

Diffusing Political Concerns: How Unemployment Information Passed between Social Ties Influences Danish Voters

James E. Alt, Harvard University

Amalie Jensen, University of Copenhagen

Horacio Larreguy, ITAM, Institute for Advanced Study in Toulouse, and Toulouse School of Economics

David D. Lassen, University of Copenhagen

John Marshall, Columbia University

While social pressure is widely believed to influence voters, evidence that information passed between social ties affects beliefs, policy preferences, and voting behavior is limited. We investigate whether information about unemployment shocks diffuses through networks of strong and mostly weak social ties and influences voters in Denmark. We link surveys with population-level administrative data that log unemployment shocks afflicting respondents' familial, vocational, and educational networks. Our results show that the share of second-degree social ties—individuals that voters learn about indirectly—that became unemployed within the last year increases a voter's perception of national unemployment, self-assessed risk of becoming unemployed, support for unemployment insurance, and voting for left-wing political parties. Voters' beliefs about national aggregates respond to all shocks similarly, whereas subjective perceptions and preferences respond primarily to unemployment shocks afflicting second-degree ties in similar vocations. This suggests that information diffusion through social ties principally affects political preferences via egotropic—rather than sociotropic—motives.

It is widely believed that social networks—the web of strong ties that individuals interact with regularly and weak ties that individuals interact with occasionally—play a central role in explaining economic and social outcomes (e.g., Banerjee et al. 2013; Carrell, Sacerdote, and West 2013; Chetty, Hendren, and Katz 2016; Sacerdote 2001). Indeed, it is hard to overstate the potential importance of the composition and structure of the networks in which people spend many of their waking hours. However, political scientists have only recently started to exploit exogenous variation and use detailed network data to rigorously examine their empirical importance (see Fowler et al. 2011).

Social networks could influence economic and political beliefs and behavior through at least two channels. First, social ties may exert powerful pressures to conform with or coordinate around norms of political engagement through explicit threats or learned norms (e.g., Bond et al. 2012; Gerber, Green, and Larimer 2008; Larson 2017; Marshall 2019; Nickerson 2008; Siegel 2009). This pressure appears to be exerted predominantly by an individual's few strong ties (Sinclair 2012). Second, social networks may diffuse information that influences citizens' attitudes and voting behavior (e.g., Carlson 2019; Huckfeldt and Sprague 1995; Katz and Lazarsfeld 1955).

James E. Alt (jalt@iq.harvard.edu) is the Frank G. Thomson Professor of Government (Emeritus) at Harvard University, Cambridge, MA 02143. Amalie Jensen (asj@econ.ku.dk) is a lecturer in economics at the University of Copenhagen, Copenhagen 1353. Horacio Larreguy (horacio.larreguy@itam.mx) is an associate professor of economics and political science at ITAM, Mexico City, and a visiting researcher at the Institute for Advanced Study in Toulouse and Toulouse School of Economics, Toulouse. David D. Lassen (david.dreyer.lassen@econ.ku.dk) is a professor of economics and fellow at the Center for Social Data Science at the University of Copenhagen, Copenhagen 1353. John Marshall (jm4401@columbia.edu) is an assistant professor of political science at Columbia University, New York, NY 10027.

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The most novel information, relating to events beyond a voter's own experiences, may be conveyed by an individual's many weaker ties that possess more distinctive social networks (Granovetter 1973).

While the political significance of networks' social pressure function among strong ties is now well established, the information diffusion role of social networks has received limited rigorous empirical attention. This in part stems from the difficulty of reliably mapping large networks of weaker ties (Eagle, Pentland, and Lazer 2009) and the information possessed by each node. Nevertheless, since voters—even in the world's most politically engaged democracies—are often poorly informed about their economic and political environment, cheap and frequent access to information through social ties has the potential to substantially affect voters' beliefs, policy preferences, and voting behavior. Beyond the academic value of distinguishing between the diffusion and social pressure mechanisms, establishing the importance of information diffusion within social networks may guide how political parties and nongovernmental organizations (NGOs) should target their information campaigns and illuminate whether voters cast their ballots based on aggregated information.

This article examines how the diffusion of unemployment information between social ties affects voters' perceptions of the national economy and their own unemployment prospects, policy preferences, and voting behavior. In the aftermath of the 2008 financial crisis, we estimate the diffusion effects of other individuals becoming unemployed within the last year in Denmark. In a context where policies to address unemployment were politically salient, the diffusion of information relating to such unemployment shocks—which incorporates any downstream consequences of this experience, including the possibility that some of those individuals may regain employment—could alter political attitudes through two main channels. On one hand, “egotropic” interests may drive a voter's economic and social policy preferences (e.g., Iversen and Soskice 2001; Margalit 2013; Moene and Wallerstein 2001; Rehm 2011b). This implies that information inducing individuals to believe that they personally face greater unemployment risks will lead them to support more generous social insurance and the left-wing parties advocating such policies (Rehm 2011a). On the other hand, “sociotropic” voters may instead use their assessment of the national economy—rather than their personal economic situation—to inform their vote choice (Kinder and Kiewiet 1981). This theory instead implies that information about unemployment shocks affecting others will reduce a voter's support for the government.

By linking Danish administrative data with surveys conducted between 2010 and 2013, we address two major obstacles to identifying the political effects of unemployment

shocks that diffuse through social networks. First, our rich administrative data enable us to objectively and accurately map networks of social ties through which information could pass for all living Danes since 1980. Our network of strong and mostly weak ties includes (i) nuclear family and partner, (ii) recent coworkers, and (iii) the graduating cohort of an individual's most recent degree program. Although information may not always pass between every individual tie, our nationally representative survey validates that conversations—including about unemployment—are common between these ties. While survey methods effectively identify close ties, our approach to mapping both strong and weak ties at scale reduces the severe risk of introducing biases by omitting relevant ties (Chandrasekhar and Lewis 2016).

Second, the administrative data enable us to estimate the effects of second-degree social ties—individuals whom someone could learn about only through shared first-degree ties but with whom they do not interact directly—becoming unemployed within the last 12 months. We focus on information about shocks that must pass through two ties in order to (i) mitigate the challenges of estimating causal effects within social networks using nonexperimental data and (ii) help distinguish information diffusion from social conformity pressures or emotional reactions that are most likely to arise when one actually knows people who became unemployed. Our identification strategy, which builds on Bramoullé, Djebbari, and Fortin (2009), rests on two key features. First, our focus on unemployment shocks, rather than status, alleviates the “reflection problem” (Manski 1993) by establishing the shock's source and thus the direction from which any information must pass. Second, beyond focusing on shocks affecting second-degree social ties, we further mitigate the risk that common shocks—that could reflect vocation-specific risks, exposure to different political perspectives, differences in local economic conditions, and localized access to media content—might instead drive voter responses by (a) restricting the set of second-degree ties to those living in different locations from either the respondent or the first-degree tie connecting the respondent to the second-degree tie and (b) including fine-grained fixed effects that ensure that our identifying variation comes only from differences in the distribution of shocks within the networks of respondents in the same parish and same industry, occupation, and educational categories within any given year.

We find that the beliefs, policy preferences, and voting behavior of Danes are highly responsive to unemployment shocks afflicting second-degree social ties. Indicating that information relatively frequently flows through our networks of predominantly weak ties, an increase in the share of second-degree ties that became unemployed within the last year increases voters' expectations of unemployment—for both the

country at large and themselves. These concerns are reflected in increased support for more generous unemployment insurance, which was proposed by Denmark's left-wing parties after the financial crisis. Such second-degree unemployment shocks also influence voting behavior, increasing a voter's probability of voting for a left-wing political party. Variation in incumbency within our sample indicates that voters are not simply punishing the incumbent party, as predicted by sociotropic theories. Beyond showing that information acquired through social ties is a key force underlying policy preferences and voting behavior, the magnitude of our estimates could account for the left bloc's wafer-thin electoral victory in 2011. Indeed, a 3-percentage-point increase in the share of second-degree ties that became unemployed in the last year increases a voter's probability of voting for a left-wing party by around 3 percentage points.

Although we cannot directly observe interactions between millions of voters, our analysis of transmission mechanisms suggests that our findings reflect information diffusion through social networks and egotropic economic interests guiding policy and political responses to beliefs about unemployment. First, our survey data indicate that voters regularly discuss unemployment shocks with others and that such conversations often entail discussing unemployment risks, unemployment insurance policies, and—to a lesser extent—politics. Second, consistent with social ties sharing unemployment information relatively frequently, responses to first-degree ties becoming unemployed are around five times greater than responses to second-degree ties becoming unemployed. Third, increased subjective unemployment risks and increased support for greater unemployment insurance and left-wing parties primarily reflect shocks to second-degree ties in the same industry or occupation as a respondent. Such heterogeneity suggests that egotropic interests drive political preferences. This interpretation is further supported by voters not differentiating between the industries or occupations of second-degree social ties when assessing the national unemployment rate and barely altering their policy preferences or voting behavior when second-degree ties in industries or occupations other than their own become unemployed.

This article makes two primary contributions. First, we leverage network data with unprecedented detail to demonstrate that social ties play an important role in the political lives of Danish voters by diffusing information pertaining to individuals outside a voter's immediate network. Given the predominance of weak ties in our networks, our findings chime with seminal studies suggesting that weak ties facilitate job opportunities by supplying more novel information (Granovetter 1973) and that economic and political information often emanates from friends and neighbors (Huckfeldt and Sprague 1995; Katz and Lazarsfeld 1955; Kiewiet 1983). More recent

studies have highlighted the importance of peers for enhancing work and educational performance (e.g., Cornelissen, Dustmann, and Schönberg 2017; Sacerdote 2001), exposure to alternative perspectives (Barberá 2015), providing political expertise (e.g., Ahn et al. 2013), and mobilizing turnout (Bond et al. 2012; Gerber et al. 2008; Nickerson 2008) and collective action (Siegel 2009; Steinert-Threlkeld 2017). In contrast with these studies, and the research already highlighting the role of information and especially social pressure among individuals with close ties (e.g., Sinclair 2012), we show that information diffusion through relatively weak ties significantly affects political preferences and voting behavior in an unfavorable real-world economic environment. Our findings thus lend external validity to experimental studies that identify information diffusion within networks in more artificial laboratory or online contexts (Ahn et al. 2013; Barberá 2015; Carlson 2019; Klar and Shmargad 2017; Mutz 2002).

Second, our analysis indicates that concerns about unemployment risks primarily influence policy preferences and voting behavior via egotropic, rather than sociotropic, considerations. We overcome the difficulty of distinguishing such accounts (see Ansolabehere, Meredith, and Snowberg 2014) by separating personal and national unemployment expectations and differentiating sensitivity to the similarity of the industry of the individuals who became unemployed. Our results support the insurance-based theories proposed by Iversen and Soskice (2001), Moene and Wallerstein (2001), and Rehm (2011b). While the effects that we observe are, unsurprisingly, smaller than for individuals becoming unemployed themselves, information about others received through social networks appears to be more persistent and likely to influence voting behavior (see Margalit 2019). Moreover, our findings suggest that the wealth of previous findings attributed to sociotropic voting (e.g., Hansford and Gomez 2015) could instead reflect voters updating about their unemployment prospects from the signals they receive within their social networks. In suggesting that egotropic motives outweigh sociotropic motives, our results complement Fisman, Jakiela, and Kariv's (2015) finding that exposure to the Great Recession made voters more selfish and less egalitarian.

INFORMATION DIFFUSION THROUGH SOCIAL NETWORKS

The potential for information to diffuse through networks to reach uninformed individuals is widely recognized (see Jackson 2010).¹ Indeed, citizens become informed about job

1. Our focus is not on how different network structures or the position of shocked individuals influence information diffusion (see e.g., Klar and Shmargad 2017).

opportunities and increase their productivity through their social ties (e.g., Caldwell and Harmon 2019; Cornelissen et al. 2017). Granovetter (1973) further distinguishes strong ties that individuals interact with more frequently from weak ties that individuals interact with occasionally. The more novel information that weak ties with low levels of network overlap can provide is often most valuable (Aral and Van Alstyne 2011; Granovetter 1973), whereas strong ties may be comparatively important for supporting monitoring and enforcement within groups (e.g., Larson 2017).

The informative role of social networks may be especially important in political contexts. Given that voters with limited interest in politics face weak incentives to acquire costly political information for themselves (Downs 1957; Huckfeldt and Sprague 1995), many voters in advanced democracies encounter politically relevant information through a somewhat diverse group of friends and family (Huckfeldt, Johnson, and Sprague 2004; Kiewiet 1983). Better-informed opinion leaders are particularly influential within these networks (Huckfeldt and Sprague 1995; Katz and Lazarsfeld 1955). While information is inevitably modified somewhat as it diffuses between individuals (Carlson 2019), social ties remain a critical source of politically relevant information—in large part because many citizens, even in media-abundant contexts, are exposed to little else.

In the context of unemployment shocks afflicting others, we expect that such information will often be passed between strong and weak ties in some form. Regardless of the accuracy of their prior beliefs about economic conditions, learning of more cases of others becoming unemployed is likely to increase a voter's perception of aggregate unemployment rates if such individuals are not all quickly reemployed or if reemployment information is conveyed less frequently. Such signals may also increase an individual's perception of their own unemployment risk, if their risk is perceived to be associated with the risk of those who became unemployed. In line with studies demonstrating that West European voters update in sophisticated ways from politically relevant information provided by credible media and political sources (e.g., Alt, Lassen, and Marshall 2016; Kendall, Nannicini, and Trebbi 2015), we expect that:

H1. Exposure to information relating to more individuals becoming unemployed that is conveyed through social ties will increase an individual's perception of aggregate unemployment.

H2. Exposure to information relating to more individuals becoming unemployed that is conveyed through social ties will increase an individual's perceived risk of

becoming unemployed themselves, especially when the unemployment shocks affect those in similar vocations.

Persistent changes in posterior beliefs about national and individual unemployment prospects could in turn alter voters' political preferences and voting behavior. This could reflect egotropic or sociotropic logics. Proponents of the egotropic approach posit that voters facing higher individual or occupational unemployment risks will increase their support for government programs, including demanding more generous unemployment insurance in the face of greater risks of becoming unemployed (Iversen and Soskice 2001; Moene and Wallerstein 2001; Rehm 2011b) and voting for the left-wing political parties typically espousing such policies (Rehm 2011a). To the extent that learning of unemployment shocks afflicting others causes voters to form different expectations about becoming unemployed themselves, the egotropic logic predicts that:

H3. If voters are guided by egotropic motivations, being exposed to information about unemployment shocks that is conveyed through social ties will increase an individual's support for more generous social insurance programs and left-wing political parties.

This preference for insurance could also translate into greater support for general redistribution on the margin, although such policies remain costly for higher-income voters when employed.

While the egotropic logic rests on voters supporting policies that they expect will personally benefit them materially, sociotropic voters instead vote on the basis of national-level economic performance (Kinder and Kiewiet 1981). This could reflect a self-interested desire to elect a competent government or more altruistic motivations. Regardless, we expect that voters who come to believe that the national unemployment rate is higher than they previously believed will then hold the government responsible and accordingly decrease their support for the parties in government:

H4. If voters are guided by sociotropic motivations, being exposed to information about unemployment shocks that is conveyed through social ties will decrease an individual's support for incumbent parties.

DANISH SOCIAL AND POLITICAL CONTEXT

We study the effects of unemployment shocks transmitted through social ties on economic concerns and political preferences in the aftermath of the 2008 financial crisis in Denmark. Elections follow a proportional representation system,

and Denmark has historically been governed by alternating center-right (Venstre/Liberal and Conservative parties) and center-left (Social Democrat and Socialist People's parties) coalition governments. The center-right governed between 2001 and 2011, before regaining control in 2015. Denmark's 98 municipalities, the primary unit of subnational government, contain 2,187 parishes (in 2011)—the country's smallest administrative unit.

Informal social ties

Informal networks, rather than formally constituted organizations, are the primary basis of social ties in Danish society.² While family ties are undoubtedly important, various studies also highlight the workplace (e.g., Glitz and Vejlin 2014) and educational institutions (e.g., Nielsen and Svarer 2009) as important sources of social interaction in Denmark. In the workplace, individuals are likely to spend more time with coworkers than almost anyone else. A European Commission (2004) survey further shows that 44% of adults report meeting socially with colleagues outside of work at least once a month. Almost all students complete 10 years of school, and 93% of the 2012 cohort continued into some form of high school program. High school graduates enter either the labor market or tertiary education. Given that only five metropolitan areas in Denmark offer university degrees, the geographic diversity of social ties often expands at this point. For many individuals, their closest friends emerge from their final educational institution, while 64% of adults report having social contact with friends at least once a week (European Commission 2004).

Social interactions through these informal networks often diffuse economic and political information. For example, 52% of survey respondents report that they would rely on their social network to receive help with paperwork (related to taxes, social benefits, etc.), 73% say that they would use their social network to discuss private problems, and 40% indicate that they would use their social network to borrow money (European Commission 2004). These types of interactions are also consequential, as labor market information from former coworkers affects displaced workers' reemployment probabilities (Glitz and Vejlin 2014) and job-to-job mobility (Caldwell and Harmon 2019). More generally, discussion of unemployment and politics is common among family members, current and former colleagues, and former classmates. On a scale from 0 to 10, ranging from "never talk to these people about this subject" to "often talk to these people about this subject," figure 1A shows that the majority of the working-age population discusses unemployment within each class of

tie in 2015, and most frequently among work colleagues. Figure 1B documents similar patterns and higher frequencies regarding the discussion of politics in general. In comparative perspective, the 2008–10 wave of the European Values Study ranked Denmark fourth of 46 countries in terms of discussing politics with friends, and twenty-sixth and twentieth in terms of discussing politics with their mothers and fathers, respectively.

In adult life, social ties tend to be stable over time due to limited geographical mobility. In 2014, the number of people changing their official address amounted to 15% of the population, of which only 35% moved across municipalities.³ Young people typically move across municipal borders when they leave their parents' home around the ages of 20–22, and mobility is below average for all age groups above 37. Ties with some former classmates, and especially ties with current and former coworkers, thus remain stable and active for many Danes over their adult lives.

Unemployment as a political issue following the 2008 financial crisis

After a decade of low (gross) unemployment rates in the 2000s, reaching 2% in early 2008, unemployment almost tripled to around 6% by the 2011 general election.⁴ The economy, and especially unemployment, was central to the political debate. Nearly 20% of voters cited unemployment as the most important issue for politicians to address, while a further 20% regarded the welfare state as most important.⁵ After the election, unemployment remained around 6%, and the share of Danes regarding unemployment as the biggest political problem rose from 18% in late 2011 to 36% by late 2013.⁶ Only in 2014 did the unemployment rate start to fall, stabilizing at around 4% in 2016.

Left-right ideological differences in party platforms were clear in response to the unemployment surge during the financial crisis. The Venstre-led center-right government implemented a "tax freeze" before proposing and passing several market-oriented policies, including a regressive tax cut in 2009–10, a 2011 "growth program" providing subsidies to small businesses and promising cuts to corporation tax,

2. Low church attendance means that religious networks are weak.

3. Statistics Denmark, Statistikbanken, Flytninger, table FLY33 and table FLY66, <https://www.statistikbanken.dk/statbank5a/default.asp?w=2560>.

4. Gross (unlike net) unemployment counts those in active labor market programs as unemployed.

5. Danish Election Study, <https://www.valgprojektet.dk/files/Danske%20v%C3%A6lgere%201971-2011%20-%20Februar%202013.pdf>.

6. See the 2011 Danish Election Study poll, <https://jyllands-posten.dk/indland/article6370472.ece/>. See also the 2013 Jyllands-Posten poll, <https://jyllands-posten.dk/indland/article6370472.ece/>.

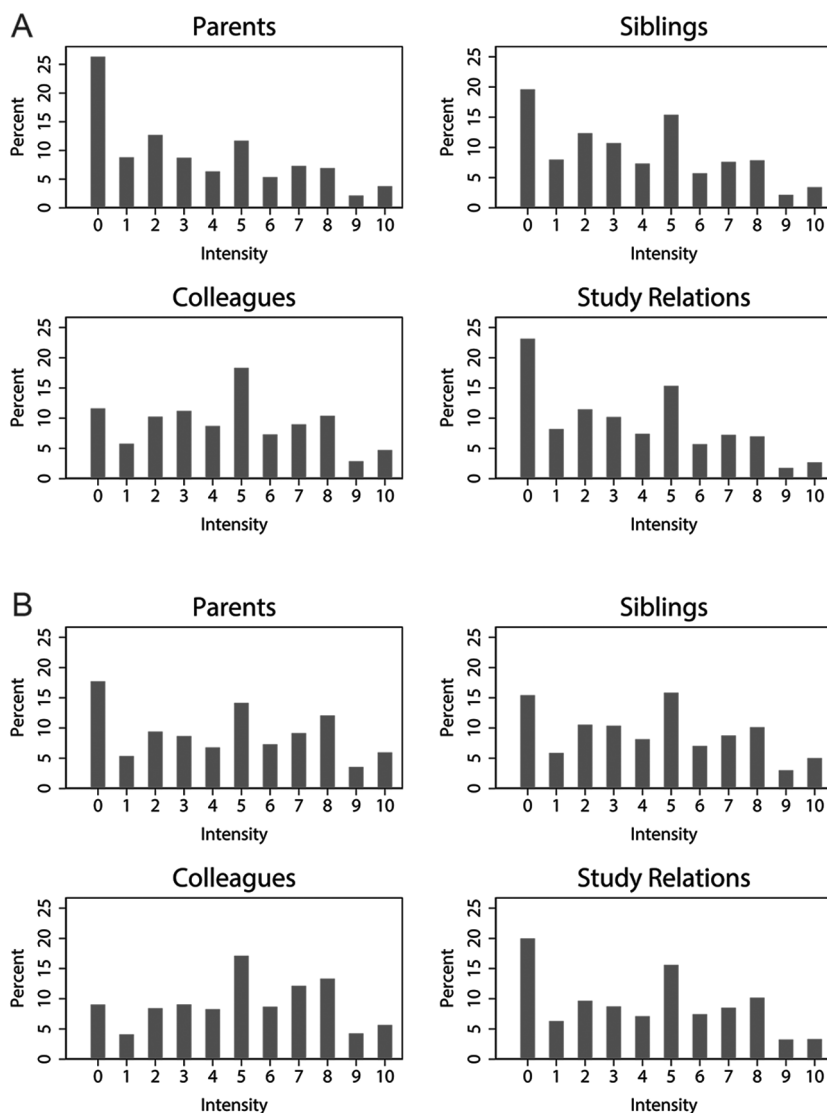


Figure 1. Frequency of discussion of political issues within social networks in the working-age population. Source: Danish Panel Study of Income and Asset Expectations 2015. A, Network links and discussion intensity: unemployment. B, Network links and discussion intensity: politics.

and—most controversially—a 2010 reform of Denmark’s unemployment insurance system that limited the maximum benefit duration of the generous voluntary insurance scheme from four to two years.⁷ In contrast, the Social Democrats and Socialist People’s Party winning 2011 campaign revolved around their “Fair Solution.” This program also contained many policies focused on labor market imbalances but instead emphasized demand-side and educational policies. They strongly criticized the reform of the unemployment insurance system and called for public investments, labor agreements, and improved education to create new jobs.

7. The insurance system and this reform are described further in app. sec. A.1.

EMPIRICAL DESIGN

This section first introduces our main variables and operationalizes social ties. We then detail our empirical strategy for identifying the effects of an increase in the share of second-degree social ties that experienced an unemployment shock, which we hypothesize could diffuse through first-degree social ties to influence respondents to our panel survey. We focus on shocks to second-degree individuals that survey respondents do not interact with directly to mitigate the risk that common shocks drive our estimates and to help distinguish information diffusion from social conformity.

Panel survey and administrative data

We leverage two high-quality sources of data. First, our outcome variables are questions from the 2010–13 rounds of

the Danish Panel Study of Income and Asset Expectations capturing subjective unemployment perceptions, policy preferences, and vote choice. Each survey was fielded in January and February. This telephone survey first sampled around 6,000 Danes registering some labor income between 1998 and 2004, and has randomly resampled from this pool to maintain the sample size over time.⁸ Although this sample is slightly older, better educated, and richer, comparing columns 1 and 2 with columns 3 and 4 in table 1 shows that our survey respondents broadly resemble the Danish working-age population.

Second, to define unemployment shocks and social ties between individuals, we rely on detailed individual-level administrative data for the entire population. These government-collected registers, which contain family relations, education, and income tax returns, are available annually between 1980 and 2012. We thus possess unique identifiers and data for all 7.98 million individuals living in Denmark over this period. Panel survey responses were linked to these records by Statistics Denmark. Access to this administrative data is described in appendix section A.2.

Outcomes: Economic and political beliefs and preferences. With respect to beliefs about unemployment, we measure national and personal assessments. First, we measure beliefs about aggregate unemployment in two ways: in 2011–13, the survey elicited respondents’ best guess at the current national unemployment rate; and in 2011 and 2013, the survey elicited respondents’ national unemployment rate forecast for the next year. Second, an individual’s risk of becoming unemployed is based on their self-assessed probability, from 0 to 1, of becoming unemployed in the forthcoming year.

We define three indicator variables to capture policy preferences: for the 34% of respondents expressing support for increasing unemployment insurance above the existing level; for the 38% of respondents believing that the government should do more to support the poor; and for the 39% of respondents believing that the government should use a non-market-based stimulus—public investments or a temporary increase in unemployment insurance, as opposed to (income or VAT) tax cuts or firm subsidies—to address the economic crisis (only available in the 2010 survey).⁹

Two further outcomes measure support for political parties: intention to vote for a left-wing party—the Social Democrats, Social Liberals, Socialist Party, or Red-Green

Alliance—and an indicator for voters that reported having voted for such a left-wing party at the 2011 election.¹⁰ Respectively, 42% and 50% of respondents supported the left by these two measures.

Individual unemployment shocks. To capture individual unemployment shocks that represent novel information, we follow Margalit (2013) in focusing on instances of other individuals recently becoming unemployed.¹¹ In contrast, longer-term unemployment status is less likely to be discussed and is more vulnerable to biases arising from common shocks. Accordingly, we define unemployment shocks within the last year using an indicator that denotes whether an individual was registered as unemployed in the November preceding the survey—the snapshot at which the Danish administrative data are collected—but was not registered as unemployed in November the year prior.¹² On average, 3% of working-age Danes experience such a shock each year over our study period. The timing of these shocks makes it unlikely that survey respondents heard about them just before completing the surveys conducted in January and February.

Individuals who become unemployed often later regain employment, and these two processes can occur concurrently for different second-degree ties. Unsurprisingly, there is thus a strong positive correlation between the share of second-degree ties that became unemployed and reemployed ($\rho = 0.38$). The share of second-degree ties that experience unemployment shocks should thus be considered a compound of learning about individuals becoming unemployed and all events that occur subsequently, including some of those individuals regaining employment.

Mapping social networks of strong and weak ties. Our administrative data present a rare opportunity to extensively map social ties throughout a population. Although some ties are closer than others, a comprehensive network is critical for ensuring that bias is not introduced by the omission of ties through which information passes. Indeed, our estimates would be upwardly biased if unemployment shocks directly or indirectly affecting social ties were correlated with shocks affecting other unmeasured ties. Chandrasekhar and Lewis (2016) further prove that missing ties can produce nonclassical measurement error that can severely upwardly bias

8. The initial response rate was 50% (including unreachables), and attrition into 2011 was 31%.

9. In each case, “don’t know” or “none of the above” were coded as 0.

10. Reported turnout rates in our survey were 98%, although nationwide turnout in 2011 was 88%.

11. When exiting employment, individuals are transferred to unemployment status and receive unemployment benefits or cash assistance (see app. sec. A.1).

12. Following international standards, those in active labor market program count as unemployed.

Table 1. Summary Statistics for the Population and Our Sample

	Full Population, Aged 20–65		Survey Respondents		Survey Respondents' First-Degree Social Ties		Survey Respondents' Second-Degree Social Ties	
	Mean (1)	Median (2)	Mean (3)	Median (4)	Mean (5)	Median (6)	Mean (7)	Median (8)
Woman	.50	0	.49	.16	.54	1	.51	1
Age	42.90	43.00	45.61	46.43	43.55	43.98	42.27	42.75
Children	.78	0	1	1	.97	1	.86	0
Single	.35	0	.22	0	.26	0	.32	0
Gross income (DKK)	325,251	294,646	406,620	362,241	432,552	379,043	364,299	329,621
Total assets (DKK)	848,888	375,907	1,231,939	807,815	1,118,013	777,663	950,351	563,494
Total debt (DKK)	635,145	271,566	827,908	563,647	826,492	597,290	727,413	428,592
Homeowner	.49	0	.67	1	.63	1	.55	1
Education basic	.33	0	.19	0	.09	0	.23	0
Education short	.39	0	.41	0	.41	0	.45	0
Education medium	.16	0	.25	0	.30	0	.21	0
Education long	.08	0	.14	0	.20	0	.10	0
Unemployed	.06	0	.04	0	.03	0	.04	0
Unemployment shock	.04	0	.03	0	.02	0	.03	0
Observations	13,385,137	13,385,137	17,816	17,816	1,882,081	1,882,081	9,009,683	9,009,683

Note. To comply with Statistics Denmark's anonymity restrictions, medians and lower and upper bounds of ranges are computed across five observations. The summary statistics in cols. 3–8 are for the largest sample used in our analyses below.

estimates, even when nodes are missing at random. Such concerns are pertinent in Denmark, where—as figure 1 illustrates—information related to employment often passes between relatively weak ties (see also Caldwell and Harmon 2019; Glitz and Vejlin 2014). To minimize biases, we adopt an inclusive definition of social ties that encompasses ties of varying strengths. This enables us to estimate effects that average across any information that flows between more and less distant ties.

Specifically, we approximate an individual's first-degree network of strong and predominantly weak ties using the following criteria:

1. *Family*: parents, adoptive parents, siblings, half-siblings, and partners.¹³
2. *Vocation*: coworkers from within the previous two years. For firms with 25 or more employees or for individuals who accumulated more than 50 coworkers across multiple firms, we only include coworkers within the same one-digit educational category.
3. *Education*: fellow students from the cohort at the institution where their highest level of educational degree was obtained (e.g., subject-degree class at a specific university for university-level degrees), or the cohort at the point of dropping out of school without a degree.

The firm size restriction reflects the likelihood that individuals in large firms interact primarily with recent colleagues doing similar types of jobs within the firm. The education restriction captures the likelihood that ties attenuate upon moving on to another educational institution. Although our definition of weak ties inevitably includes some omissions,¹⁴ our results are robust to defining larger networks that include more past colleagues and high school and university-degree graduating classes as well as adjusting for indicators of firm- and education-level network truncation.

While the interaction between some of these individuals may be negligible, our operationalization of social ties does capture meaningful real-world communications between Danes. First, data from the mobile money app MobilePay show that these familial, vocational, and educational ties are all significant predictors of electronic payments between

Danes (Sheridan 2019). Second, we further conducted a nationally representative survey of 1,506 Danish adults in November 2018 to validate our operationalization of social ties.¹⁵ Figure 2 shows that respondents report having conversed with significant numbers of social ties by our definition. Within the last year, the mean respondent had a general conversation with more than 50% of individuals within our family and vocational categories, and a conversation about economics or politics with at least 30%. Respondents converse with fewer members of their terminal educational cohort, although the relationships that they do sustain may comprise their closest ties. The robustness checks in table A7 (tables A1–A10 are available online) report similar results when shocks that could only be transmitted through educational ties are excluded.

We combine the familial, vocational, and educational information above to construct an adjacency matrix characterizing first-degree social ties between every individual in the Danish population alive between 1980 and 2012. Appendix section A.4 explains how this matrix was computed. We focus on the social ties of the 8,747 unique labor force participants that appear in our 2010–13 surveys. The mean and median survey respondent in a given year respectively register 224 and 81 first-degree ties, of which 2% and 5%, 74% and 43%, and 24% and 52% are familial, vocational, and educational ties, respectively.

Identification strategy

Our goal is to estimate the effect of information relating to unemployment shocks that diffuses through social ties on a voter's economic and political beliefs, preferences, and behavior. To maintain a reasonable probability that information relating to unemployment shocks reaches our survey respondents, while reducing the possibility that this is confounded by social pressure or emotional reactions that could arise when respondents are linked directly to those becoming unemployed, we leverage our population-level network data to exploit unemployment shocks afflicting working-age (20–65) second-degree ties. A second-degree tie is an individual that is a first-degree tie of at least one of a respondent's first-degree ties but is not a first-degree tie of the respondent. After excluding nearby second-degree ties and including fine-grained fixed effects that account for factors that could generate differences in respondents' networks, this approach leverages distant shocks to “friends of friends” that are plausibly exogenous to other determinants of our outcomes. We now explain this identification strategy in detail.

13. Siblings and parents are linked if a father or mother is alive and was registered by the Danish government at any point between 1980 and 2012.

14. The most obvious omissions are (nonwork and nonschool) friends and non-nuclear-family members. If such individuals live locally and have local friends themselves, our sample restrictions described below should mitigate the bias from these omissions.

15. Appendix sec. A.3 describes the survey protocols.

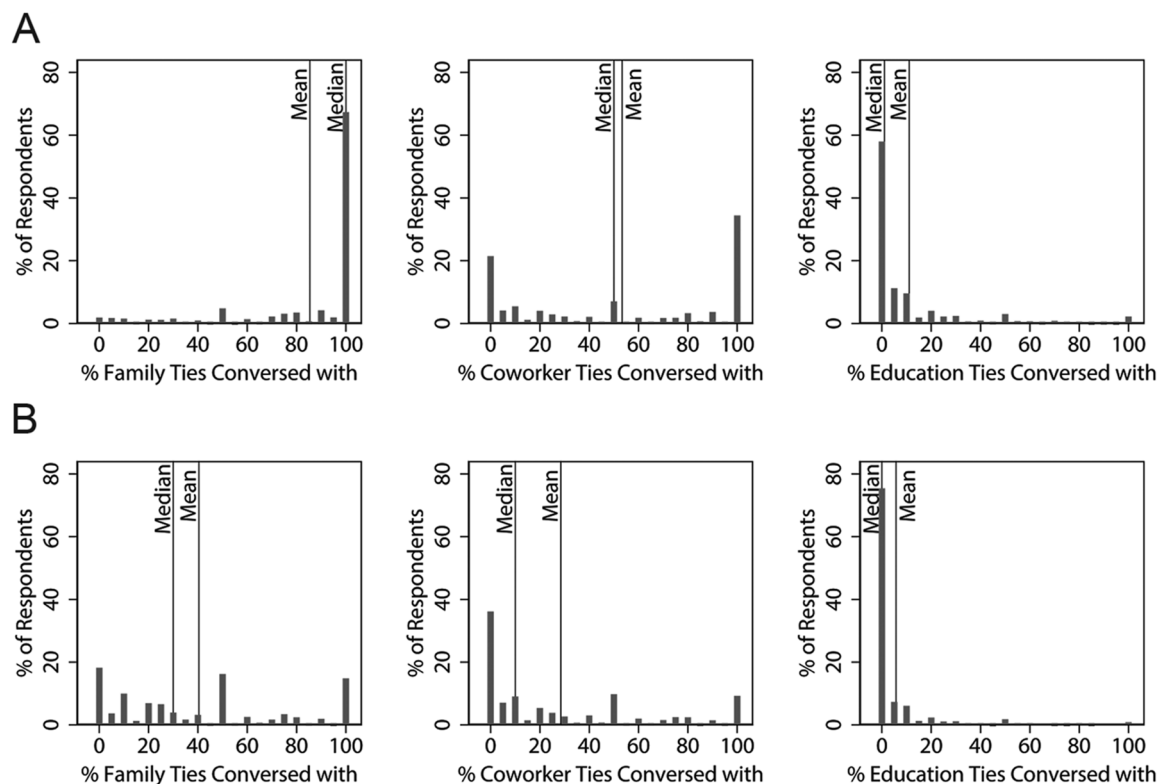


Figure 2. Histograms showing the share of first-degree weak ties whom individuals converse with. A, General conversations within the last year; B, conversation about economics or politics within the last year (lower bound). All questions were phrased to reflect our operational definitions of first-degree weak ties (see app. sec. A.3). Conversations about economics or politics represent a lower bound because, since we cannot identify the union of the exact individuals that respondents refer to, we take the maximum of the percentage of ties converted with about each topic.

More formally, our design focuses on “intransitive triads” where individuals i and j are connected and individuals j and k are connected, but i and k are not connected.¹⁶ To trace informational shocks, we exploit variation in the share of i 's second-degree ties—that is to say k 's that are only connected to i through a j —that became unemployed in a given year.¹⁷ Because each k is only connected to i through a j that is a first-degree tie for both i and k , unemployment shocks afflicting i 's second-degree ties should only affect i by diffusing through j . Figure 3 illustrates this design, where i is our panel survey respondent, j is a first-degree tie, and k is a second-degree tie.

Leveraging unemployment shocks afflicting second-degree ties addresses two challenges that often impede the estimation of information diffusion effects within social networks. First, our focus on k -specific unemployment shocks addresses the reflection problem—that correlated economic or political outcomes between individuals i and k could reflect i affecting k through j or k affecting i through j (see Manski 1993)—by

establishing the source of the shock and, thus, the direction in which any information must diffuse. Second, by focusing on unemployment shocks and shocks with two degrees of separation, we reduce the risk that any correlation between shocks afflicting second-degree ties and respondent outcomes reflects common characteristics or experiences shared by i and k (Bramoullé et al. 2009).

Nevertheless, a key concern is that respondents and their second-degree ties experience common shocks. Consequently, i would receive essentially the same, or highly correlated, information about an unemployment shock to k without receiving such information from a j linking k to i . We address the spatial component of this concern by first excluding all second-degree ties located in the same municipality as i .¹⁸ Second-degree ties k_1 and k_2 in figure 4A are examples of such excluded cases. To address an analogous problem arising when j experiences shocks correlated with k , we further exclude any second-degree tie k that is located in a parish where any first-degree tie j that indirectly connects i and k resides.¹⁹ This

16. Appendix sec. A.4 illustrates how second-degree social ties are constructed.

17. To compute this share k 's that are linked to i through multiple j 's are counted only once. Table A2 shows that the results are robust to counting each j , k pair separately.

18. Table A7 shows similar results if we further exclude k 's from i 's region.

19. Table A7 reports similar point estimates when k 's located in the same municipality as j are excluded.

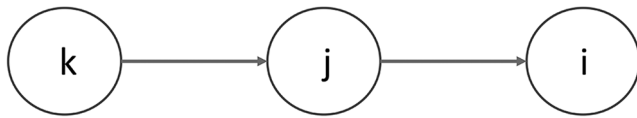


Figure 3. Illustration of undirected connections between weak ties. In this example, individual *i* is observed in our survey, and we estimate the effect of an unemployment shock afflicting individual *k*—information about which must pass through individual *j*—on individual *i*.

excluded case is exemplified by the second-degree tie *k*₃ in figure 4A. Consequently, our identification strategy only exploits unemployment shocks to individuals *k* in a different location from both individuals *i* and *j*, as illustrated in figure 4B.

These two restrictions reduce the number of second-degree ties used to compute the share of a respondent’s second-degree ties that became unemployed by around half. Before applying these exclusions, survey respondents had a mean of 17,632 and a median of 7,831 second-degree ties in a given year; after the exclusions, the mean and median respectively drop to 7,130 and 4,364 second-degree ties. Although excluding proximate ties that could generate biases may reduce the external validity of the shocks, table 1 shows that the socioeconomic characteristics of the remaining working-age second-degree ties are broadly similar to the working-age population.

We further address more general common shocks by including fine-grained *i*-level fixed effects. Specifically, we use four sets of respondent-by-year fixed effects to restrict attention to variation in unemployment shocks that arise due to differences in network composition between individuals within the same industry, occupation, educational, and geographic groupings.²⁰ First, industry × year fixed effects absorb common economic and political attitudes as well as vocational interactions among voters within a particular two-digit industry classification in a given year. Second, occupation × year fixed effects absorb differences across one-digit occupational classifications in a given year. Third, education × year fixed effects absorb differences across time in the attitudes of voters within a given one-digit educational classification. Appendix section A.5 describes these digit classifications. Fourth, parish × year fixed effects absorb parish-specific shocks—such as common community preferences or localized media cov-

20. Rather than leverage within-respondent variation, we exploit cross-sectional variation because—by the law of large numbers—there is limited variation in the share of a respondent’s second-degree ties becoming unemployed each year (conditional on year-interacted fixed effects). Although meaningful temporal variation requires year-on-year significant changes in the risk profile of a second-degree network, table A3 shows that the results are generally robust to including a lagged dependent variable to adjust for stable determinants of outcomes.

erage—that could induce individuals with different networks to adopt similar unemployment concerns and political preferences. Together, these fixed effects capture many potential common shocks and increase confidence that our estimates reflect differences in the distribution of second-degree shocks experienced by otherwise similar individuals. A placebo test and robustness checks employing more demanding adjustment strategies and sample restrictions further address common shock concerns.

In sum, we estimate the effect of an increase in the share of respondent *i*’s second-degree ties that recently became unemployed on outcomes for *i* using the following ordinary least squares (OLS) regression,

$$Y_{it} = \beta \text{Second-Degree Unemployment Shock Share}_{it} + \gamma_{wt} + \delta_{ot} + \eta_{et} + \mu_{pt} + \varepsilon_{it}, \quad (1)$$

where Second-Degree Unemployment Shock Share_{*it*} is the share of *i*’s (nonexcluded) second-degree ties that were

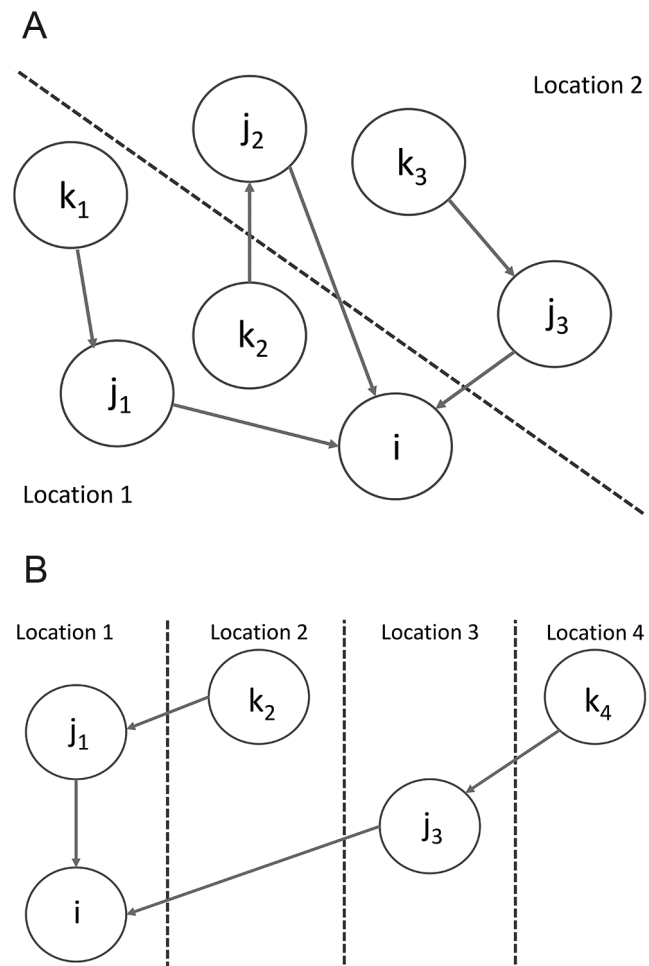


Figure 4. Illustration of excluded (A) and included (B) second-degree social ties

unemployed two months before the survey in year t (having not been unemployed in year $t - 1$), and γ_{wt} , δ_{ot} , η_{et} , and μ_{pt} are respondent-level industry, occupation, education, and parish fixed effects that vary by year t . Standard errors are clustered by i 's municipality.

RESULTS

This section presents our main finding that unemployment shocks to second-degree social ties significantly affect economic and political beliefs, preferences, and behavior, before leveraging placebo and sensitivity analyses to demonstrate the robustness of our findings.

Effects of unemployment shocks afflicting second-degree social ties

Table 2 reports our main results estimating the effect of an increase in the share of working-age Danish voters' second-degree social ties who became unemployed in the last year on our outcomes of interest. A unit increase in the share experiencing an unemployment shock implies a shift from 0% of second-degree ties becoming unemployed to 100%, while the standard deviation is 1.5%.

We first find, in line with hypothesis 1, that unemployment shocks to second-degree social ties increase perceptions of aggregate unemployment rates. Our point estimates in columns 1 and 2 indicate that a percentage point increase in the share of second-degree ties that became unemployed in the last year increases both an individual's current guess at the national unemployment rate and their expectation for the coming year by around 0.25 percentage points. A standard deviation increase in the share of a respondent's second-degree ties becoming unemployed thus implies around a 0.06 standard deviation increase in an individual's assessment of aggregate unemployment rates. Even among a relatively informed electorate, and consistent with Alt et al. (2016), voter beliefs about national unemployment rates are thus quite malleable. Moreover, the positive estimates suggest that information about second-degree ties becoming unemployed dominates, on average, any possible subsequent information about the smaller share of such ties that became reemployed.

Voters' beliefs about their own unemployment risk are also influenced by second-degree unemployment shocks. Supporting hypothesis 2, column 3 shows that each percentage point increase in the share of a respondent's second-degree social ties that became unemployed in a given year increases an individual's self-assessed probability of becoming unemployed within the next year by 0.74 percentage points on average. This level of responsiveness, which exceeds differences in perceptions about aggregate unemployment, implies that a

3-percentage-point—or almost a two standard deviation— increase in unemployment shocks afflicting individuals that a respondent is indirectly connected to increases the subjective risk of unemployment by 2.2 percentage points. Such an effect is around 14 times smaller than the 31-percentage-point increase in the perceived risk of being unemployed associated with respondents themselves suffering an unemployment shock in the last year (see panel C of table 3). Nevertheless, our results still suggest that unemployment experiences of second-degree social ties that are relayed by “word of mouth” are also important determinants of voters' subjective economic outlook. Such beliefs are consistent with voters forming posterior beliefs without possessing the information required to account for the fixed effects in our statistical model (see app. sec. A.7.3).

Beyond influencing a respondent's economic outlook, unemployment shocks afflicting “friends of friends” also affect policy preferences. Consistent with both hypothesis 3 and hypothesis 4, column 4 shows that a 3-percentage-point increase in the share of second-degree ties becoming unemployed increases the probability that an individual supports more generous unemployment insurance by 2.0 percentage points. This amounts to around one-eighth of the greater support for unemployment insurance among respondents who themselves became unemployed. Although the estimates in columns 5 and 6 are not statistically significant, they suggest that unemployment shocks afflicting second-degree ties may also increase support for redistribution toward the poor and non-market-based government stimulus. It is possible that changes in support for such measures are more limited because they are less directly targeted toward citizens expecting to become unemployed. Together, these findings suggest that unemployment shocks transmitted through networks of mostly weak ties cause voters to adopt more left-wing policy positions.

Consistent with the expectation that risk and distributive preferences translate into support for left-wing political parties, unemployment concerns and policy preferences are mirrored in the increased propensity of a respondent to vote for one of Denmark's left-wing parties. Columns 7 and 8 demonstrate that a 3-percentage-point increase in the share of a respondent's second-degree ties that became unemployed in the last year increases the intention to vote for a left-wing party and actually voting for a left-wing party in the 2011 election by 2.3 and 3.7 percentage points, respectively. By way of comparison, these effects are around half the size of the difference in left vote between respondents who did and did not themselves become unemployed. The relatively substantial effects of information that diffuses through social ties thus suggest that networks of mostly weak ties could alter electoral outcomes and governing coalitions, particularly in the close elections experienced recently in Denmark.

Table 2. Estimates of Second-Degree Social Tie Unemployment Shocks on a Respondent's Economic and Political Beliefs, Preferences, and Behavior

	Guess National Unemployment Rate (1)	National Unemployment Rate Expectation (2)	Own Unemployment Expectation (3)	Want More Unemployment Insurance (4)	Government Should Support the Poor (5)	Support Non- Market-Based Stimulus (6)	Intend to Vote for Left Party (7)	Voted for Left Party in 2011 (8)
Second-degree unemployment shock share	.226*** (.056)	.260*** (.059)	.743*** (.211)	.652* (.354)	.279 (.327)	.212 (.427)	.780** (.301)	1.242** (.577)
Observations	13,000	8,667	17,816	17,816	17,816	4,816	17,816	5,209
Outcome range	[0,1]	[0,1]	[0,1]	{0,1}	{0,1}	{0,1}	{0,1}	{0,1}
Outcome mean	.085	.076	.174	.320	.387	.402	.439	.500
Outcome SD	.055	.050	.302	.467	.487	.490	.496	.500
Unemployment shocks mean	.022	.022	.023	.023	.023	.025	.023	.022
Unemployment shocks SD	.014	.014	.015	.015	.015	.018	.015	.014
Survey years unavailable	2010	2010, 2012				2011, 2012, 2013		2010, 2011

Note. All specifications are estimated using OLS and include respondent-level industry × year, occupation × year, education × year, and parish × year fixed effects. Standard errors are clustered by respondent municipality.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

Table 3. Placebo and Main Robustness Checks

	Guess National Unemployment Rate (1)	National Unemployment Rate Expectation (2)	Own Unemployment Expectation (3)	Want More Unemployment Insurance (4)	Government Should Support the Poor (5)	Support Non- Market-Based Stimulus (6)	Intend to Vote for Left Party (7)	Voted for Left Party in 2011 (8)
A. Placebo Test Examining Shocks to Similar First-Degree Social Ties That the Respondent Does Not Know								
Placebo second-degree unemployment shock share	.036 (.039)	.024 (.050)	.117 (.158)	.097 (.157)	-.345** (.145)	.022 (.232)	-.489*** (.152)	-.810*** (.189)
Observations	13,000	8,667	17,816	17,816	17,816	4,816	17,816	3,243
B. Adjusting for Respondent Cohort × Year Fixed Effects								
Second-degree unemployment shock share	.220*** (.054)	.265*** (.059)	.629*** (.216)	.748** (.335)	.386 (.330)	.292 (.408)	.828*** (.292)	1.479*** (.552)
Observations	13,000	8,667	17,816	17,816	17,816	4,816	17,816	5,209
C. Adjusting for the Respondent Themselves Suffering an Unemployment Shock								
Second-degree unemployment shock share	.223*** (.056)	.257*** (.058)	.667*** (.216)	.617* (.351)	.262 (.337)	.137 (.431)	.774** (.302)	1.203** (.559)
Unemployment shock	.014*** (.004)	.007 (.005)	.310*** (.018)	.153*** (.028)	.100*** (.029)	.120** (.047)	.035 (.024)	.081* (.044)
Observations	12,991	8,664	17,799	17,799	17,799	4,808	17,799	5,206
D. Adjusting for 10 Predetermined Respondent Covariates								
Second-degree unemployment shock share	.199*** (.053)	.246*** (.057)	.380* (.209)	.477 (.359)	.138 (.333)	.123 (.438)	.718** (.287)	1.155** (.564)
Observations	12,991	8,664	17,799	17,799	17,799	4,808	17,799	5,206

Note. All specifications are estimated using OLS and include respondent-level industry × year, occupation × year, education × year, and parish × year fixed effects. The placebo test in panel A is described in the main text. The covariates included in panel D are gender, age, whether single, number of children, annual income, total asset wealth, total debt, homeowner status, whether unemployed, and the number of second-degree social ties; the regression coefficients for these variables are reported in table A6. Standard errors are clustered by respondent municipality.

* $p < .1$.
 ** $p < .05$.
 *** $p < .01$.

Thus far, our findings are consistent with both egotropic (hypothesis 3) and sociotropic (hypothesis 4) voting motivations. Even the elevated vote for the left-wing opposition party in 2011 could have reflected sociotropic voting if voters came to view the center-right incumbent coalition as less competent. However, table A5 shows that unemployment shocks did not reduce intention to vote for the government, which comprised left-wing parties in 2012 and 2013 survey rounds. We provide further evidence against the sociotropic interpretation of voter responses below by showing that political preferences respond primarily to concerns about their own unemployment risks.

Although social interactions between familial, vocational, and educational weak ties are all fairly common in Denmark, it is natural to consider heterogeneity by type of social tie. Tables A9 and A10 interact unemployment shocks with the type of ties linking a respondent to a first-degree weak tie and linking a respondent's first-degree tie to a second-degree tie. The results overall suggest that shocks transmitted through each type of tie operate relatively similarly.

Robustness checks

Perhaps the greatest concern is that our estimates reflect common shocks afflicting both the respondent and their second-degree social ties. Beyond our sample restrictions and fine-grained fixed effect structure, we address further this concern using various robustness checks.

First, we conduct a placebo test designed to detect common shocks afflicting respondents with similar types of network by assigning respondents "fake" first-degree social ties that are similar to a respondent's actual social ties. Specifically, each j was replaced by a randomly selected $j' \neq j$ from our sample (without replacement) that lives in the same municipality and works in the same one-digit industry as j in a given year, but is not actually a first-degree tie of the respondent. We then examine the effects of shocks affecting the k 's associated with each j' . Consistent with common shocks not driving our results, panel A of table 3 reports no evidence that shocks influence respondent beliefs and preferences. The negative coefficients in columns 5, 7, and 8 for the variables capturing left-wing attitudes run in the opposite direction to our main findings.

Second, shocks afflicting second-degree social ties belonging to the respondent's same cohort could be associated with those affecting the respondent themselves (e.g., due to legislation or labor demand decisions that differentially affect certain age groups). We address this potential source of common shocks by including (birth year) cohort \times year fixed effects and thus exploit only variation in unemployment shocks to second-degree ties belonging to the same cohort in a given year. Panel B shows that the inclusion of such fixed effects does not alter our findings.

Third, we further address the concern that our findings are spurious by adjusting for predetermined covariates. Panel C includes an indicator for a respondent becoming unemployed in the last year. Panel D adds 10 further respondent-level socioeconomic and demographic covariates: gender, age, whether single, number of children, annual income, total asset wealth, total debt, homeowner status, whether unemployed, and the number of second-degree social ties. In neither case does adjusting for these covariates substantively alter our findings.

Table A7 reports the results of five additional checks addressing potentially confounding factors or sensitivity to network construction. We show that our findings are robust to (i) further excluding second-degree ties from the same region as the respondent, (ii) excluding second-degree ties that live in the same municipality as the first-degree tie linking them to the respondent, (iii) adjusting for indicators for respondents whose social tie networks were truncated at the i and j levels by our vocational and educational restrictions, (iv) excluding respondents with more than 10,000 or 5,000 second-degree ties, and (v) ties that rely on ties generated by familial or educational ties. Furthermore, table A8 shows that the effect of increasing the share of second-degree ties that became unemployed is relatively linear.

INFORMATION TRANSMISSION MECHANISMS DRIVING VOTER RESPONSES

We next illuminate the process through which unemployment shocks to second-degree social ties influence voters. The following analyses indicate that information diffuses through first-degree ties, who respond similarly, and suggest that political responses are primarily driven by egotropic rather than sociotropic motivations.

Information diffusion through first-degree social ties

Information diffusion between second-degree ties likely requires that the intermediary internalizes unemployment shocks at least somewhat similarly to the ultimate recipient. It is difficult to see how a respondent could be sensitive to unemployment shocks experienced by individuals that they do not interact with without such a chain of events.

To assess this transmission mechanism, we first fielded a nationally representative survey in 2018 to examine what information is passed to others when "someone you know" becomes unemployed. Figure 5 shows that most respondents at least occasionally relay this event to others within their social tie network. Furthermore, many respondents instigate

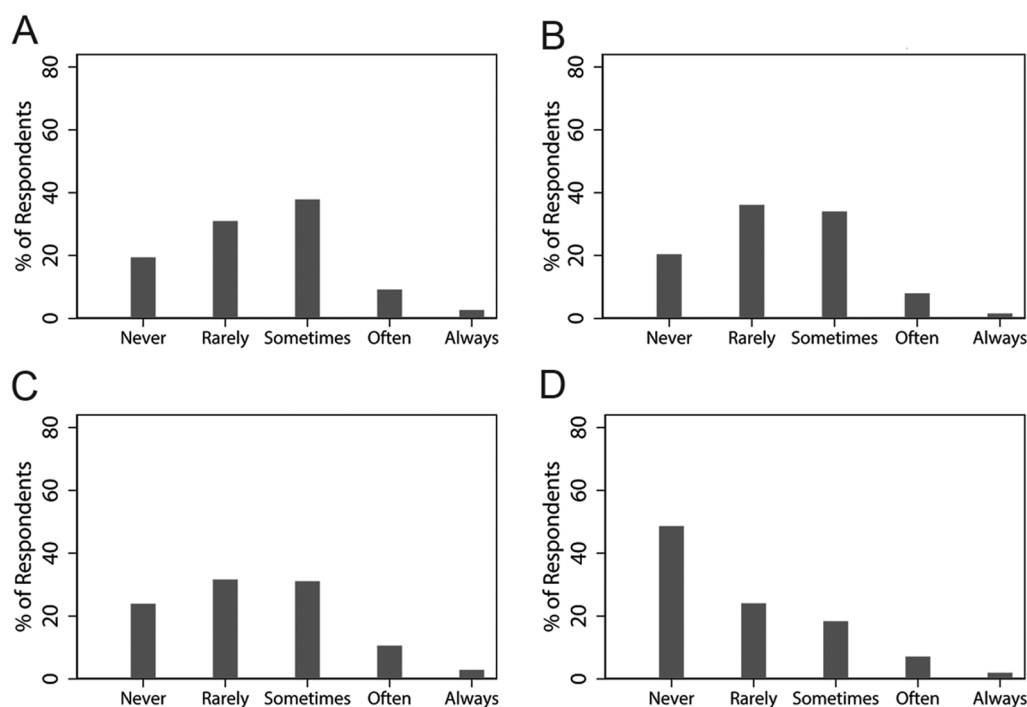


Figure 5. Discussions that individuals instigate when a first-degree social tie becomes unemployed. *A*, Talk to others about the event; *B*, talk to others about unemployment risk; *C*, talk to others about unemployment insurance; *D*, talk to others about left politicians. All responses are from our 2018 nationally representative survey of adult Danes. All questions refer to what happens after “someone you know becomes unemployed.”

discussions with others about unemployment risk, unemployment insurance, and—to a lesser extent—the need for more left-wing politicians in response to someone they know becoming unemployed. Only 9% of respondents report never instigating any kind of discussion after someone they know becomes unemployed. Danes thus often seem to diffuse politically relevant information to their first-degree social ties when another first-degree tie becomes unemployed.

A second implication of the information diffusion mechanism is that intermediary ties should alter their beliefs and preferences in response to unemployment shocks in a similar manner to our respondents. Ideally, we would test this by estimating the effect of unemployment shocks afflicting second-degree ties on the intermediary tie j that links respondent i to the k 's. Unfortunately, very few of these intermediaries also participated in our panel survey. In the spirit of two-sample instrumental variable techniques, we instead use the first-degree tie between i and j to substitute for the first-degree tie between j and k that we would ideally estimate. If i - j and j - k links are independently sampled from the same population, then we will obtain the same estimates in expectation (Inoue and Solon 2010). Table 1 shows that our respondents' first-degree social ties are broadly similar to both our respondents and their second-degree ties, as required. We then approximate the first step in the transmission of infor-

mation from k to j by estimating the following OLS regression:

$$Y_{it} = \beta \text{First-Degree Unemployment Shock Share}_{it} + \gamma_{wt} + \delta_{ot} + \eta_{et} + \mu_{pt} + \varepsilon_{it}, \quad (2)$$

where First-Degree Unemployment Shock Share $_{it}$ is now the share of a respondent's first-degree social ties that became unemployed within the last year. The fixed effects are analogous to equation (1), while we exclude first-degree ties located in the same municipality as the respondent.

The results reported in table 4 add further credence to the information diffusion mechanism. An increase in the share of first-degree social ties that became unemployed influences respondents' own unemployment concerns and policy and political preferences in the same direction as we found for shocks to second-degree ties in table 2. Specifically, a 3-percentage-point increase in the share of first-degree ties that became unemployed in the last year significantly increases a respondent's own perceived risk of becoming unemployed by 0.6 percentage points, their support for unemployment insurance by 0.5 percentage points, and their support for left-wing political parties by 0.5–1 percentage points. We now also observe a statistically significant increase in support for government policies supporting the poor.

However, the effects of unemployment shocks afflicting first-degree ties also differ from the effects of shocks afflicting

Table 4. Estimates of First-Degree Social Tie Unemployment Shocks on Respondent Economic and Political Beliefs, Preferences, and Behavior

	Guess National Unemployment Rate (1)	National Unemployment Rate Expectation (2)	Own Unemployment Expectation (3)	Want More Unemployment Insurance (4)	Government Should Support the Poor (5)	Support Non- Market-Based Stimulus (6)	Intend to Vote for Left Party (7)	Voted for Left Party in 2011 (8)
First-degree unemployment shock share	.014 (.012)	.012 (.015)	.205*** (.068)	.156** (.065)	.166** (.084)	.165 (.125)	.133* (.069)	.388** (.190)
Observations	12,771	8,496	17,454	17,454	17,454	4,683	17,454	5,137
Outcome range	[0,1]	[0,1]	[0,1]	{0,1}	{0,1}	{0,1}	{0,1}	{0,1}
Outcome mean	.085	.076	.171	.319	.387	.405	.440	.502
Outcome SD	.055	.050	.299	.466	.487	.491	.496	.500
Unemployment shocks mean	.025	.026	.027	.027	.027	.031	.027	.025
Unemployment shocks SD	.053	.052	.057	.057	.057	.065	.057	.046
Survey years unavailable	2010	2010, 2012				2011, 2012, 2013		2010, 2011

Note. All specifications are estimated using OLS and include respondent-level industry \times year, occupation \times year, education \times year, and parish \times year fixed effects. These estimates are not directly comparable to those in table 2 because the denominator underpinning the unemployment shock share differs; the sample is slightly lower than table 2 because respondents whose first-degree ties all live in the same municipality are excluded. Standard errors are clustered by respondent municipality.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

second-degree ties in two important ways. First, the effects of first-degree ties becoming unemployed on a respondent's own concerns and political preferences are notably larger per shock. To see this, note that the point estimates in tables 2 and 4 are not comparable because the denominators that define the share of ties that became unemployed differ substantially: in these empirical analyses, the mean respondent has 186 first-degree social ties, but 4,487 second-degree social ties. To compare the effect of a single tie becoming unemployed, we divide the coefficients in tables 2 and 4 by these means respectively. This implies that, per shock, the effects of a first-degree social tie becoming unemployed on unemployment concerns, social policy preferences, and vote choices are four to eight times greater than the effects of a second-degree tie becoming unemployed. Second, and in stark contrast, the effect of unemployment shocks to first- and second-degree ties on a respondent's national unemployment outlook are relatively similar in magnitude per shock. This contrast suggests that the difference between the effects of shocks to first- and second-degree ties cannot be entirely attributed to information decay arising from the greater probability that i learns about a shock to j than i learns about a shock to k through j .

One possible explanation is that the differential response between subjective expectations and preferences and aggregate perceptions reflects the likelihood that first-degree social ties are more similar to respondents than second-degree ties. Respondents may then be more sensitive to unemployment shocks afflicting first-degree ties because shocks to similar people are more informative about their own risks, whereas any unemployment shock is relevant for inferring national aggregates. We further test this interpretation by next examining whether respondents are indeed most responsive to shocks afflicting individuals who are similar to themselves, as hypothesis 2 predicts.

Preferences and voting behavior are motivated by egotropic interests

The greater effects of unemployment shocks afflicting first-degree social ties corroborate the information diffusion mechanism but also suggest that voters may differentiate information about unemployment shocks on the basis of their implications for their personal economic interests. We test the argument that unemployment shocks afflicting similar people provide a stronger signal of an individual's own prospects by estimating the following specifications:

$$\begin{aligned}
 Y_{it} = & \beta_1 \text{Second-Degree Unemployment Shock Share}_{it} \\
 & + \beta_2 \text{Second-Degree Share Similar}_{it} \\
 & + \beta_3 (\text{Second-Degree Unemployment Shock Share}_{it} \\
 & \times \text{Second-Degree Share Similar}_{it}) \\
 & + \gamma_{wt} + \delta_{ot} + \eta_{et} + \mu_{pt} + \varepsilon_{it},
 \end{aligned} \quad (3)$$

where Second-Degree Share Similar $_{ikt}$ is the share of a respondent's second-degree ties that are in the same two-digit industry or in the same one-digit occupation in survey year t .²¹

In line with hypothesis 2, the results in table 5 suggest that voters indeed respond more to unemployment shocks afflicting second-degree ties that are economically similar to themselves. The interaction coefficients capture the differential effect of an increase in the share of second-degree ties that became unemployed within the last year as the share of economically similar second-degree ties rises from 0% to 100%. Our estimates show that the effect of unemployment shocks to second-degree ties on subjective unemployment expectations and support for more generous unemployment insurance is substantially greater than for unemployment shocks to dissimilar second-degree weak ties. The interaction is also large and positive for self-reported vote choice, although it is not quite statistically significant. Aggregate unemployment perceptions suggest a stark contrast, as respondents respond similarly to unemployment shocks afflicting all types of second-degree ties. This lack of distinction reinforces the finding above that respondents' beliefs respond roughly equally to aggregate employment shocks affecting first- and second-degree ties, and further indicates that greater sensitivity to shocks afflicting similar people does not simply reflect information filtering by j . Together, these results suggest that voters distinguish the relevance of different types of information that diffuse through networks comprising strong and predominantly weak ties.

Given that individuals' economic concerns and policy preferences are more sensitive to unemployment shocks to similar individuals, these findings suggest that voters are primarily motivated by personal interests. In contrast with sociotropic accounts (hypothesis 4), table 5 demonstrates that unemployment shocks afflicting all types of second-degree tie influence perceptions of national unemployment, but only shocks to similar second-degree ties affect political preferences. In sum, these findings support an egotropic interpretation of voter preferences (hypothesis 3), whereby information that diffuses between even relatively weak social ties increases a voter's own concern about unemployment, which is reflected in a stronger preference for left-wing policies and political parties.

Discussion of mechanisms

Our main results show that Danish voters' economic and political beliefs and preferences are significantly affected by unemployment shocks afflicting second-degree social ties.

21. The analogous approach for first-degree social ties is underpowered because, by definition, most first-degree ties are from the same industrial or educational group.

Table 5. Heterogeneity in the Effect of the Share of Second-Degree Social Ties That Became Unemployed in the the Last Year on Respondent Economic and Political Beliefs, Preferences, and Behavior, by Economic Similarity of Respondent and Second-Degree Ties

	Guess National Unemployment Rate (1)	National Unemployment Rate Expectation (2)	Own Unemployment Expectation (3)	Want More Unemployment Insurance (4)	Government Should Support the Poor (5)	Support Non- Market-Based Stimulus (6)	Intend to Vote for Left Party (7)	Voted for Left Party in 2011 (8)
Second-degree unemployment shock share	.212*** (.072)	.237*** (.087)	.274 (.352)	-.145 (.469)	.224 (.549)	-.616 (.640)	.632 (.422)	.372 (.790)
Second-degree share similar	.007 (.004)	.002 (.005)	-.098*** (.020)	-.093** (.035)	-.028 (.047)	-.122* (.067)	.004 (.040)	.028 (.060)
Second-degree unemployment shock share × share similar	.047 (.189)	.105 (.238)	1.705* (.934)	2.855** (1.131)	.210 (1.442)	2.686 (1.849)	.517 (1.313)	2.989 (2.561)
Observations	13,000	8,667	17,816	17,816	17,816	4,816	17,816	5,209
Second-degree share similar mean	.434	.435	.430	.430	.430	.418	.430	.428

Note. All specifications are estimated using OLS and include respondent-level industry × year, occupation × year, education × year, and parish × year fixed effects. Standard errors are clustered by respondent municipality.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

Furthermore, our evidence examining the mechanisms suggests that this information diffuses through the intermediaries indirectly connecting respondents to the second-degree ties that became unemployed, that voters formulate beliefs in a logical fashion (upweighting similar types when considering their own unemployment prospects but not doing this when forming aggregate unemployment projections), and base their policy and political preferences primarily on their subjective concerns.

It is difficult to see how social conformity could solely account for these findings. A strictly social conformity explanation would require that an unemployment shock to a second-degree tie changes their behavior in a way that alters the social expectations governing the behavior of a first-degree tie in the presence of our respondent when the second-degree tie that suffered the shock is not present. This alternative account relies on no relevant information being transferred between individuals at either step in the chain, only changes in behavior.

However, it is unlikely that an increase in the share of k 's that became unemployed would change social norms in the first-degree networks that the k 's and j 's share in ways that influence norms in the networks that the i 's and their j 's share. This is especially unlikely under our design because k and j and j and i live in different locations. Furthermore, the social conformity explanation struggles to explain why respondents react more to shocks afflicting second-degree ties in the same industry or occupation, given that knowledge of their similarity could only arise from information diffusion. We thus believe that our findings most likely reflect information transmission within social networks.

An important question largely beyond the scope of this study is how, and what type of, information diffuses between strong and weak social ties. On one hand, there are major benefits to our design with respect to plausibly isolating exogenous variation in unemployment shocks—at an unprecedented scale and level of detail—that could only plausibly reach an individual via at least some information diffusion. On the other, the exact nature of what is diffused is “black-boxed” beyond the general discussions described in figure 5. Specifically, we cannot discern what second-degree ties communicate to a respondent's first-degree ties, how this information is parsed by these intermediary connections, and what politically relevant discussions arise between our respondents and their first-degree ties as a consequence of the second-degree ties becoming unemployed. Moreover, we do not know whether discussion about unemployment and reemployment differs in frequency or form. We are therefore unable to determine whether changes in second-degree social ties' economic beliefs and political preferences, or just the information about unemployment shocks themselves, in-

duce the changes we observe among voters two degrees of separation away.²²

CONCLUSION

We show that information diffusion within networks of strong and mostly weak ties plays an important role in shaping economic and policy beliefs and preferences and, ultimately, voting behavior. Combining Denmark's extraordinarily detailed individual-level data with a cross-sectional empirical strategy exploiting unemployment shocks to second-degree social ties at scale, we address the identification and network measurement challenges faced by previous studies investigating the impact of information diffusion within social networks. By focusing on shocks that must pass through intermediary ties, our approach also helps to distinguish information diffusion from social pressures. Our findings show that voters are highly responsive to unemployment shocks afflicting second-degree ties, influencing their beliefs about both national unemployment levels and personal unemployment risk. However, while perceptions of national aggregates respond to any person becoming unemployed, self assessments are only responsive to shocks afflicting those in the same industry. Consistent with individuals being motivated primarily by their economic self-interest, voters disproportionately alter their policy preferences and vote choices in response to shocks afflicting second-degree ties that are economically similar. This induces them to support more generous unemployment insurance and vote for left-wing political parties.

Our finding, that the political significance of information diffusion within social networks suggests that the capacity of social networks for diffusion may be just as important as networks' conformity pressures faces two limitations. First, although this study represents a rare opportunity to employ observational data that are both detailed and—especially given that Denmark's political and labor market institutions and experiences with the financial crisis were similar to other Western European nations—may generalize to other economic downturns (Pietryka and DeBats 2017), our findings are nevertheless specific to the context and time period examined. Further studies are thus required to assess information diffusion's effects between relatively weak ties in other contexts, on a wider range of political behaviors, and in direct comparison with social pressure's influence.

Second, an important limitation demanding future research are the questions of what types of information are transmitted between social ties and how they are transmitted.

22. Instrumenting for a peer's unemployment expectations with second-degree unemployment shocks (Bramoullé et al. 2009) is likely to violate the exclusion restriction.

Qualitative and panel studies in the United States observing political discussion in small communities (e.g., Huckfeldt and Sprague 1995; Walsh 2004) suggest one blueprint. Such studies could be complemented by experiments focusing on small groups in settings where communication, conformity pressures, and beliefs can be controlled and monitored (e.g., Klar and Shmargad 2017). Despite lower external validity, progress in examining how and what information is passed between both strong and weak ties relies on understanding these processes in detail.

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