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# Local news monopolies increase misperceptions about immigration

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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 about the size of the local immigrant population by about four percentage points. We 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.

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## 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 over-estimated 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

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Stantcheva observe that ‘the political debate about immigration takes place in a world of misinformation’.<sup>1</sup>

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. Prior research by Herda (2010) has demonstrated the importance of media for misperceptions about immigrants. However, the precise link between the two remains ambiguous – Herda (2010) finds that the direction of the effect depends on the type of media that respondents consume. In our study, we expand on this research by focusing on a 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 5,000 respondents reported their perceptions of the relative size of the combined first- and second-generation immigrant population in their neighbourhood. Drawing on fine-grained census data, we operationalise 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 neighbouring zip code regions. Frequently, newspaper coverage boundaries overlap. As a result, some individuals may have access to multiple news outlets, while their neighbours may only be able to subscribe to one single

outlet. Exploiting overlapping market boundaries, we compare individuals in monopolistic news markets to neighbouring 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 increase 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 neighbouring 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 neighbourhood. Using a survey item, we can 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 neighbourhood. This finding aligns with an empirical implication of our model of information diffusion through interactions with local social contacts: we find that the effects of local news monopolies are concentrated among constituents with a large number of local social contacts. In other words, our effects are driven by individuals who, when situated in a local news monopoly, will no longer be indirectly exposed to heterogeneous information from multiple outlets through interpersonal discussions. We emphasise that our results on the mechanism require 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.

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 emphasise that misperceptions are not set in stone: rather, a competitive media landscape can counter false beliefs. Akin to King, Schneer, and White (2017), we show that traditional news outlets shape perceptions, discussions, and behaviour 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 a 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. Local news in Germany

We measure misperceptions at the local level. Individuals in our sample report on the perceived share of immigrants in their neighbourhood. 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, 960).

German local newspapers are well-established and highly trusted. While online news sources have become more important in recent years, survey data shows that their importance was still limited (Bundesverband Deutscher Zeitungsverleger 2011; GLES 2016; Statista 2014) when our data was collected. In addition, local news are often named as one of the most reputable and trustworthy news sources in Germany, or even the most reputable news source (Kunert, Hofrichter, and Simon 2018; Nic et al. 2018). Mirroring trends across a number of industrialised countries, traditional news outlets in Germany face declining readership, which has sparked concerns about the information available to constituents and political accountability (Hayes and Lawless 2015; Ramsay and Moore 2016; Gao, Lee, and Murphy 2020). We provide more details on (i) the reputation of local news outlets, (ii) trends in readership and (iii) the determinants of newspaper coverage areas in section A.4 in the SI.

Before outlining our theoretical framework in more detail, 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 labour 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 visualise 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.<sup>2</sup>

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 about twice as likely to report on immigrants as the *Thüringische Landeszeitung*. 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 Landeszeitung*, 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 – on average – 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.5 in the appendix). We chose this newspaper since it covers the zip-code region with the largest number of respondents in our matched sample. Importantly, we highlight that the circulation of the *Saarbrücker Zeitung* is very close to the average circulation of the 88 most important local newspaper in the country. We find that this local newspaper highlights different aspects of immigration, such as immigrant participation in the labour market, integration through educational programmes, 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.

### 3. 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 2). 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 commonplace concerns and worries about immigration, it seems likely that these discussions also touch on immigration.<sup>3</sup> Assuming individuals consume news from 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 2, 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.<sup>4</sup>

As laid out above, 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. Following the logic of this argument, the effects of local news monopolies on misperceptions should be concentrated among individuals with a large number of social connections. When embedded in segmented local media markets, these individuals are most likely to be indirectly exposed to information from local news outlets that they do not read through interpersonal discussions. In contrast, information aggregation is less likely for individuals who either (i) do not maintain local social ties and/or (ii) are situated in local news monopolies. When individuals do not maintain local social ties, they are less likely to be exposed to heterogeneous information through interpersonal discussions. Likewise, when there exists only a single local news outlet, interpersonal discussions will not result in the exchange of information from different news sources. Against this background, we expect that the effect of newspaper monopolies (compared to competitive markets) should be strongest for individuals with many social contacts. Accordingly, we derive and test the following empirical implication of our theoretical framework:

**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.

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 behaviour 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 differences between monopolistic and segmented markets are caused by direct aggregation effects. However, we emphasise 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.

Summarising 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.

#### 4. 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 5,000, 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.<sup>5</sup> 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 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 organisation 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.

##### 4.1. Outcome: misperceptions

We define misperceptions as the absolute difference between individual estimates and the true presence of the first- and second-generation immigrant population.

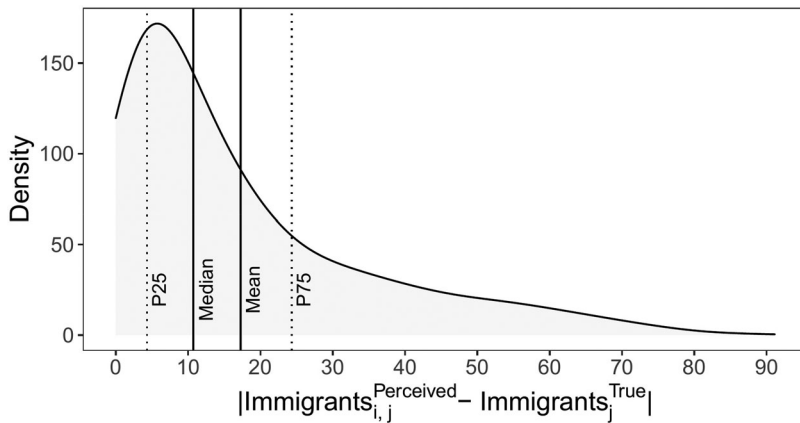
To measure perceptions of the size of the local immigrant population, we rely on an EDCAS survey item that asks respondents to estimate the combined share of first- and second-generation immigrants in their local neighbourhood. ‘Neighborhoods’ are defined as areas within ten minutes walking distance from respondents’ homes.<sup>6</sup> Using this survey item, we define misperceptions of individual  $i$  living in zip code region  $j$  as follows:

$$Y_{ij} = |\text{Immigrants}_{ij}^{\text{Perceived}} - \text{Immigrants}_j^{\text{True}}|$$

We note that while the original survey question asks respondents to estimate the local immigrant population at the neighbourhood level, we compare this to the true presence of immigrants at the zip-code level – the smallest geographical unit to which we can link survey respondents for data privacy reasons.<sup>7</sup> The definition of a neighbourhood as given in the EDCAS survey (ten minutes walking distance from respondent’s homes) suggests that neighbourhoods are, on average, about 3 km<sup>2</sup> in size. In comparison, the median zip code area covers an area of about 27 km<sup>2</sup> and contains 6,500 inhabitants. The relative difference in size between neighbourhoods and zip code areas may appear large at first. However, we can use the census grid cell data to descriptively show that the resulting measurement error is likely unproblematic. While the median size of each zip code area is 27 km<sup>2</sup>, two-thirds of its population live in an area of, on average, 4 km<sup>2</sup>. 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 ‘neighbourhoods’ 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 neighbourhood-level presence of immigrants.

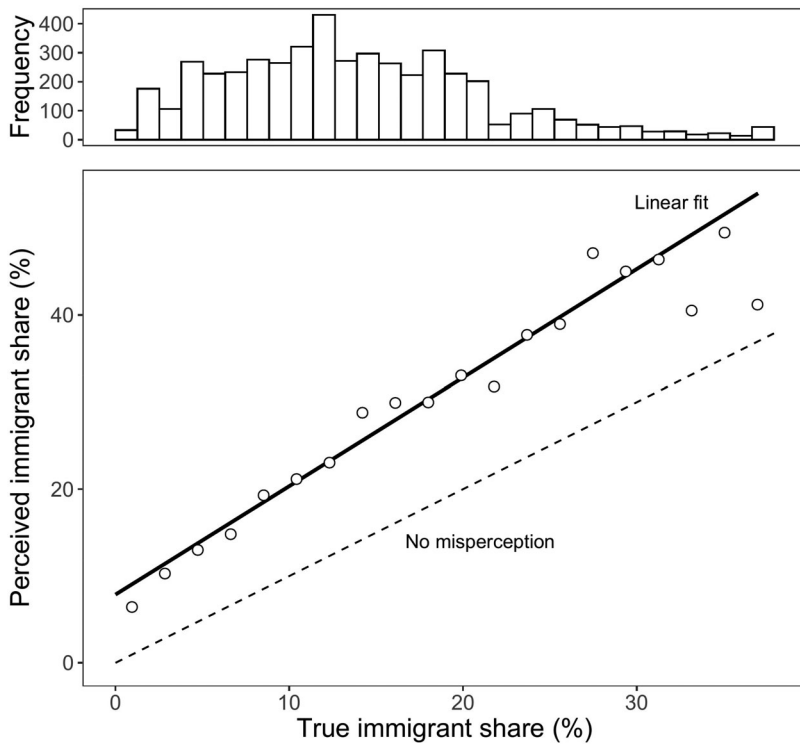
Our measure of misperceptions incorporates both overestimation and underestimation of the true presence of immigrants.<sup>8</sup> Since we use the absolute value, it is always positive and can be regarded as the distance between perceptions and reality. In [figure 1](#), we visualise the distribution 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.

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



**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.



**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.

immigrant respondents. Possibly, immigrants interact more frequently with other immigrants, leading them to overestimate the presence of immigrants in their local area.

#### 4.2. *Treatment variable: local newspaper monopolies*

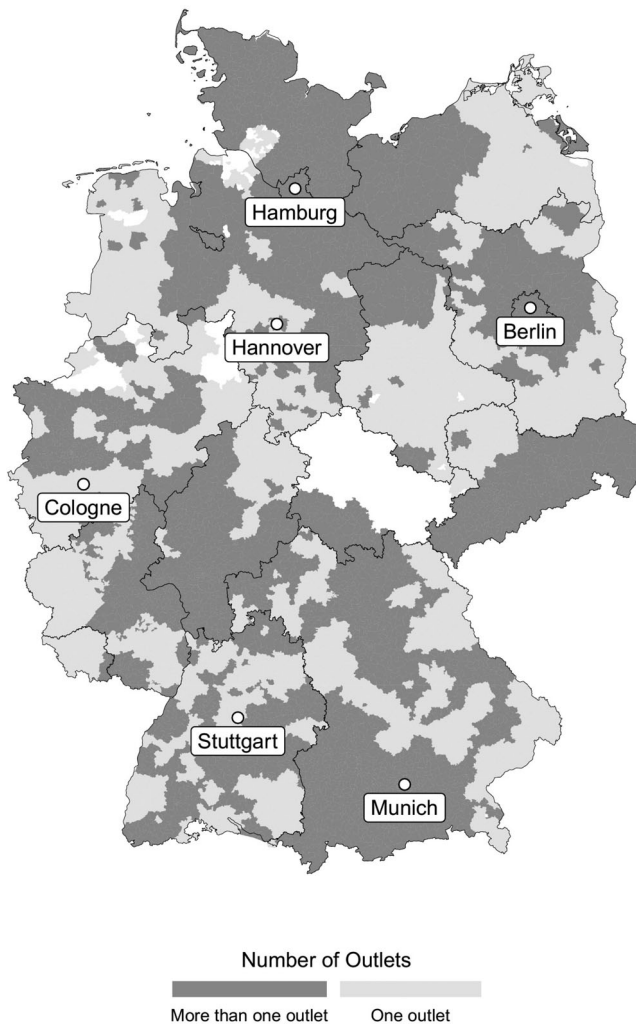
We compare individuals in monopolistic news markets to individuals in neighbouring segmented markets. Our main independent variable is a binary variable  $T_{i,j}$ , which is equal to one if an individual lives in a zip code region  $j$  that is covered by only a single local newspaper and zero if multiple 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 A.7). We discuss the availability of local newspapers outside their core coverage regions in section A.6 in the SI.

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 variation in local news monopolies.

#### 4.3. *Empirical strategy*

To identify the causal effect of local newspaper monopolies on misperceptions, we utilise 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 neighbouring 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  $B$ .<sup>9</sup> This design can be motivated as follows: a naive comparison between individuals in monopolistic and segmented markets would likely be subject to confounding, as these regions differ across a number of observed and unobserved characteristics. However, we argue that concerns about confounding should be much less pronounced at the intersections of two newspaper coverage areas. We argue that whether the residence of individuals is located just barely in a monopolistic area or covered by an additional local news outlet is exogenous in our setting.

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

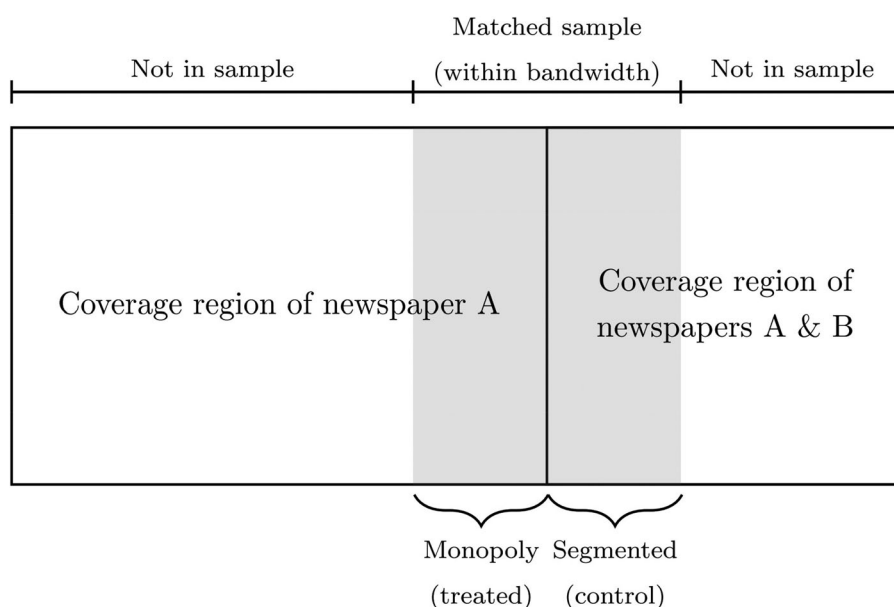


**Figure 3.** Local news monopolies in Germany.

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.

outlet. The last condition allows us to specifically analyze regions where newspaper coverage areas overlap. Second, 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 visualise 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. 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. Finally, we also vary the maximum allowed distance between matched treated and control units  $z$ . We view matching as a nonparametric pre-



**Figure 4.** Visualisation of the overlapping markets design.

Notes: The figure visualises 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.

processing step in our analysis (Iacus, King, and Porro 2019). All treated units for which no match within a radius of  $z$  kilometers could be found are pruned. We also match with replacement, i.e. one control unit can be matched to multiple treated units. In doing so, we do not 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. To adjust for any remaining covariate imbalance between treated and control group after matching, we also include the matching covariates in the model estimation.<sup>10</sup>

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 neighbouring 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 units. 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



**Figure 5.** Visualisation 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.

the treated and control units as a scale-invariant balance measure (Imbens and Rubin 2015, 361). We find good balance in our main matched sample using a distance caliper of 25 km.

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

$$Y_{ij} = \alpha + \tau T_{ij} + x_{ij} + \varepsilon_{ij}$$

Here,  $Y_{ij}$  measures the level of misperceptions of individual  $i$  in zip code area  $j$ , as defined in section 4. As noted previously,  $T_{ij}$  is our main treatment variable and indicates the presence of a local newspaper monopoly in zip-code region  $j$ . The main estimand in this study is  $\tau$ , the effect of monopolistic local news markets on individual misperceptions. In addition to the intercept  $\alpha$ , we include a vector of covariates  $x_{ij}$  in some of our model specifications to adjust for any remaining covariate imbalance after 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. We cluster standard errors at the zip code level.

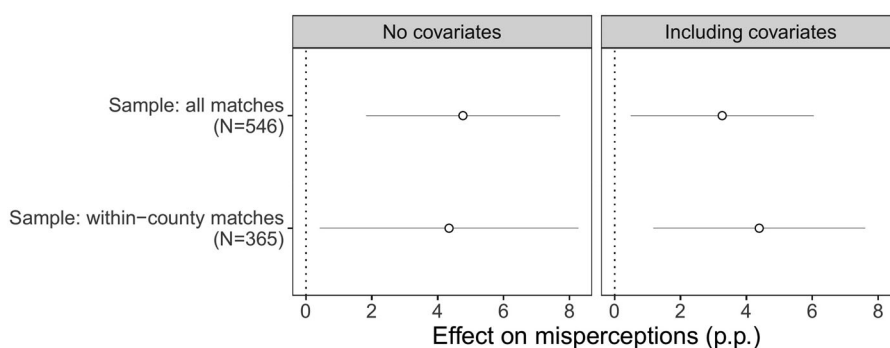


## 5. Results

In [figure 6](#), we present coefficient estimates from two linear regressions, using the matched data set as described in [section 4.3](#). 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.

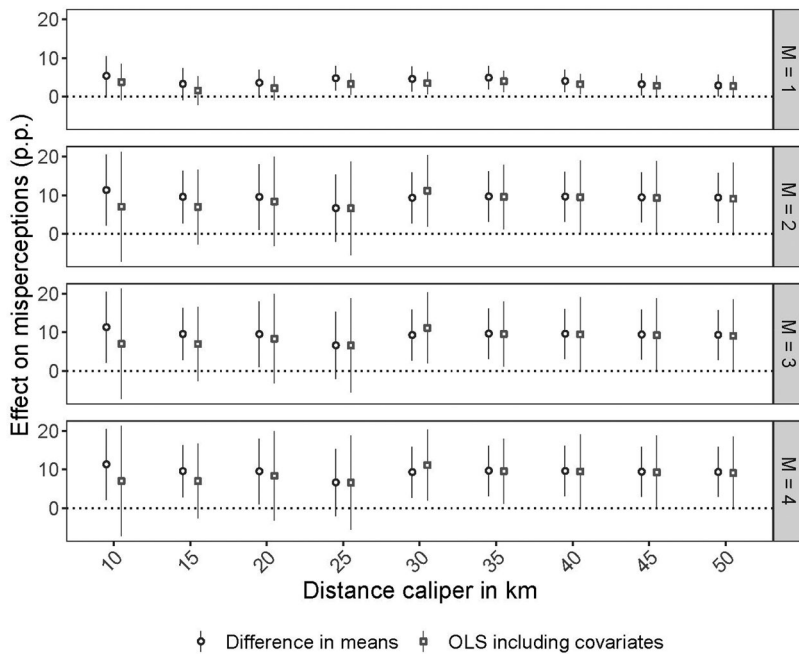
We find that the main result holds when we control for both individual-level covariates, and for population density and unemployment rates at the municipality level (see [table A.1](#) in the appendix for an overview of the covariates). In [figure A.7](#) in the appendix, we standardise the misperceptions 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  $z = 25$  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 emphasise 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 [figure 7](#), 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.



**Figure 7.** 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.

In section A.7, we conduct a series of additional robustness checks to verify our results. Among other things, we establish that our results hold (i) when using simple fixed effects models instead of matching, (ii) when we exclude outliers on the dependent variable, (iii) when we log-transform our outcome prior to the analysis, (iv) when we drop respondents who underestimate the local immigrant population, (v) when we use the number of available outlets as the treatment instead of a binary monopoly indicator, (vi) when we control for national news readership and internet access, and (vii) when we control for civic engagement and income. We also conduct a series of additional checks and placebo tests to rule out that spillover effects are driving our results. Across a wide variety of model specifications, our substantive conclusions remain unchanged: local media monopolies increase misperceptions about the local share of the immigrant population.

### 5.1. Heterogeneity

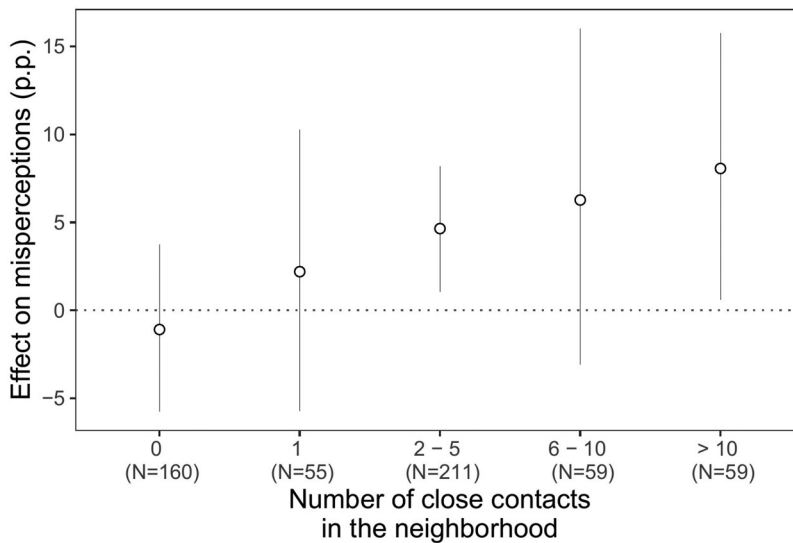
Following our theoretical model, we posit that the effect of newspaper monopolies works through the indirect aggregation of information through interactions with close social contacts. If information from multiple news sources diffuses through interaction with others, individuals with few or no social 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' neighbourhoods. To do this, we use a survey item that asks respondents how many of their friends live in their neighbourhood. The response categories are (i) one, (ii) two, (iii) 2–5, (iv) 6–10, (v) more than 10 (see section A.11.2 for the original question wording in German).

Before moving on, we note that the EDCAS survey item described above only captures one kind of social ties – friendships. We are not able to measure other kinds of social ties, particularly family or romantic relationships. Nevertheless, we argue that the number of friends is an important and useful measure of social ties for our setting and theoretical framework, which we base on two observations: first, friendships are the most common form of social ties in human social networks. Hill and Dunbar (2003) shows that, depending on individual age, friends make up about half to two thirds of all social contacts. Second, our proposed mechanism relies on the aggregation of information from *different* news outlets. Since romantic relationships are more likely to involve cohabitation than friendships, these types of social ties are less relevant for our theoretical mechanism. The reason for this is that cohabitating individuals likely consume news from the same source, e.g. the local newspaper that one or more members of the household subscribes to. Compared to romantic relationships, family relationships are likely a more relevant type of social tie. However, our analysis is constrained by the variables that are part of the EDCAS data set, which does not include on family relationships. In light of our theoretical framework, we consider the number of friends that live in respondent's local neighbourhood as a useful proxy measure for indirect exposure to heterogeneous information from multiple news outlets in local social networks.

Using the same specification as in figure 6, we estimate the effect of monopolies conditional on the number of individuals' social contacts in the neighbourhood. To obtain an estimate of the effect of monopolies conditional on the number of social contacts, we re-estimate model 2 in table A.3 in the appendix, but now interact the binary monopoly indicator with the categorical close contact variable. After estimating this model, we calculate quantities of interest following the procedure described by King, Tomz, and Wittenberg (2000): we calculate  $E[Y | T = 1, S = s] - E[Y | T = 0, S = s]$  at each value of the 'contacts' variable  $S$ , and average over 10,000 draws from the estimated coefficient distribution. In doing so, we account for the estimated variance of all relevant model parameters and their covariance with each other in our calculation of relevant quantities of interest.

In figure 8, 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.6 in the appendix, where we show that results are similar.



**Figure 8.** 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 neighbourhood. 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.

## 6. Discussion

This paper has provided novel causal evidence on the effects of local news monopolies on misperceptions about immigration. Utilising overlap in newspaper coverage areas to mitigate concerns about selection into monopolistic or segmented markets, 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 three 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. Consequently, we again emphasise that evidence on the mechanism should be viewed as suggestive rather than definitive. Second, we note that the heterogeneity analyses we run to unpack the mechanisms underlying our results are constrained by data availability. While we argue that information exchange in social networks is a key mechanism driving our results, our survey data only contains indirect measures for each step in this causal chain.

Unfortunately, we do not directly observe (i) the media consumption behaviour of individual respondents, (ii) their friends, and (iii) the information exchange that occurs within social networks. Ideally, future research in this vein should collect network data in order to trace the mechanisms that link media market segmentation and political knowledge. Third, and related to the points outlined above, our quantitative analyses do not allow us to precisely trace the cognitive processes by which information translates into perceptions. It is possible that even homogeneous information in monopolistic newspaper markets can result in heterogeneous perceptions if voters exposed to the same content interpret this information differently. This mechanism may be one reason why a substantial share of variation in misperceptions remains unexplained, even after accounting for the social network and local media market individuals are embedded in. As we discuss in section 5, the effects of local newspaper monopolies are relatively modest and a large number of other factors determine the formation of misperceptions at the individual level.

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; Zuiderveld-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 a 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 inter-personal 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.

Finally, it is worth discussing whether these results generalise to today. Over the last decade, people increasingly consume news from online sources, while the readership of local news has decreased. At the same time, local news outlets now routinely distribute their content online, e.g. through dedicated websites and social media. In 2021, weekly readership of printed local news was about 27%, ranging from 12% for individuals aged 18–24 to about 35% for individuals aged 55 and older. In addition, about 12% of respondents report reading articles from local news outlets online, with consumers continuing to rate local news as a highly trustworthy source of news (Hölig, Hasebrink, and Behre 2021). With the total share of regular local news consumers at about one third, local news remains an important source of information for constituents.<sup>11</sup> In particular, the positive correlation between age and local news consumption means that local news matter particularly for the demographic that has the highest turnout (Statista 2022). Regarding our finding, this means that the detrimental effects of newspaper monopolies likely apply to about one third of all adults, a smaller, yet still sizable, number of people.

Moreover, the detrimental effects of newspaper monopolies are concentrated in a demographic that is particularly politically active – older citizens.

## Notes

1. We discuss prior research on misperceptions in more detail in section A.1 in the SI.
2. Arnold 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.
3. In the 2010 wave of the German Socio-Economic Panel Survey (SOEP), 63% of respondents expressed that they were ‘very’ or ‘somewhat’ worried about immigration to Germany.
4. The precise definition of misperceptions about the local immigration population is given in section 4.1.
5. More than 7,000 interviews were completed in Germany. For about 5,000 respondents, we also observe the zip-code. The size of our matched sample smaller because of missing data for some covariates, and a lack of overlapping media market regions for some respondents (see Figure A.11). We note that the EDCAS survey only covers a subset of all German zip-code regions. We refer to Schaeffer et al. (2011), in particular section 2.3 of the survey manual, for additional details on the survey sampling and regional stratification in Germany.
6. We provide more details on the question wording in section A.11 in the SI.
7. In section A.3 in the SI, we discuss in detail how we construct estimates of the true immigrant population at the zip-code level based on grid square population data from the 2011 German census.
8. We note that overestimation is much more common than underestimation. In section A.7, we describe an additional specification that just looks at overestimation
9. For 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, in some cases, we compare monopolies to markets with three or more newspapers.
10. In Figure A.5, we demonstrate that our results remain unchanged when we retain duplicated observations in the matched sample.
11. Compared to the numbers in 2011 that we discuss in section A.4, this means that local newspaper reach has declined by about 40%, or 22 percentage points

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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