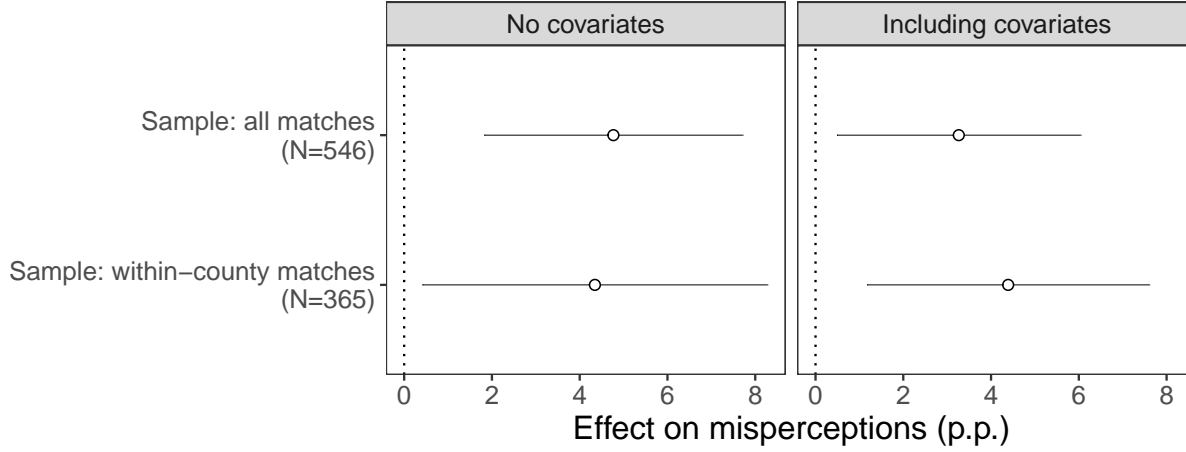
6 Results

In figure 6, we present coefficient estimates from two linear regressions, using the matched data set as described in section 5.3. We find that local newspaper monopolies increase individual-level misperceptions. For individuals in monopolistic newspaper markets, misperceptions are about three to five percentage points greater than for those in segmented markets, depending on the specification. This corresponds to an increase of about 0.3 standard deviations or 21% – 38% relative to the non-monopoly baseline, which is the intercept in the models (see table A.3 in the appendix for more detailed results). The estimates of the average treatment effect on the treated are significant at conventional levels.

We find that the main result holds when we control for both individual-level covariates, as well as for population density and unemployment rates at the municipality level (see table A.1 in the appendix for an overview of the covariates). In figure A.7 in the appendix, we standardize the misperceptions outcome to better compare the effect size of the monopoly indicator to the control variables in the model. We find that the observed difference between monopolistic and segmented markets is about 60% of the difference in misperceptions between first-generation immigrants and natives. Similarly, it is equal to about the difference between men and women. Taken together, the quantities in figure A.7 suggest that local newspaper monopolies have modest effects on misperceptions.

For the main results, we set the distance caliper to be $z = 25\text{km}$ and the maximum number of matched units to be $M = 1$. We therefore match each treated unit to one single optimal control unit. We emphasize that the distance caliper specifies the *maximal* permissible distance between treated-control pairs. However, the average distance between observations in the matched data is considerably lower, at about 15 kilometers. In section 6.2 we demonstrate that our results are robust to different choices of the distance caliper and the maximum number of matched units, regardless of whether we use covariates or not.

Figure 6: Effect of local monopolies on misperceptions



Notes: The figure displays estimates from a linear regression after matching on adjacency and covariates. The unit of observation is the individual. Treated individuals only have access to one local news outlet, while those in the control group have access to two or more. Positive effect sizes indicate that misperceptions of the relative size of the first- and second-generation immigrant population are stronger in monopoly markets. We show results for models with and without control variables, as well as for the full matched sample and the sample of matched individuals that reside in the same county. The horizontal lines represent 95% confidence intervals. For detailed results, see table A.3 in the appendix.

A potential concern is that even for small distance calipers, the boundaries of coverage areas may coincide with administrative or political boundaries. While we cannot be certain that our design never leads to comparisons across other meaningful boundaries, we argue that these comparisons are likely rare. Prior qualitative work suggests that regional economic interdependencies and demands by advertisers, rather than administrative boundaries, determine coverage areas (Blotevogel 1984, see also the discussion in section 3). Also, respondents are never matched across state boundaries. In fact, the majority of treated respondents (61%) are matched to control individuals within the same county. What is more, our matching algorithm requires that individuals in treated and control regions are covered by at least one common outlet. Pairs of matched individuals are therefore situated within a common media market. To more directly address this concern, we also present results for a sample that only contains matched pairs of respondents who reside in the same county (see figure 6 and table A.3 in the appendix). Here, we explicitly do not compare across county

borders. Reassuringly, this yields similar results to our main analysis.

6.1 Heterogeneity

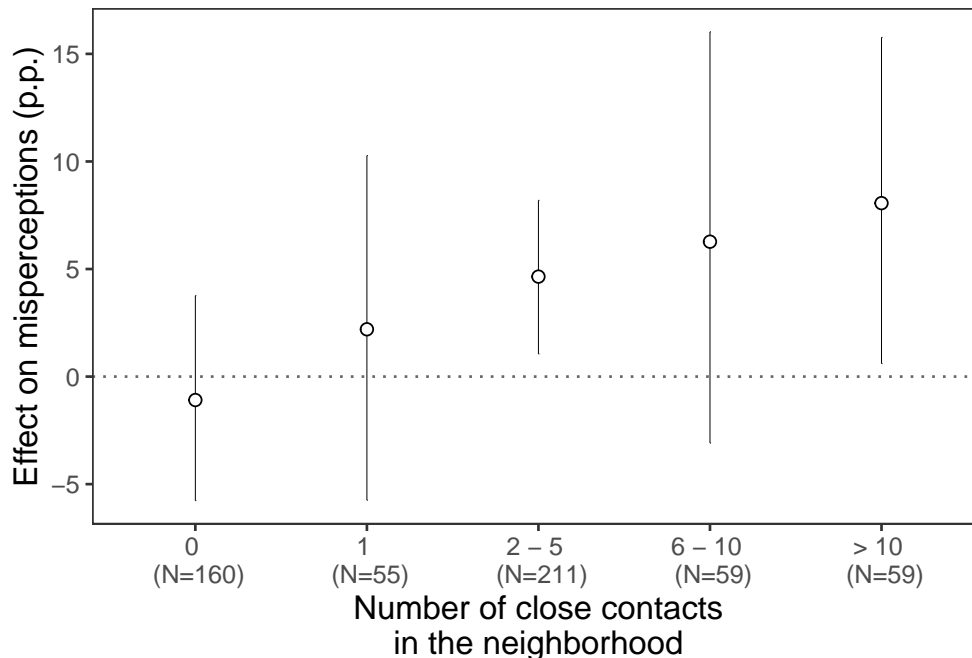
Following our theoretical model, we posit that the effect of newspaper monopolies works through the indirect aggregation of information through interactions with close social contacts. If information from multiple news sources diffuses through interaction with others, individuals with few or no social contacts should be less affected by the local media environment. The EDCAS survey allows us to directly test the moderating effect of social contacts through the self-reported number of close contacts or friends in individuals' neighborhoods. The precise question wording is as follows:

How many of your friends live in your neighborhood?

- One
- Two
- 2–5
- 6–10
- More than 10

Using the same specification as in figure 6, we estimate the effect of monopolies conditional on the number of an individuals's social contacts. In doing so, we re-estimate model 2 in table A.3 in the appendix, but interact the binary monopoly indicator with the categorical close contact variable. We then take 10,000 draws from the posterior coefficient distribution to account for post-estimation uncertainty. For each draw, we calculate $E[Y|T = 1, C = c] - E[Y|T = 0, C = c]$ at each value of the 'contacts' variable here denoted as C . As a result, we obtain an estimate of the effect of monopolies conditional on the number of social contacts.

Figure 7: Effect of local monopolies on misperceptions (heterogeneity by number of close contacts)



Note: The figure shows the estimated effect of local media market monopolies on misperceptions, conditional on the number of an individual's close contacts in their respective neighborhood. The effect is the expected difference in misperceptions of the first- and second-generation immigrant population between individuals located in monopolistic vs. segmented markets. Positive effect sizes indicate that misperceptions are stronger in monopoly markets. The vertical lines represent 95% confidence intervals.

In figure 7, we present the results. For respondents who report having zero or one close contacts, misperceptions are unaffected by the local media landscape. Reassuringly, this confirms our theoretical prediction: without indirect exposure to information through close social contacts, monopolies do not affect individual misperceptions. In contrast, we observe sizable effects for individuals with a larger number of close contacts. The point estimates for the effect of monopolies on misperceptions increase almost linearly in the number of contacts. We stress that this linear increase in the estimated effect size is not a result of our model specification but stems directly from the data. We estimate the interaction term separately for each response category of the close contacts variable. As an alternative specification, we present the results using a standard linear interaction term in figure A.5 in the appendix,

where we show that results are similar.

We conclude that a segmented media landscape reduces misperceptions only when individuals can exchange information through interactions with social contacts. As a note of caution, we emphasize that causal identification is difficult when the moderator is not randomly assigned. The number of close contacts could be correlated with a range of possible confounders, so we caution against a causal interpretation of the results in figure 7. However, the results confirm a prediction that stems directly from our theoretical model, supporting the hypothesis that the effect of local newspaper monopolies works via the diffusion of information through interactions with close contacts.

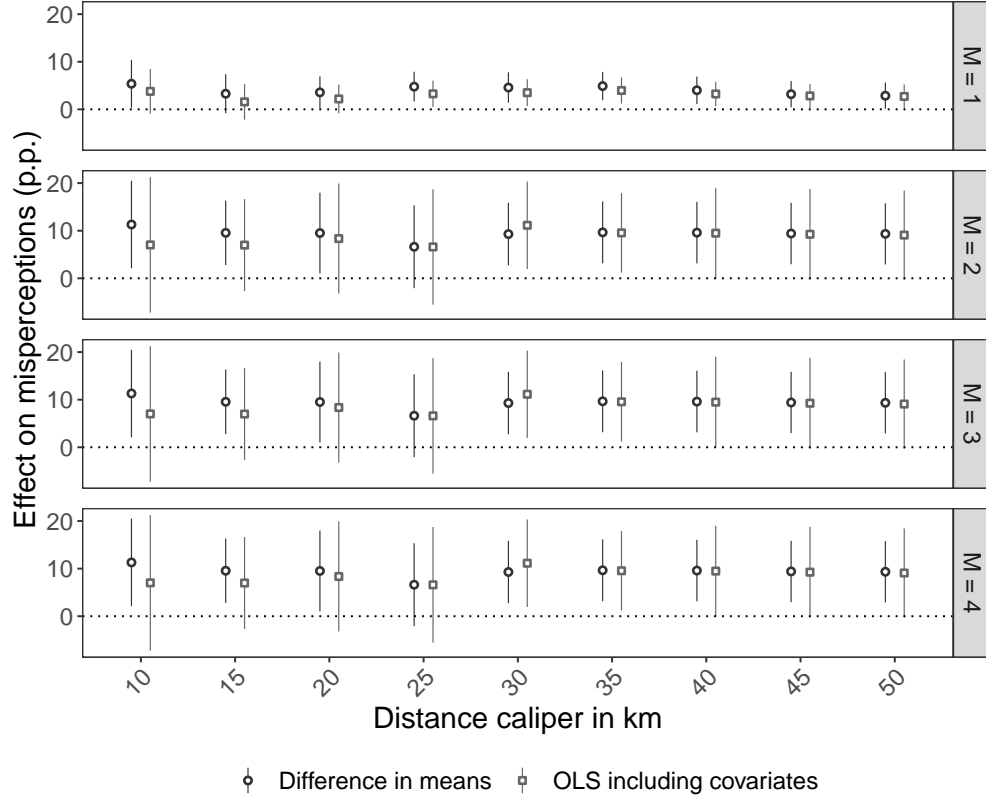
6.2 Robustness & alternative specifications

Through several additional checks, we address potential concerns regarding the choice of matching parameters, idiosyncrasies of the matched sample, outliers, spillovers, national news exposure as well as alternative definitions of the independent variable and the outcome.

First, we verify that our results are not driven by the matching parameters z and M . In figure 8, we show the results are robust to varying the distance calipers z and different maximum numbers of control units matched to each treated unit M . Since directly adjacent regions should be most comparable, the conditional independence assumption is most likely to hold for the smallest values of the distance caliper z . Reassuringly, we find large and significant effects when we set the distance caliper to its minimum value, $z = 10\text{km}$. Across all 72 model specifications, the mean effect estimate is 3.47 percentage points, which corresponds to a 0.16 standard-deviation increase in the dependent variable.

Second, we present results from models in which we omit the matching procedure and instead consider the full sample. Using fixed effects, we approximate our matching algorithm through a within-state comparison of monopolistic and segmented media markets. In the first two columns of table A.13 in the appendix, we confirm that the results, while somewhat

Figure 8: Sensitivity



Note: The plots show the estimated effect of monopolies at varying treated-control maximum distance thresholds. We also vary the maximum number of control units matched to each treated unit M . The standard errors are clustered by zip code. Information on the total sample size in each matched data set is provided in figure A.11 in the appendix. Figure A.10 shows the average distance between treated and control units in the matched sample.

smaller in magnitude, are consistent with the matching results presented in figure 6.

Third, we exclude unrealistically high estimates of the local immigrant population. Some respondents estimate that the proportion of immigrants in their neighborhood exceeds 90%. While these responses may correspond to actual beliefs, outliers could also stem from a lack of attention, difficulties in understanding the survey question, or unfamiliarity with proportions. In models 1 and 2 in table A.4 in the appendix, we verify that our results are robust to excluding the largest 5% of misperception responses.

Fourth, we address the concern that our results might be driven by skewness in the

distribution of our outcome variable. We apply two transformations to our dependent variable to address this concern: a log transformation and the Box-Cox transformation – two methods that are commonly recommended to deal with non-normality (Sakia 1992). After applying the transformation, our dependent variable more closely approximates a normal distribution. Reassuringly, we are able to replicate our main results using these transformed outcome variables (see table A.9 in the appendix).

Fifth, we limit our analysis to overestimation rather than general misperceptions, since drivers of over- and underestimation could be distinct (Herda 2013). In models 3 and 4 in table A.4 in the appendix, we confirm that the matching results hold when we limit the sample to respondents who overestimate the proportion of immigrants. In columns 3 and 4 of table A.13, we consider the whole sample of individuals who overestimate, without using the matching procedure. We again find suggestive evidence that monopolies increase overestimation, although these results are only significant at $\alpha = 0.1$.

Sixth, we use the number of outlets rather than the binary monopoly indicator as the main explanatory variable. Again, we rely on the full sample in conjunction with controls and fixed effects.¹³ Based on our theoretical framework, we expect a non-linear relationship between misperceptions and segmentation in the market for news. When there are already a lot of news outlets in the market, each additional outlet should have a smaller marginal effect compared to markets where there are only one or two outlets. In table A.14 in the appendix, we present two ways of modeling misperceptions: as a linear and then as a quadratic function of the number of outlets. We do not find a relationship for the linear specification – rather, the evidence points to a quadratic relationship. The quadratic specification is significant at $\alpha = 0.1$ when we include outliers, and significant at $\alpha = 0.05$ once we exclude them. We

¹³We deliberately do not employ our matching algorithm to estimate the effect of the number of outlets. In principle, we could estimate the generalized propensity score, i.e. the conditional density of the number of newspapers given covariates (Imbens 2000; Imai and van Dyk 2004). However, given our limited sample size, this would require us to abandon the logic of comparing geographically proximate individuals.

conclude that the relationship between misperceptions and the number of outlets is likely decreasing and convex, confirming our prior expectations. Misperceptions decline as local media markets become more segmented. However, the magnitude of this decline is smaller when there are already a large number of outlets in the market.

Seventh, we address the role of national and online news media as a source of perceptions. Based on prior research, perceptions are likely driven in part by the consumption of different types of local and national media, such as newspapers, radio, television, and the internet (Herda 2013). To isolate the effects of local news, we estimate a series of additional models that control for the zip code level readership of Germany’s largest national newspaper *Bild*, as well as the share of households with access to broadband internet. In tables A.6 and A.7 in the appendix, we show that neither the addition of *Bild* readership nor broadband access changes our results, demonstrating that local news affect perceptions above and beyond consumption of national and online news.¹⁴

Eighth, we consider income and civic engagement as potential confounders for the relationship between local news monopolies and misperceptions. In tables A.10 and A.11 we repeat the same analysis as for our main results but now consecutively include a number of proxy measures for the level of income and civic engagement at both the individual and zip code level in the regression analysis. Reassuringly our results are robust to the inclusion of household income, tax revenue, native employment, turnout, and club membership as additional control variables.

Finally, we address the possibility of spillovers between adjacent media markets. Causal identification requires no spatial autocorrelation across individuals, i.e. the potential outcome of person i must be independent of person j ’s treatment status. While we cannot

¹⁴We were not able to obtain finely disaggregated data on TV or radio consumption in 2011. The *Bild* readership data comes from the same source as our newspaper coverage data. We caution against a causal interpretation of the point estimates presented in table A.6 and A.7, as national news readership and broadband access might constitute collider variables in this case (Rosenbaum 1984).

entirely rule out spillover effects across zip code boundaries, we address the issue in two ways. Akin to a ‘donut’-RD design (see Barreca, Lindo and Waddell 2016), we first impose the constraint that treated and control individuals live at least 20 kilometers but no more than 50 kilometers away from each other. In this sample, the geographic distance between treated and control units makes spillovers less likely while still achieving balance on observables. We present the results in table A.5. We find that our results are robust to this modification (we note that the results are only significant at $\alpha = 0.1$ when we include covariates).

As an additional check for spillovers, we perform a placebo test. We subset the data to individuals in competitive markets and regress misperceptions on the proportion of neighboring zip code regions with monopolistic newspaper markets. In doing so, we capture the degree to which individuals in segmented markets are exposed to potential spillover effects from monopoly regions. We find no evidence that the monopolies in neighboring regions affect individual misperceptions (see table A.8). Both tests suggest that potential spillovers are not large sources of bias in our design.

We note that another source of spillover effects across adjacent markets could be that individuals consume online news. However, as we have discussed in section 3, online news readership was low during the period of our study. In a 2009 survey (GLES 2016), only, 5.7% of respondents reported reading any daily newspaper online. We note that this number refers to the prevalence of online newspaper readership overall. Among the individuals who indicate to consume news online, only a subset will consume local news from a neighboring media market as defined in our analysis. Consequently, we maintain that spillovers due to online news consumption likely only affect a very small subset of our sample.

7 Discussion

This paper has provided novel causal evidence on the effects of local news monopolies on misperceptions about immigration. Utilizing overlap in newspaper coverage areas, we show that access to a greater number of news sources decreases individual misperceptions about immigrants. The effect is particularly pronounced for individuals who have a larger number of close contacts. This supports our hypothesis that individuals aggregate information from a variety of sources through interactions with close social contacts at the local level. The evidence thus brings clarity to a heretofore underexplored consequence of newspaper monopolies: knowledge about salient policy issues.

Before discussing the wider implications of our research, we discuss four caveats. First, we only present correlational evidence for the proposed mechanism of information diffusion through social interactions. Our moderating variable may be associated with other, possibly unobserved, confounders. While the moderating effect of the number of social contacts aligns with our theoretical argument, we cannot claim to perfectly describe the mechanism that underlies the relationship between local newspaper monopolies and misperceptions of the immigrant population. A possible alternative explanation may be direct exposure to multiple outlets. While consumption of multiple outlets is uncommon, we do not have sufficient data to disentangle direct and indirect consumption effects. Consequently, we again emphasize that evidence on the mechanism should be viewed as suggestive rather than definitive.

Second, our study period predates the ascent of online news websites and social media as major news sources (see section 3, where we provide more evidence on this). We cannot directly speak to how the interplay between traditional news sources and social media affects misperceptions. Given the high trust they enjoy, (Nic et al. 2018), local news outlets likely continue to serve as important sources of information. In addition, prior research has established that a large proportion of online news is provided by traditional news sources,

such as local and national newspapers (Wolf and Schnauber 2015). This holds true particularly for local news, for which traditional outlets remain the main source (Schweiger 2017). Therefore, the effects of monopolistic *traditional* news media likely persist even as exposure to non-traditional news sources rises. Still, examining how the effects of newspaper monopolies are moderated by the increasing importance of non-traditional, online news sources is a promising direction for future research.

Third, we recognize that there is a discrepancy between the level at which the aggregate presence of immigrants is measured (zip code regions) and the level at which individuals report perceptions (neighborhoods). To partially address this discrepancy, we show that adding zip code region size as a control does not change our results (see table A.12). Nevertheless, data limitations prohibit us from constructing a measure of perceptions that is more closely aligned with the geographic unit at which the presence of immigrants is observed.

Finally, we emphasize that the effects of local newspaper monopolies are relatively modest, as we discuss in section 6. Given that perceptions of the size of the immigrant population are likely affected by a large number of factors, we reiterate that future research should examine the effects of market composition for other media types, such as national or online news.

We highlight the positive aspects of our findings: our research provides a counterpoint to the narrative of filter bubbles (see e.g. Flaxman, Goel and Rao 2016; Zuiderveen Borgesius et al. 2016). When faced with the choice of different information sources, individuals may select into consuming information that aligns with their own priors (Mullainathan and Shleifer 2005). While confirmation bias and self-selection likely operate at the individual-level, our results show that media choice in the market for news can have positive indirect effects. In the context of local news, we find that perceptions become *more* accurate as individuals have access to wider set of news sources. We argue that diffusion of information through social interactions could account for these results, underlining the need to study the indirect

effects of media exposure. In doing so, we join a number of researchers who examine the flow of information through social interactions (see e.g. Katz 1957; Huckfeldt et al. 1995). Our results complement this line of research, as causal conclusions in the literature on interpersonal political communication commonly stem from one-time lab or survey experiments (Druckman, Levendusky and McLain 2018). We, however, provide causal evidence from an observational setting, where individuals are continuously exposed to what many of them consider to be their most trustworthy source of information.

While not the main focus of our study, we examine whether newspaper monopolies also shift attitudes towards the outgroup. In figure A.6 in the appendix, we explore the relationship between local news monopolies and two survey items that measure anti-Muslim attitudes in the EDCAS survey. We find suggestive evidence that local news monopolies not only increase misperceptions but also reduce native support for Muslim immigrants. This is consistent with prior work that demonstrates that misperceptions and attitudes are closely connected (Hooghe and de Vroome 2015; Gorodzeisky and Semyonov 2019). This additional analysis highlights that the persuasive effects of media exposure may be exacerbated if consumption induces biased beliefs about a group of people.

Our findings relate to a broader trend of consolidation in the market for news. While traditional news sources continue to be relevant, the number of news outlets is steadily declining. In Germany, the number of daily newspapers has decreased by 14%, or 19 outlets, between 2011 and 2018. Similar trends towards consolidation can be observed in the United States (Darr, Hitt and Dunaway 2018), the United Kingdom (Ramsay and Moore 2016) or Norway (Sjøvaag 2014). Our study suggests that policymakers have an incentive to limit further consolidation of the market for local news. Preventing the creation of local monopolies may lead to more accurate perceptions in the long run. In the context of highly politicized issues like immigration, preserving viewpoint diversity is crucial to ensure that political behavior and preferences are founded on accurate information. In addition to being detrimental for consumers, monopolies also lead to aggravated misperceptions about

vulnerable minority groups. Further consolidation in the market for news is therefore not only economically inefficient but also entails substantial negative political externalities.

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A Supporting information (online only)

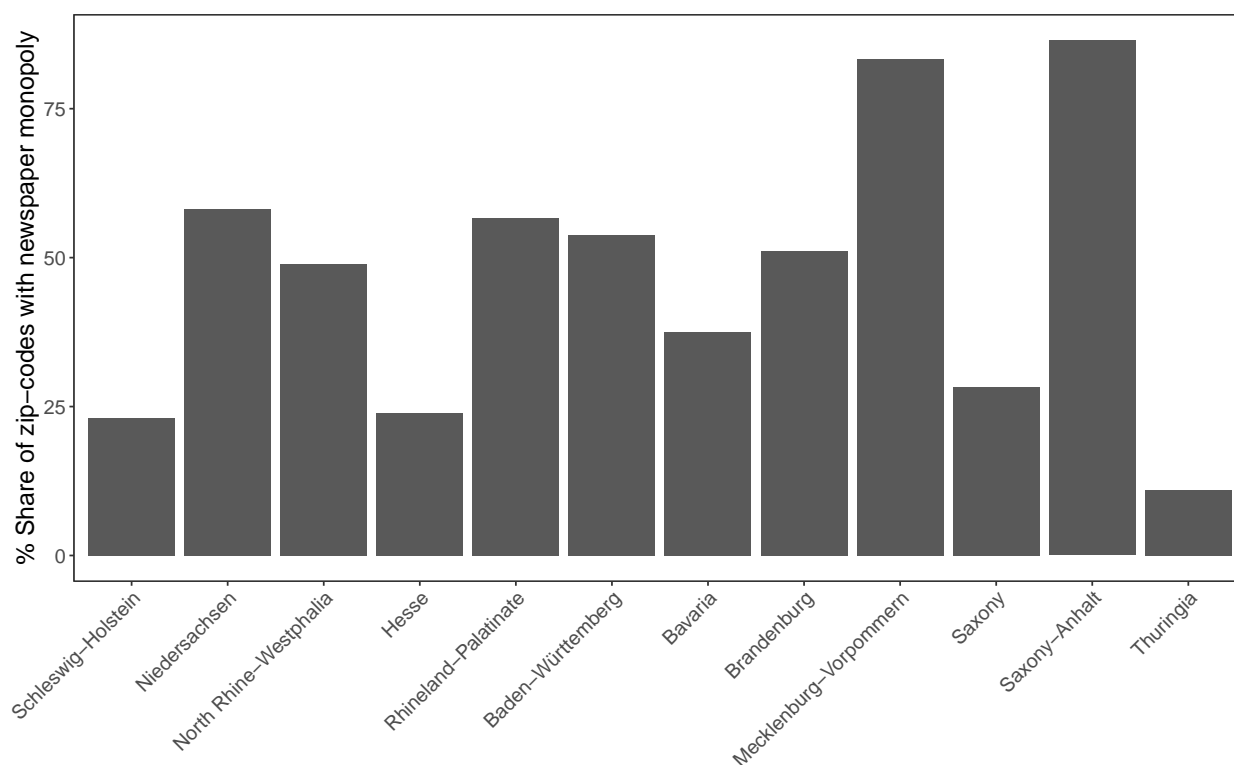
A.1 Summary statistics on misperceptions and newspaper monopolies

Table A.1: Summary statistics

	Full sample			Matched sample		
	Mean	Median	SD	Mean	Median	SD
Individual characteristics						
Age	48.24	47	16.81	46.06	45	16.01
Gender: female	0.54		0.50	0.49		0.50
Education: primary	0.02		0.15	0.03		0.16
Education: lower secondary	0.04		0.20	0.04		0.20
Education: upper secondary	0.46		0.50	0.54		0.50
Education: post-secondary	0.18		0.38	0.17		0.37
Education: tertiary	0.30		0.46	0.23		0.42
Unemployed	0.15		0.36	0.17		0.37
Part-time employed	0.40		0.49	0.37		0.48
Native	0.60		0.49	0.61		0.49
First gen. immigrant	0.28		0.45	0.26		0.44
Second gen. immigrant	0.13		0.33	0.12		0.33
Friends: 0	0.30		0.46	0.11		0.31
Friends: 1	0.10		0.30	0.10		0.30
Friends: 2–5	0.38		0.48	0.29		0.46
Friends: 6–10	0.12		0.32	0.39		0.49
Friends: >10	0.10		0.30	0.11		0.31
Misperception (p.p.)	17.28	10.72	17.53	15.64	9.82	16.50
Municipality characteristics						
Immigrant population (%)	13.66	12.42	8.25	12.37	12.01	6.61
Population density / km ²	1768.26	1979	1388.57	802.65	397.50	916.52
Unemployment rate	0.04	0.04	0.02	0.03	0.03	0.01
Local news monopoly	0.27		0.44	0.68		0.47
Number of news outlets	2.60	2	1.62	1.38	1	0.60

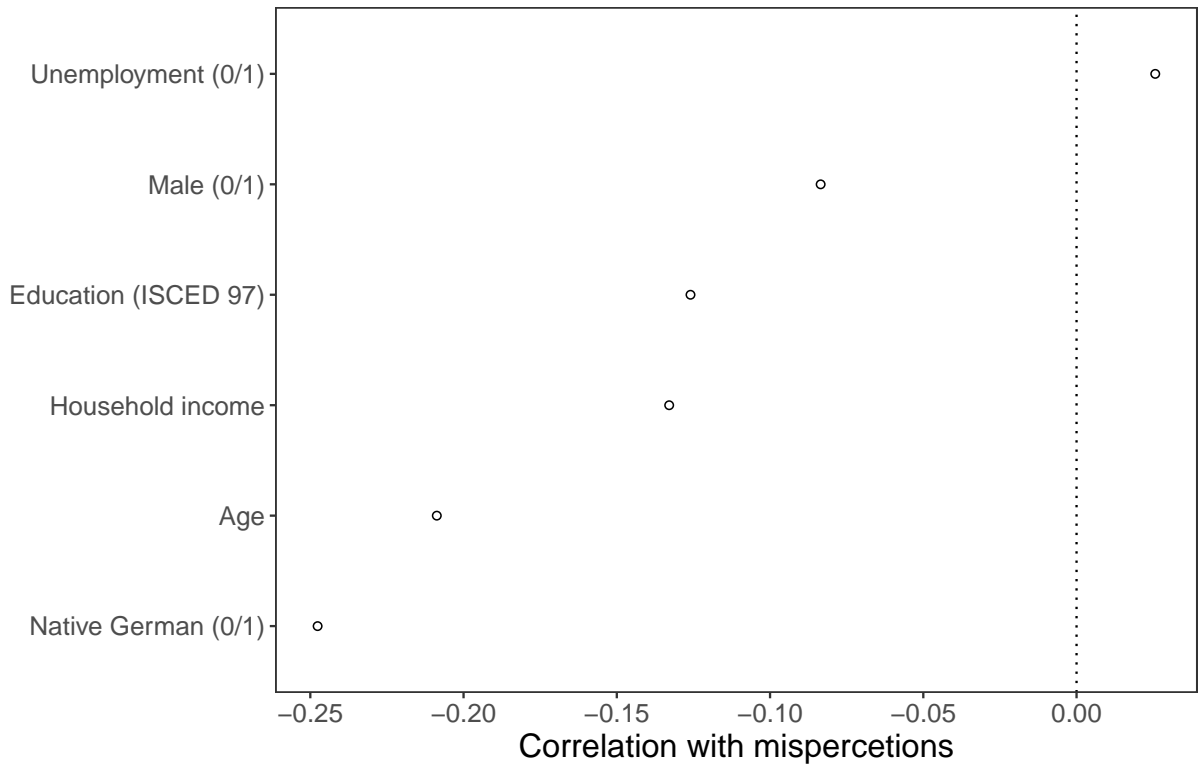
Note: The table shows summary statistics for individual and zip code level characteristics. For continuous variables, we show medians in addition to means. All other variables are binary indicators. For the categorical variables, the categories may not add up to one due to rounding.

Figure A.1: Local news monopolies by state



Notes: The figure shows the percentage share of zip-code regions with a local news monopoly by state. We exclude the city states Bremen, Hamburg, Berlin, as well as the Saarland. Our data set contains many missing values for zip-code regions in Thuringia, hence the summary statistic for this state should be interpreted with caution.

Figure A.2: Individual-level predictors of misperceptions



Notes: The figure shows the bivariate correlation between our dependent variable, misperceptions, and individual-level characteristics of the respondents. We use all pairwise complete observations.

A.2 Information on local news coverage

We now provide additional evidence on what immigration-related topics are covered in local newspapers. A full content analysis of all local newspapers in Germany is beyond the scope of our study. Instead, we provide illustrative evidence on coverage in the *Saarbrücker Zeitung*. We chose this outlet because it covers the zip-code region with the largest number of respondents in our matched sample. While the *Saarbrücker Zeitung* may not be representative of all local newspapers in Germany, we believe the content data can shed more light what exactly local newspapers report on with respect to immigration. To gather the reporting data, we proceed as follows. We employ Google Search to find local coverage of immigration, using a search string that contains several terms that are frequently using in immigration-related coverage.¹⁵ From Google Search, we obtain the headlines of the first 200 results, and then remove all articles that report on national rather than local politics. This gives us a total of 92 articles. We then classify each article into one of seven substantive categories. We describe each topic in table A.2, where we also give examples of articles represent these topics. In figure A.3, we present the relative frequency of each topic among all 92 articles.

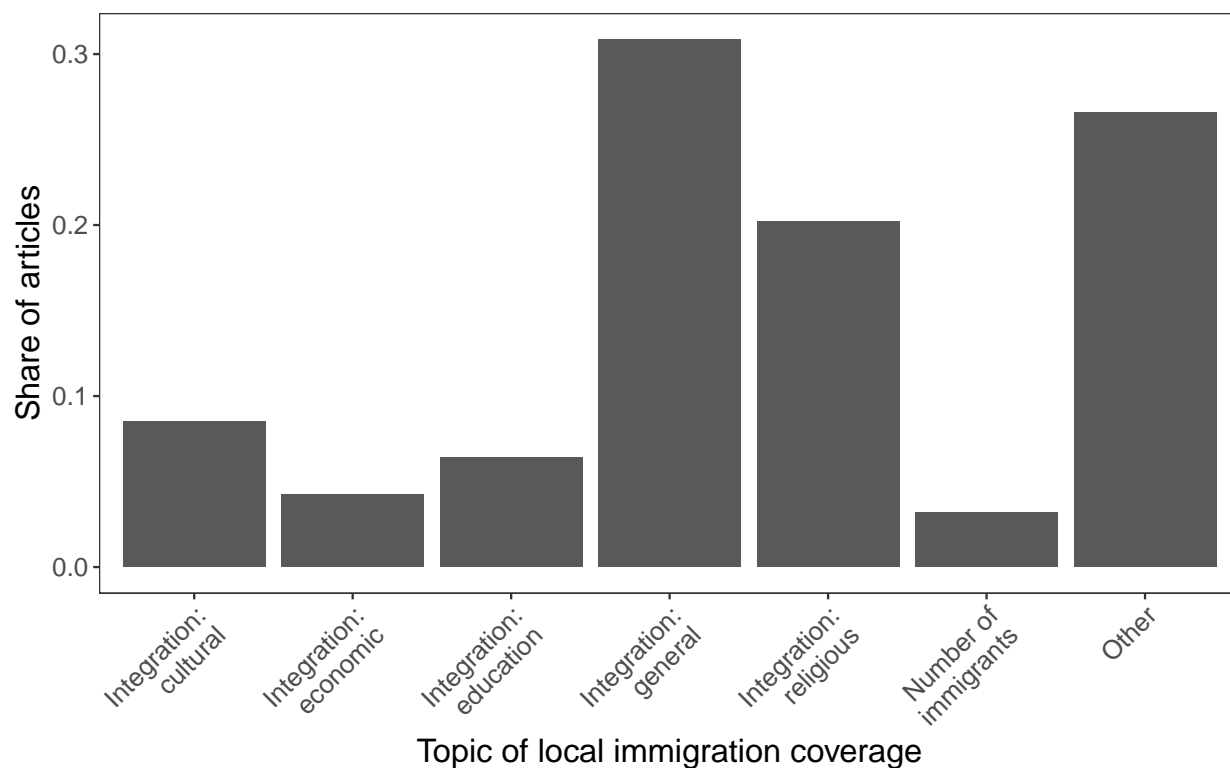
¹⁵The exact search string is `einwanderung OR migranten OR zuwanderer OR zuwanderung OR einwanderer OR immigration OR migration OR ausländer OR muslims OR islam OR integration`.

Table A.2: Definition and examples of immigration-related coverage categories in the *Saarbrücker Zeitung*

Content category	Definition	Example headline
Integration: cultural	Reporting on integration through cultural participation, e.g. in local associations or clubs	“In [town], integration happens on the sports ground / playing field”
Integration: economic	Reporting on the economic integration of immigrants, e.g. on employment or entrepreneurship	“New project trains migrants for employment in elderly care occupations.”
Integration: education	Reporting on integration through participation in education	“Ten immigrants part of new course offered by the local vocational school.”
Integration: general	Reporting on immigrants and integration more generally, without a specific topical focus	“[Name] from Eritrea is starting a new life in local village.”
Integration: religious	Reporting on religious issues, mostly relating to Islam	“Muslim congregation invites locals to the breaking of the fast during Ramadan.”
Number of immigrants	Specific information on levels and changes of the number of immigrants in the local community	“One in six people in [town] are foreigners.”
Other	Articles that do not fit into any of the other categories	“Exhibition about migration opens at local public school.”

Note: The table contains information on the immigration coverage topics shown in figure A.3. The data is based on local coverage of immigration-related issues in the *Saarbrücker Zeitung*. For information on how the data was collected, see the preceding discussion. We present the relative frequency of articles for each topic in figure A.3.

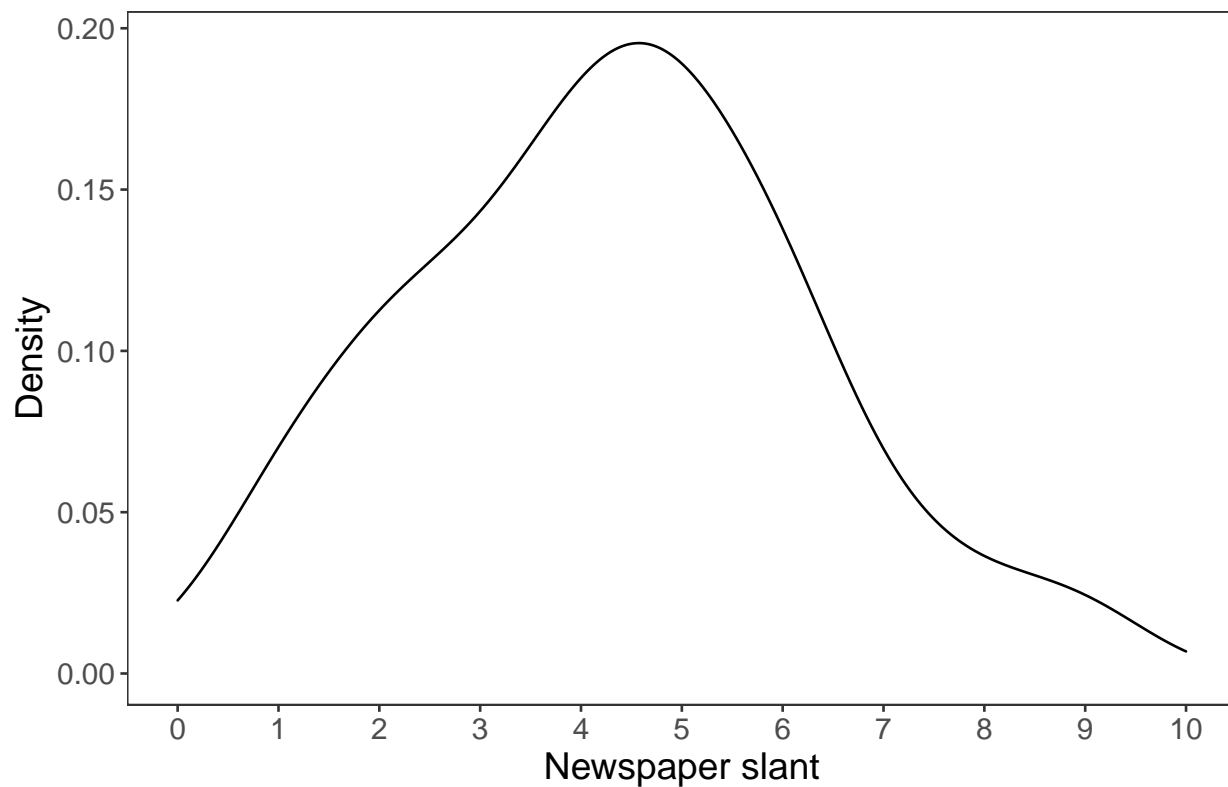
Figure A.3: Exemplary data on frequency of local coverage of immigrants, based on articles from the *Saarbrücker Zeitung*



Notes: The figure shows the relative frequency of different topics among all articles devoted to local coverage of immigration in the *Saarbrücker Zeitung*. The sample is based on the first 200 google search results when searching for immigration-related articles in the *Saarbrücker Zeitung*. We then subset this sample to articles that cover immigration on the local level, resulting in a total of 92 articles. We then classify each article according to its content. Definitions and examples for the categories are given in table A.2. The bars show the relative frequency of each topic among all 92 articles. We chose the *Saarbrücker Zeitung*, because it covers the zip-code region with the largest number of respondents in our matched sample.

A.3 Information on accuracy of reporting

Figure A.4: Newspaper slant scores (Wellbrock 2011)



Notes: The figure shows a density plot of the newspaper ‘slanting’ scores across 97 German newspapers. The original item (in German language) measures the ‘Unparteilichkeit’ of newspapers on a scale from 0 to 10. We reverse-coded this item. We obtained this data from Wellbrock (2011). We note that the scores for individual outlets are based on a varying number of expert ratings. Some outlets were only rated by a single expert, while for other outlets, we observe the mean accuracy score across multiple expert raters.

A.4 Additional analyses – matched sample

Table A.3: Post-matching regressions

	DV: Misperception			
	All matches		Within-county matches	
	(1)	(2)	(3)	(4)
Media market monopoly	4.767** (1.599)	3.265* (1.413)	4.346* (2.005)	4.389** (1.639)
Individual covariates	No	Yes	No	Yes
Municipality covariates	No	Yes	No	No
Distance caliper	25 km	25 km	25 km	25 km
Average distance	15.94 km	15.94 km	14.86 km	14.86 km
Max. number of controls per treated	1	1	1	1
Mean of DV	15.64	15.64	14.21	14.21
Standard Deviation of DV	16.50	16.50	16.49	16.49
Cluster	Zip	Zip	Zip	Zip
N	546	546	365	365
R ²	0.018	0.190	0.016	0.2408

Note: The table displays treatment effects from a linear regression after matching on adjacency and covariates. The coefficients correspond to those shown in figure 6. The unit of observation is the individual. Treated individuals only have access to one local news outlet, while those in the control group have access to two or more. The included covariates in models 2 and 4 are the same as those used to calculate the Mahalanobis distance between observations as part of the matching algorithm. The last two models consider the subset of matched individuals that live in the same county. At the municipality level, we control for population density and unemployment rates. Standard errors in parentheses are clustered at the zip code level. ***p < .001; **p < .01; *p < .05

Table A.4: Post-matching regressions for varying samples

	Misperception					
Media market monopoly	3.726*** (1.106)	2.227* (1.002)	6.861** (2.565)	5.057* (2.354)	5.805*** (1.740)	3.712* (1.605)
Indiv. Covariates	No	Yes	No	Yes	No	Yes
Municipality Covariates	No	Yes	No	Yes	No	Yes
Distance caliper	25 km	25 km	25 km	25 km	25 km	25 km
Max. number of controls per treated	1	1	1	1	1	1
DV mean	13.04	13.04	22.32	22.32	17.93	17.93
Excluding Outliers	Yes	Yes	No	No	Yes	Yes
Overestimation Only	No	No	Yes	Yes	Yes	Yes
Cluster	Zip	Zip	Zip	Zip	Zip	Zip
N	518	518	292	292	264	264
R ²	0.020	0.184	0.026	0.221	0.033	0.231

Note: The table displays treatment effects from a linear regression after matching on adjacency and covariates. The unit of observation is the individual. Treated individuals only have access to one local news outlet, while those in the control group have access to two or more. At the municipality level, we control for population density and unemployment rates. Standard errors in parentheses are clustered at the zip code level. ***p < .001; **p < .01; *p < .05

Table A.5: Post-matching regressions, excluding close matches

	DV: Misperception	
	(1)	(2)
Media market monopoly	3.100* (1.430)	2.444 (1.310)
Indiv. covariates	No	Yes
Municipality covariates	No	Yes
Distance caliper	20–50 km	20–50 km
Max. number of controls per treated	1	1
DV mean	17.07	17.07
Cluster	Zip	Zip
N	816	816
R ²	0.006	0.138

Note: The table displays treatment effects from a linear regression after matching on adjacency and covariates. The unit of observation is the individual. Treated individuals only have access to one local news outlet, while those in the control group have access to two or more. We only include matched units that are further than 20km and no more than 50km apart. The included covariates in model 2 are the same as those used to calculate the Mahalanobis distance between observations as part of the matching algorithm. At the municipality level, we control for population density and unemployment rates. Standard errors in parentheses are clustered at the zip code level. ***p < .001; **p < .01; *p < .05

Table A.6: Post-matching regressions, controlling for national news readership

	DV: Misperception	
	(1)	(2)
Media market monopoly	4.801** (1.615)	3.270* (1.410)
Bild readership p.c.	-10.3 (31)	-19.9 (31.9)
Indiv. Covariates	No	Yes
Municipality Covariates	No	Yes
Distance caliper	25 km	25 km
Max. No. of. controls per treated	1	1
DV mean	15.64	15.64
N	546	546
R ²	0.019	0.191

Note: The table displays treatment effects from a linear regression after matching on adjacency and covariates. The models are identical to models 1 and 2 shown in table A.3 with one exception: we include per capita readership of Germany's largest daily newspaper, *Bild*, as a control variable at the zip-code level in both models. ***p < .001; **p < .01; *p < .05

Table A.7: Post-matching regressions, controlling for internet access.

	DV: Misperception			
	Broadband ≥ 1 Mbps	Broadband ≥ 1 Mbps	Broadband ≥ 6 Mbps	Broadband ≥ 6 Mbps
Media market monopoly	4.245** (1.536)	3.176* (1.402)	4.105** (1.495)	3.325* (1.401)
Indiv. covariates	No	Yes	No	Yes
Municipality covariates	No	Yes	No	Yes
Distance caliper	25 km	25 km	25 km	25 km
Max. No. of. controls per treated	1	1	1	1
DV mean	15.64	15.64	15.64	15.64
N	546	546	546	546
R ²	0.042	0.193	0.069	0.197

Note: The table displays treatment effects from a linear regression after matching on adjacency and covariates. The models are identical to models 1 and 2 shown in table A.3 with one exception: we include the share of households with broadband internet access at two different speeds as a control variable at the zip-code level in all four models. ***p < .001; **p < .01; *p < .05

Table A.8: Regression of misperceptions on the proportion of neighboring treated units.

	DV: Misperception	
	(1)	(2)
Proportion of neighboring treated units	3.923 (4.738)	-2.496 (2.410)
Indiv. covariates	Yes	Yes
Sample	Matched	Full
Municipality covariates	Yes	Yes
Distance caliper	25 km	None
Max. number of controls per treated	4	
Mean of DV	12.56	17.68
Cluster	Zip	Zip
N	185	2557
R ²	0.191	0.134

Note: We limit the sample to regions with more than one local outlet. The independent variable is the share of directly adjacent zip code regions that are local news monopolies. The unit of observation is the individual. In model 1, we use the same matched sample as in the first two columns in table A.3. In model 2, we consider the full sample. The included covariates in model 2 are the same as those used to calculate the Mahalanobis distance between observations as part of the matching algorithm. At the municipality level, we control for population density and unemployment rates. Standard errors in parentheses are clustered at the zip code level. ***p < .001; **p < .01; *p < .05

Table A.9: Post-matching regressions, transforming the DV

	DV: Misperception (transformed)			
	(1)	(2)	(3)	(4)
Media market monopoly	0.556** (0.194)	0.343* (0.172)	0.304*** (0.092)	0.190* (0.087)
Indiv. Covariates	No	Yes	No	Yes
Zip Covariates	No	Yes	No	Yes
Distance caliper	25 km	25 km	25 km	25 km
Average distance	15.94 km	15.94 km	15.94 km	15.94 km
Max. No. of. controls per treated	1	1	1	1
DV mean	3.01	3.01	2.34	2.34
DV Transformation	Box-Cox	Box-Cox	Log	Log
N	546	546	546	546
R ²	0.018	0.188	0.020	0.192

Note: Post-matching regressions. Standard errors are clustered at the zip-code level. We transformed the dependent variable using the Box-Cox transformation and the natural-log transformation. For the Box-Cox transformation, we chose an optimal value of $\lambda = 0.2$ ***p < .001; **p < .01; *p < .05

Table A.10: Post-matching regressions, controlling for income

	DV: Misperception		
	(1)	(2)	(3)
Media market monopoly	3.700* (1.582)	4.780** (1.639)	4.743** (1.636)
Indiv. Covariates	Yes	Yes	Yes
Zip Covariates	Yes	Yes	Yes
Covar: HH income	Yes	Yes	Yes
Covar: Tax revenue (zip)	No	Yes	Yes
Covar: Employment (zip)	No	No	Yes
Distance caliper	25 km	25 km	25 km
Max. No. of. controls per treated	1	1	1
N	450	320	320
R ²	0.197	0.206	0.208

Note: Post-matching regressions. Standard errors are clustered at the zip-code level. Here we repeat the same analysis as in table A.3 but now include i) household income, ii) tax revenue per taxpayer and iii) the total number of employees scaled by population size as additional covariates. The zip-level covariates are originally measured at the municipality level and then aggregated up to the zip-code level. ***p < .001; **p < .01; *p < .05

Table A.11: Post-matching regressions, controlling for civic engagement

	DV: Misperception		
	(1)	(2)	(3)
Media market monopoly	3.205* (1.396)	3.210* (1.412)	3.177* (1.423)
Indiv. Covariates	Yes	Yes	Yes
Zip Covariates	Yes	Yes	Yes
Covar: Turnout (zip)	Yes	Yes	Yes
Covar: Civic engagement (individual)	No	Yes	No
Covar: Civic engagement (binary, individual)	No	No	Yes
Distance caliper	25 km	25 km	25 km
Max. No. of. controls per treated	1	1	1
N	546	525	525
R ²	0.192	0.207	0.204

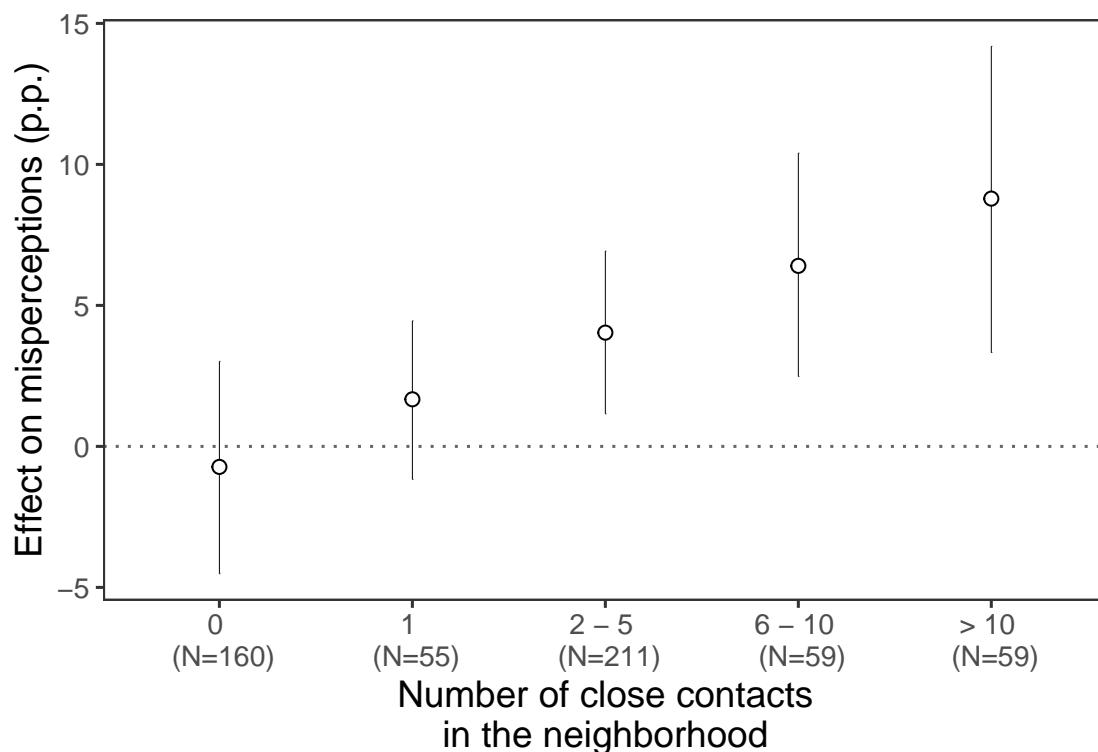
Note: Post-matching regressions. Standard errors are clustered at the zip-code level. Here we repeat the same analysis as in table A.3 but now include i) aggregate turnout in the 2009 federal election, ii) the number of civic organizations / clubs a respondent participates in and iii) whether a respondent participates in any civic organization or club (binary) as additional covariates. The clubs we consider at the individual level cover the domains sports, culture, social services, health, education, environment, politics, religion, civil society organizations, and trade unions. Turnout in the 2009 federal election was originally measured at the municipality level and then aggregated up to the zip-code level. ***p < .001; **p < .01; *p < .05

Table A.12: Post-matching regressions, controlling for size of the zip code region

	DV: Misperception	
	(1)	(2)
Media market monopoly	3.846* (1.518)	3.079* (1.439)
Indiv. Covariates	No	Yes
Zip Covariates	No	Yes
Control for zip code size	Yes	Yes
Distance caliper	25 km	25 km
Average distance	15.94 km	15.94 km
Max. No. of. controls per treated	1	1
DV mean	15.63	15.63
N	575	575
R-squared	0.046	0.189

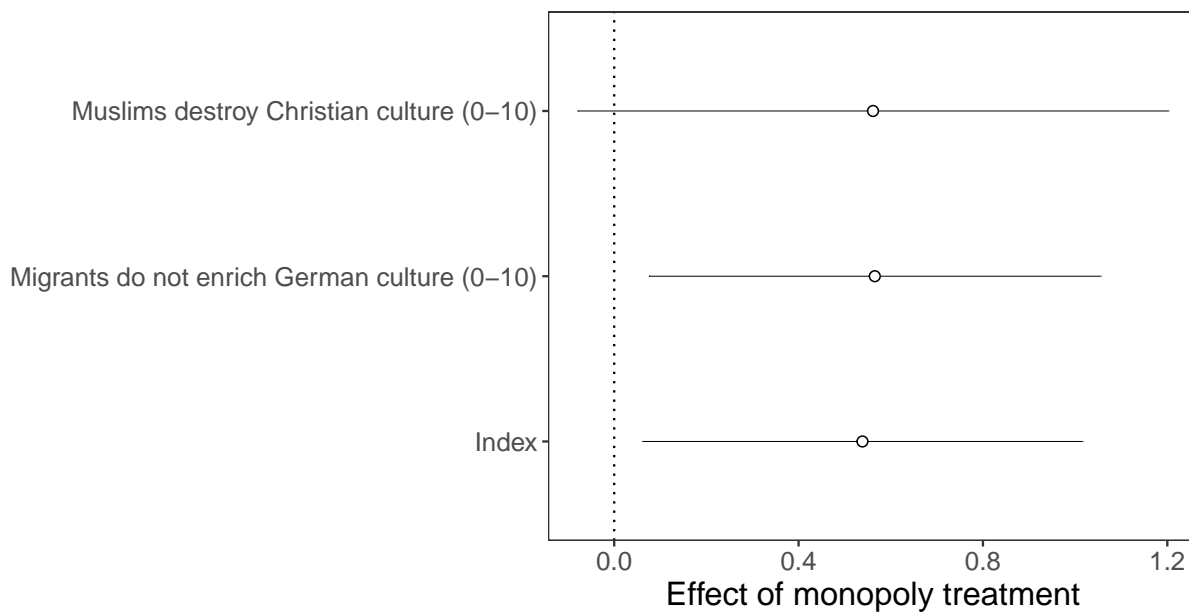
Note: The table displays treatment effects from a linear regression after matching on adjacency and covariates. The estimated models are analogous to models 1 and 2 presented in table A.3 but we now include the area of each respondent's zip-code region (in square kilometre) as an additional control variable in the regression. ***p < .001; **p < .01; *p < .05

Figure A.5: Effect of local monopolies on misperceptions (heterogeneity by number of close contacts)



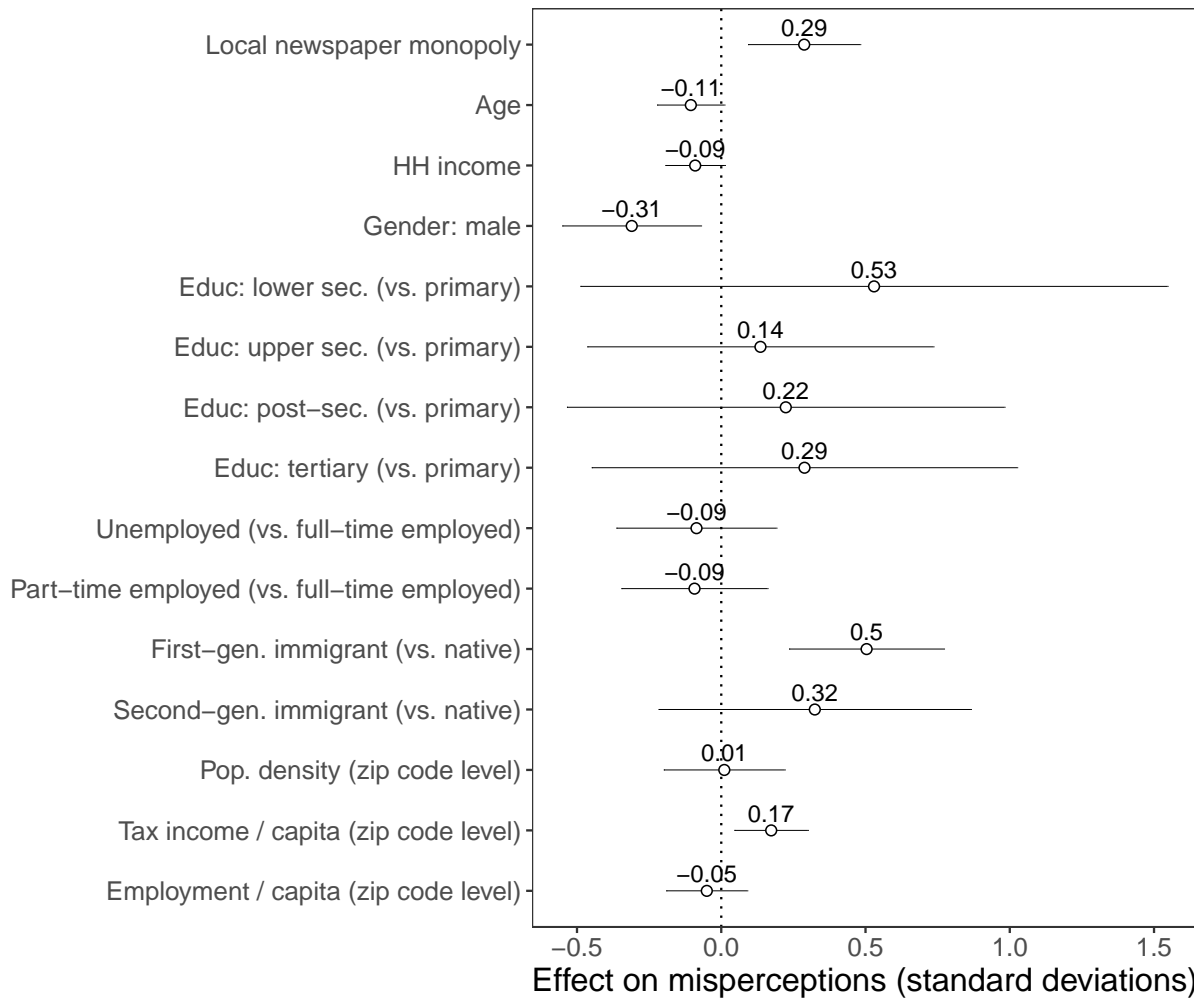
Note: The figure shows the estimated effect of local media market monopolies on misperceptions, conditional on the number of an individual's close contacts in their respective neighborhood. The effect is the expected difference in misperceptions of the first- and second-generation immigrant population between individuals located in monopolistic vs. segmented markets. Positive effect sizes indicate that misperceptions are stronger in monopoly markets. The vertical lines represent 95% confidence intervals. Different to the results presented in figure 7, we here first transform the number of friends to the numeric scale (using values ranging from 1 to 5 for the give categories) and then include a linear interaction of this variable with the treatment in the model specification.

Figure A.6: Effect of local monopolies on immigration attitudes



Notes: The figure displays estimates from a linear regression after matching on adjacency and covariates. We use the same model specification and sample as for our main results, including zip-code level and individual-level covariates (see table A.3). We now look at immigration attitudes as outcome variables. For the index, we averaged the responses to the two survey items within each respondent. The horizontal lines represent 90% confidence intervals.

Figure A.7: Effect of local monopolies on misperceptions with standardized outcome and coefficients



Notes: The figure displays estimates from a linear regression after matching on adjacency and covariates. The unit of observation is the individual. Treated individuals only have access to one local news outlet, while those in the control group have access to two or more. Positive effect sizes indicate that misperceptions of the relative size of the first- and second-generation immigrant population are stronger in monopoly markets. We standardize the outcome as well as age, population density, employment rates and tax revenue per capita. All other predictors are binary. The interpretation of the coefficients is the change in standard deviations in misperceptions for a change from zero to one for the binary variables, or a for a one standard deviation change for the four continuous variables. The numbers above the points represent the effect size for each coefficient.

A.5 Additional analyses – full sample

Table A.13: Results using the full (non-matched) sample

	Misperception			
	(1)	(2)	(3)	(4)
Monopoly	2.375** (0.804)	2.012** (0.702)	2.029 (1.184)	1.560 (0.925)
State FE	Yes	Yes	Yes	Yes
Indiv. Covariates	Yes	Yes	Yes	Yes
Municipality Covariates	Yes	Yes	Yes	Yes
Excluding outliers	No	Yes	No	Yes
Overestimation only	No	No	Yes	Yes
Cluster	Zip	Zip	Zip	Zip
N	4,489	4,267	2,728	2,507
R^2	0.147	0.131	0.141	0.128

Notes: The table contains results from four OLS regressions. The unit of observation is the individual. Treated individuals only have access to one local news outlet, while those in the control group have access to two or more. The outcome is the absolute value of the difference between the perceived and the true proportion of immigrants in the neighborhood. Standard errors in parentheses are clustered at the zip code level. ***p < .001; **p < .01; *p < .05

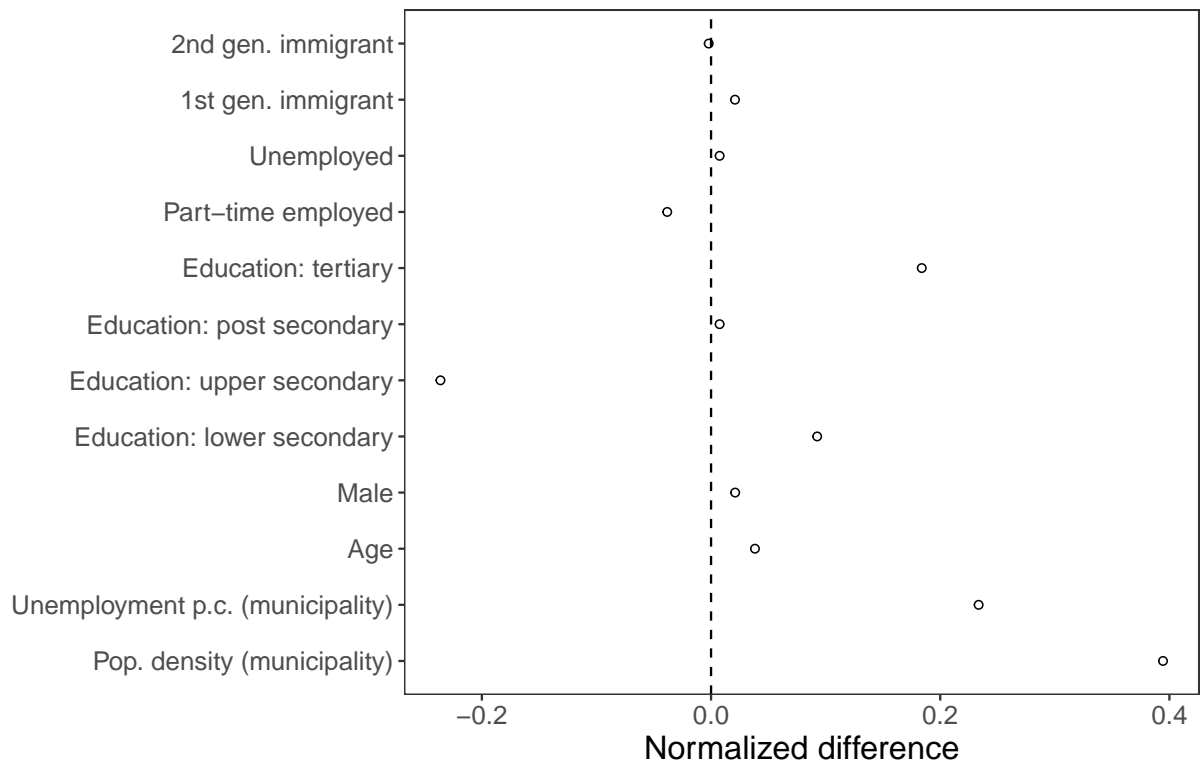
Table A.14: Results using the full (non-matched) sample - continuous treatment

	DV: Misperception			
	(1)	(2)	(3)	(4)
Number of outlets	−0.388 (0.315)	−0.251 (0.296)	−2.021 (1.042)	−2.012* (0.919)
Number of outlets (squared)			0.276 (0.154)	0.297* (0.135)
State FE	Yes	Yes	Yes	Yes
Indiv. covariates	Yes	Yes	Yes	Yes
Municipality covariates	Yes	Yes	Yes	Yes
Excluding outliers	No	Yes	No	Yes
Cluster	Zip	Zip	Zip	Zip
N	4,489	4,267	4,489	4,267
R ²	0.145	0.128	0.145	0.130

Notes: The table contains results from six OLS regressions. The unit of observation is the individual. The independent variable is the number of local newspapers that individuals have access to. The outcome is the absolute value of the difference between the perceived and the true proportion of immigrants in the neighborhood. Standard errors in parentheses are clustered at the zip code level. ***p < .001; **p < .01; *p < .05

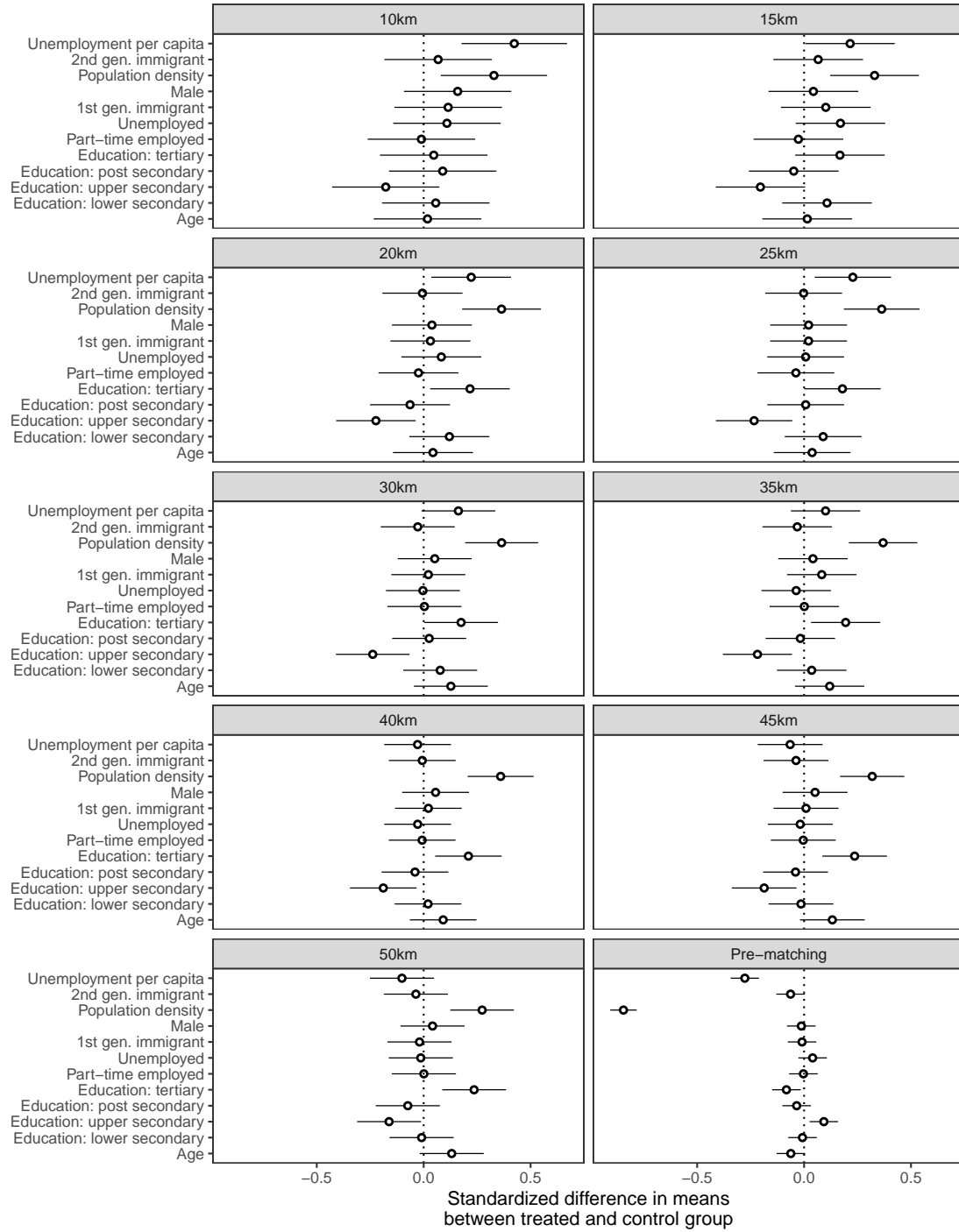
A.6 Additional information: matched sample

Figure A.8: Normalized covariate balance



Notes: The figure shows the normalized covariate balance between treated and control group in our main matched sample. Each treated unit was matched to one control unit within a maximum distance of 25km. The normalized difference is defined as the difference in means between the treated and the control groups, divided by the square root of half the sum of the treatment and control group variances (Imbens and Rubin 2015, p. 361).

Figure A.9: Covariate balance before and after one-to-one matching, for varying cutoffs.



Notes: The points show standardized difference in means between treated and control groups with 95% confidence intervals.

Figure A.10: Average distance between treated and control units in pre-processed data set in kilometers at varying maximum distance thresholds and maximum number of control units matched to each treated unit.

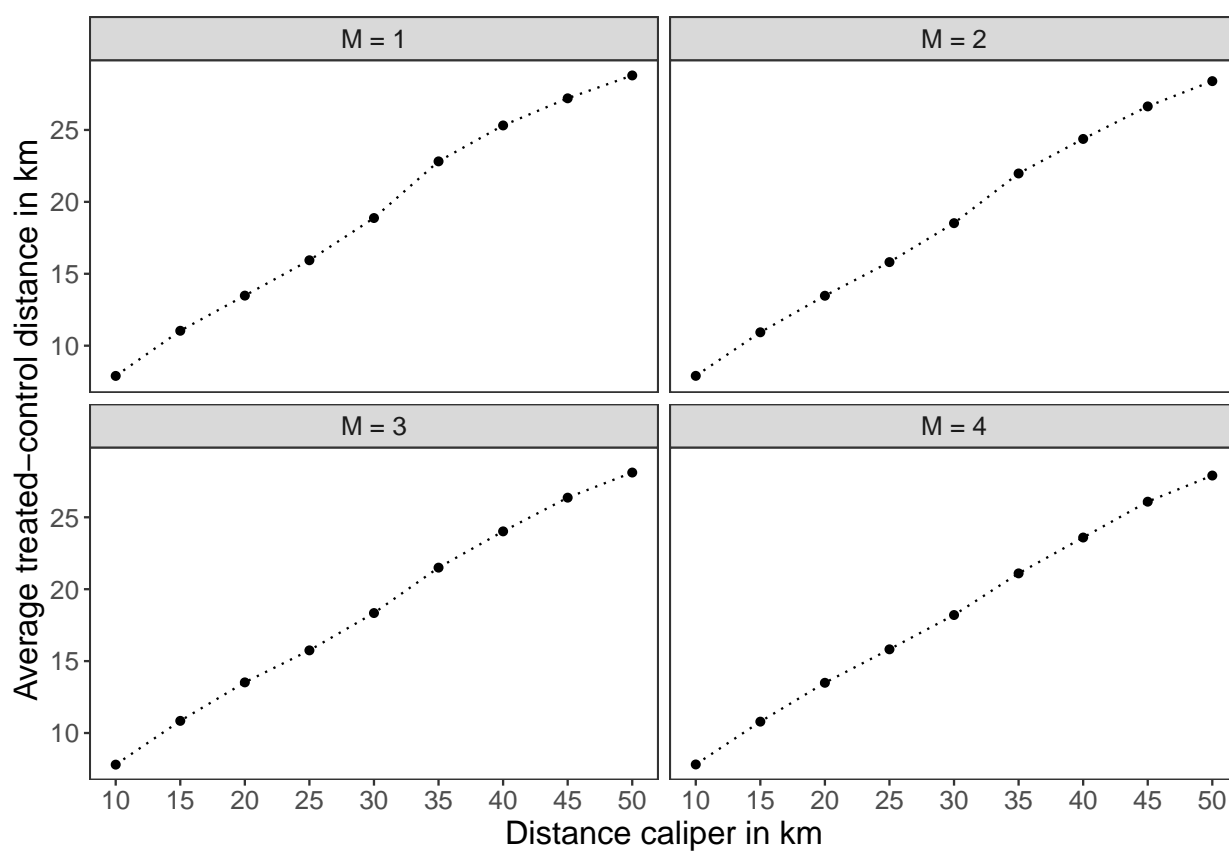
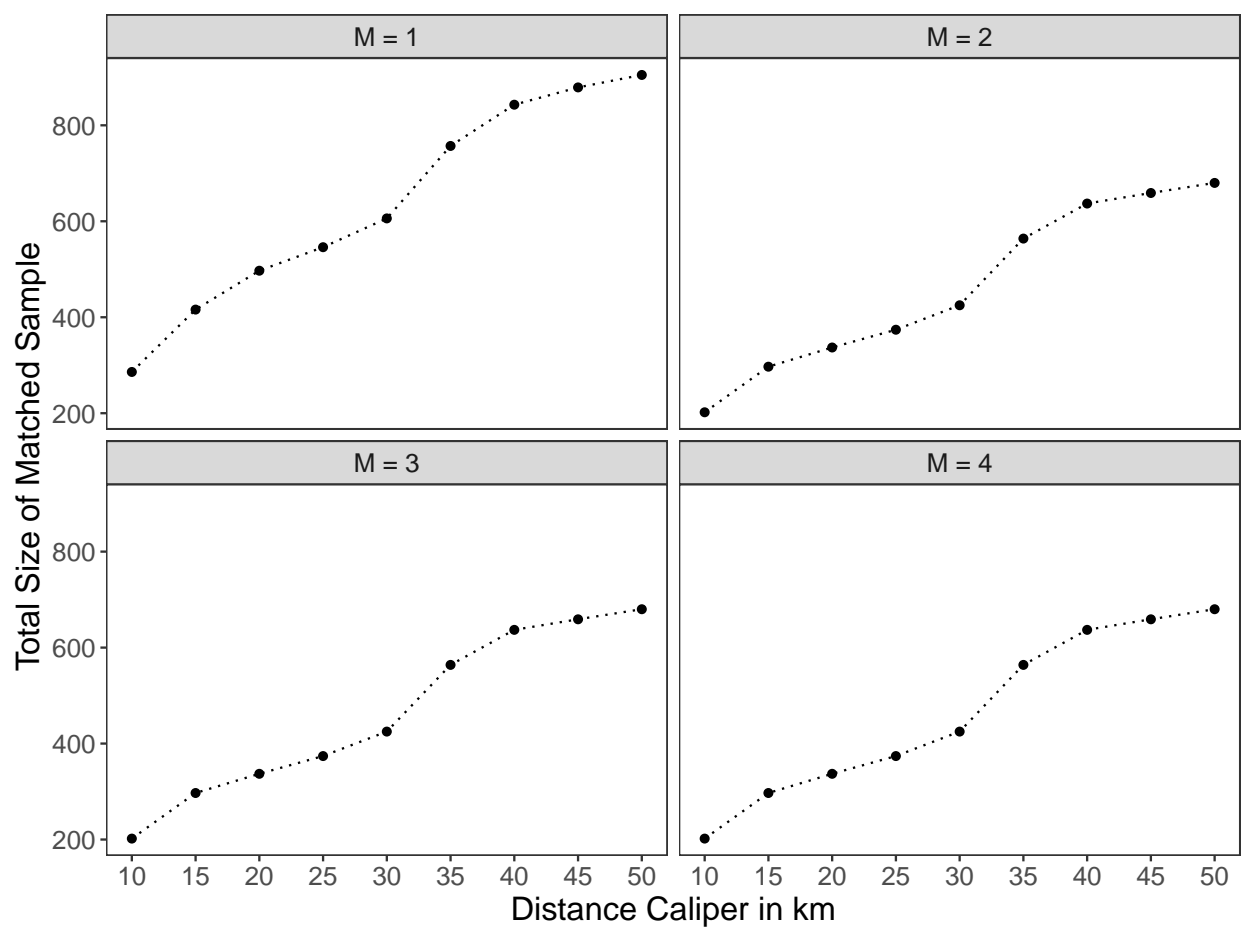


Figure A.11: Total sample size after matching at varying maximum distance thresholds and maximum number of control units matched to each treated unit.



A.7 Survey question wording

A.7.1 Immigrants in the neighborhood

The original survey question regarding the local presence of immigrants in the neighborhood is as follows:

“Wie hoch schätzen Sie den prozentualen Anteil von Menschen mit Migrationshintergrund in Ihrer Nachbarschaft? Mit Migrationshintergrund ist gemeint, dass eine Person nicht in Deutschland geboren wurde oder eines ihrer Elternteile nicht in Deutschland geboren wurde. Bitte nennen Sie mir eine Zahl zwischen 0 und 100 Prozent.“

The question can be translated as follows:

“How large is the percentage share of people with a migration background in your neighborhood? Migration background refers to a person that was either not born in Germany, or a person with [at least] one parent born outside of Germany. Please indicate a number between 0 and 100 percent.”

A.7.2 Number of close social contacts

We rely on a question that asks respondents to report the number of friends in the neighborhood. The original question wording is as follows:

Wie viele Ihrer Freunde wohnen in Ihrer Nachbarschaft? Sind das...

- Keiner
- Eine
- 2–5
- 6–10
- Mehr als 10

The question can be translated as follows:

How many of your friends live in your neighborhood?

- One
- Two
- 2–5
- 6–10
- More than 10