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Radio and the rise of Nazi in pre-war Germany^{*}

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How far can media undermine democratic institutions and how persuasive can it be in assuring public support for dictator policies? We study this question in the context of Germany before World War II, between 1929 and 1939. First, we estimate the impact of radio signal on voting for the Nazi party before and after Nazi got control over the content of the broadcast. Prior to Hitler's appointment as chancellor, the radio, broadcasting cultural programs and some political news with an anti-Nazi slant, had a substantial negative effect on voting for the Nazi party. This negative effect was fully undone in just one month before the last competitive pre-war election following Hitler's appointment in 1933, which resulted in the change of radio content to heavy pro-Nazi propaganda. In the last few months that Germany remained democracy, the persuasion power of pro-Nazi propaganda was smaller than that of the anti-Nazi radio. Second, we examine the impact of the radio after Nazi fully consolidated power. Radio propaganda helped Nazi to enroll new party members and encouraged denunciations of Jews and other open expressions of anti-Semitism. Radio was most effective as propaganda tool when combined with other tools, such as Hitler's speeches, and when the message was more aligned with listeners' priors as measured by historical variation in anti-Semitism.

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Introduction

Dictators often came to power through a democratic process. Which essential institutional elements of a consolidated democracy are missing in such episodes? How do future dictators persuade voters to support them and how do they maintain popularity during and after consolidation of power? We show that whether future dictators gain control over mass media plays a key role in answering these questions.

The most prominent example of a collapse of democracy without a military coup was the rise of the Third Reich in Germany in 1930s, as it resulted in one of the largest catastrophes in the history of mankind. Did control over mass media help to establish and maintain Adolf Hitler's dictatorial rule? Historians have not reached consensus on this question. Some provide case-study evidence in favor of such view (e.g., Shirer 1960 and Somerville 2012). The Nazi himself strongly believed in media power. The future Reich Minister of Propaganda, Joseph Goebbels, noted in his diary right after Hitler was appointed chancellor of Germany and one month before the last democratic election of Weimar Republic: *"Now it will be easy to carry on the fight, for we can call on all the resources of the State. Radio and press are at our disposal. We shall stage a masterpiece of propaganda"* (quoted in Shirer 1960). Later on, during the radio exhibition in Berlin in August 1933 he claimed *"It would not have been possible for us to take power or to use it in the ways we have without the radio..."* Other historians (e.g., Zimmermann 2006) suggest that propaganda was a lot less effective than Goebbels had claimed.² Prior to this paper, there was no systematic empirical analysis of the impact of mass media on political support for Nazi during the collapse of Weimar Republic and the rise of the Third Reich. Our aim is to fill this gap and shed light on the role of control over mass media for undermining institutions in an unconsolidated democracy and for assuring public support for dictator policies.

We use detailed geographic variation in radio signal availability combined with the fact that the content of the broadcast changed twice from having only educational and cultural programs during 1928 to having some political news with a slant against Nazi party between 1929 and 1932 to heavy pro-Nazi propaganda in 1933. First, we are interested in

² For example, Zimmermann (2006) wrote that "however, Goebbels's insistent claims regarding the power of his own propaganda, together with the characteristic methods he used, have misled later generations of historians into believing, likewise, that the propaganda was effective, and into placing primary emphasis on the media as a system of persuasion—a misconception which persists today."

how the change of the content – associated with the change in control over radio broadcast – influenced the political support of the Nazi party, which was gaining popularity over this period. These dynamic effects can be estimated as the government of Weimar Republic was extremely unstable and, as a result, five parliamentary elections took place between 1928 and 1933 (the timing of these elections was as follows: May 1928, September 1930, July 1932, November 1932, and March 1933). We predict the strength of radio signal at every point in time in every locality by combining information on the exact location and the power of radio transmitters with ITM engineering software (Irregular Terrain Model, Hufford, 2002, Olken, 2008). We verify that the signal appears to be idiosyncratic after controlling for a few demographic characteristics (such as flexible polynomial of population), some pre-existing political preferences as of 1924 (i.e. before radio expansion), and province fixed effects.

We find no effect of radio availability in 1928, i.e., before it turned political. Triggered by the referendum to renounce the Treaty of Versailles initiated by the German nationalists including NSDAP in 1929, the incumbent government changed broadcast to include some political news programs with a slant against Nazi. As a result of the change in content, in 1929-1932, radio had a significant negative effect on both the referendum vote against the Treaty of Versailles (which was supported by Nazi) and the share of vote received by Nazi party (NSDAP).³ We also find a significant effect of radio signal on the results of the presidential election in April 1932, which Hitler lost to Paul von Hindenburg: radio had a negative effect on the Hitler's vote share and positive effect on the share of votes cast for von Hindenburg. The broadcast took another sharp turn after Hitler was named chancellor of Germany and got control over radio among other executive powers in January 1933. As a result and in contrast to the effect of radio prior to 1933, in March elections, regions with higher signal had significantly larger share of vote cast for the Nazi party controlling for the Nazi vote share in the previous elections that took place only 5 months before. At the same time, without conditioning on previous elections, radio signal stopped being a significant predictor of the Nazi vote in March 1933. This means that in one-month Nazi radio propaganda was able to fully undo the negative effect of the anti-Nazi messages broadcasted in the previous four years but did not manage in this month to mobilize other voters than those who were previously persuaded not to vote for the Nazi party. We

³ NSDAP stands for The National Socialist German Workers' Party, in German: *Nationalsozialistische Deutsche Arbeiterpartei*.

calculate persuasion rates for both pro- and anti-Nazi messages and find that in the last few months that Germany remained democracy the persuasion power of pro-Nazi propaganda was smaller than that of the anti-Nazi radio.

1920s and 1930s were a time of rapid expansion of radio in Germany. The number of radio subscriptions started with essentially zero in 1924 and increased to 2 million in 1928, to 3 million in 1930, and to over 4.5 million in 1933. During the three elections between 1929 and 1932, when radio content did not change, we can also estimate the effect of radio diffusion. We find a significant negative effect of radio on votes for the Nazi party relying only on variation in the change of the signal availability associated with the change in radio transmitters between 1930 and 1932 controlling for all unobserved characteristics of localities.

Radio was far from being the only means of political persuasion. In particular, even before taking control over radio, Nazi organized fierce political campaigns using posters, street rallies, as well as door-to-door campaigning. We find that Nazi radio propaganda was complementary with at least one of the other tools of Nazi political persuasion: Hitler's speeches. The effect of pro-Nazi radio propaganda in 1933 was stronger in places, where Hitler gave a speech at a rally before 1933.

Two counterfactual exercises highlight the role of the radio in the rise of the Third Reich. First, in the absence of the radio in 1930, Nazi could have gained almost as many votes (and seats) as their main competitor, Social Democratic Party (SPD). Therefore, they could have had larger bargaining power over choosing the candidature for the chancellor and ultimately could have gained executive power 2.5 years earlier. Second, in the absence of the shift in control over radio to Nazi in January 1933 but with continued use of other tools of propaganda, the subsequent elections would have produced 5 percentage point lower vote share for Nazi party (which constitutes about a half of what NSDAP actually gained between November 1932 and March 1933 elections). Overall, our results confirm that radio propaganda was indeed an important tool in the struggle for power in late Weimar Republic and was used both by the Nazi (after 1933) and by their opponents (before 1933).

The second question that we pursue in our analysis is whether radio helped Nazi to maintain political support after the full consolidation of power. Even though there were three parliamentary elections in the Nazi Germany: in November 1933, March 1936 and April 1938, voting results are useless in measuring political support for Nazi during this

time. As is typically the case in dictatorial regimes, Nazi banned all opposition parties and in all of these elections voters were presented with a single list containing only Nazi candidates. As a result, in all three elections the turnout and the vote for NSDAP was above 90%. Thus, we turn to other measures of political support for the regime, namely, the Nazi party membership, denunciations of Jews, and other expressions of anti-Semitism.

We find that radio propaganda was important in persuading Germans to support the Nazi. First, radio broadcasts were significantly associated with joining Nazi party in 1933. (We verify that, as one would expect, there is no relationship between Nazi party membership and radio before Nazi got control over content.) The results imply that without radio propaganda, Nazi party membership would have been 5,000 people lower in 1933. Furthermore, in localities with larger radio exposure, the number of Jews deported to concentration camps before the beginning of World War II was significantly larger suggesting that these localities saw a higher rate of denunciations of Jews by ordinary Germans, which was the primary source of information for deportations (Voigtländer and Voth 2012). We also consider the following measures of expressions of anti-Semitism as outcomes: the anti-Jewish letters written by ordinary Germans to the editor of the anti-Semitic national newspaper *Der Stürmer* and the attacks on synagogues during the “Night of Broken Glass” (*Reichskristallnacht*) in 1938 (both measures come from Voigtländer and Voth 2012). We find that Nazi radio propaganda had a positive and significant effect on both of these measures of popular expressions of anti-Semitism in places that historically were more anti-Semitic, as measured by occurrence of anti-Jewish pogroms during the Black Death in 1349. We also find that radio had a larger positive effect on incidence of anti-Jewish letters to *Der Stürmer*. This effect is driven by the population of the cities that engaged in pogroms back in 1349.

Our results suggest that, first, mass media could be both an important safeguard against the fall of unconsolidated democracy and an important facilitating factor in such a fall depending on who exercises control over content and, second, dictators use mass media to gain popular support and to persuade people in virtue of their most horrible policies.

Our paper relates to several growing literatures. First, our results contribute to our understanding of institutions in unconsolidated democracies and dictatorships (see Acemoglu and Robinson 2006 for a profound and extensive overview of this literature). Our paper is the first to empirically assess the role of mass media in the fall of a democracy and the rise of a dictatorship. Notable theoretical contributions to the theory of

media in autocratic states are, for instance, Besley and Prat (2006), Egorov, Guriev, and Sonin (2009), and Gelbach and Sonin (2012).

Second, we also contribute to the literature on power of media in political persuasion. For instance, DellaVigna and Kaplan (2007), Gerber, Karlan, Bergan (2009), and Knight and Chiang (2009) show that mass media can influence voting behavior in developed democracies. Enikolopov, Petrova, Zhuravskaya (2011) and DellaVigna et al. (2012) document effects of media on voting behavior in immature democracies, namely, Russia in 1996 and Croatia in 2007. Enikolopov, Petrova, Zhuravskaya (2011) is more closely related to this paper as it uses the case of Russia's parliamentary election of 1999 to study how the absence of independent media may help election prospects of the party which controls the media. Our paper differs from the previous studies of media effects on voting behavior in the following important respects. First, our paper is the first to look at panel data with both the content and the extent of the signal coverage changing over time. This allows us to estimate dynamic effects of the change in the media content. In addition, panel nature of the data help estimating persuasion power of a certain message (i.e., anti-Nazi message) more cleanly without remaining concerns that the estimates are driven by unobserved heterogeneity. Second, this paper is the first one to look at how different means of propaganda, i.e., radio propaganda and campaign speeches, interact in their effect on voting behavior. In theory different propaganda tools can be both substitutes and complements, we find strong complementary effects.

Our paper is also related to the literature on the effects of media on ethnic hatred and public expression of nationalistic feelings. Yanagizawa (2012) studies the impact of exposure to propaganda on Hutu radio on violence against Tutsi during the genocide in Rwanda. DellaVigna et al. (2012) study the effect of Serbian nation-building radio on expressions of anti-Serbian feelings in post-conflict Croatia. Our paper shows that expressions of anti-Semitism by ordinary Germans were triggered by Nazi radio propaganda. Unlike previous paper in this strand of literature, we also show that media has a larger effect on expression of nationalism when the message is more aligned with listeners' prior attitude towards a particular ethnic group, namely, Nazi radio had larger effect on anti-Semitic behavior of Germans in places that were historically more anti-Semitic.

We also contribute to the historical literature studying the effects of propaganda in Weimar Republic and Nazi Germany (e.g., Sinton, Weidenfeld 1943, Ross 2006, and Zimmermann

2006). Our paper, however, is the first to provide systematic empirical evidence on the causal effect of radio propaganda on the Nazi support.

The rest of the paper is organized as follows. Section 2 provides background information. Section 3 discusses empirical hypothesis. Section 4 describes data. Section 5 summarizes our main empirical results. Section 6 concludes.

Background

Political Landscape

Weimar Republic was a parliamentary representative democracy established in Germany in 1919. Up until 1932, the government of Weimar Republic was controlled by a coalition of centrist parties led by democratically oriented Social Democratic Party of Germany (*Sozialdemokratische Partei Deutschlands*, SPD). Despite numerous economic problems, including hyperinflation in the first half of 1920s, the coalition had a stable majority until 1930. A severe economic depression, triggered by the recall of American short-term loans to Germany following the US Stock Market Crash of 1929 and exacerbated by the heavy burden of reparation payments, weakened the government. The early elections of September 14, 1930 aimed at its strengthening had an opposite result: the centrist parties lost a significant share of the vote to opposition parties and the government could function only with the aid of presidential decrees in the following two years. The Nazi party (NSDAP) gained the most from the economic crisis: in September 1930 elections, it received 18.3% of the vote as compared to 2.6% in 1928.

The continuing economic depression led to further radicalization of the population. In the presidential election of March 1932, Adolf Hitler got 30.1% of the total vote in the first round, and came second only to the incumbent president, Paul von Hindenburg (who got 49.6% of the votes in the first round). Von Hindenburg won the second round with 53% of votes against 36.7% for Hitler. In the early parliamentary elections of July 31 1932, the Nazi party received an astounding 37.3% of votes. The Nazi got electoral support from the rising lines of unemployed and financial support from rich industrialists who feared potential expropriation to pay government debt. Despite the Hitler's strong position on the political scene at that time, the president von Hindenburg refused to appoint him chancellor. In November 1932 parliamentary election, Nazi got only 33.1% of the vote, which amounted to approximately 2 million votes and 35 seats lost compared to previous election mainly to the Communists. Historians explain this shortfall by the financial

problems inside the Nazi party. However, as a result of misguided political strategizing in a series of negotiations between the ex-chancellor Franz von Papen and the president Hindenburg (ironically, aimed at setting constraints on the Nazi while preserving their own power), on January 30, 1933 Hitler was appointed chancellor.

The plan of constraining the Nazi failed. Shortly after Hitler's appointment as chancellor, Nazi consolidated all political powers. They took control over police and radio immediately. After the (allegedly) staged Reichstag fire in February 1933, most civil liberties were suspended, free press restricted, the communist leaders were arrested, and the terror spread over the country. All of these events coupled with massive radio propaganda lead NSDAP to gain 43.9% of the vote in the last competitive pre-WWII elections in Germany in March 1933. By the summer of 1933, all political parties, with the exception of NSDAP, were outlawed, all independent from the Nazi newspapers were forbidden; Nazi officials were put in charge of all local governments; trades unions were abolished and their leadership imprisoned. Germany became a dictatorship.

Radio content

Between 1923 and 1924, the state postal company (*Reichspost*) with participation from private investors created nine regional broadcasting companies in Germany. Initially, these regional companies had control over their own content. Programming included: music (concerts, stage plays, and opera transmissions), literary programs (primarily, belles lettres and poetry), weather, sports, and scientific and popular lectures. Advertising was also an important part of broadcast. Local news were mostly limited to non-political information about local affairs, such as retail prices or police calls for witnesses. The policy regarding broadcasting political content changed over time. In the first year of operation, few regional companies experimented with broadcasting some political news as well. However, within several months of operation, the production of all political news programs was centralized by the news agency Dradag AG. For example, during the campaign of parliamentary elections in May 1924, when the number of radio subscribers reached 16,000, Dradag AG allocated 15 minutes of air time to each of the following five parties: Zentrum, the DNVP, the SPD, the DVP, and the DDP. In 1924, the Minister of Home Affairs, Karl Jarres, argued for the need for regulation of radio recognizing the risk of

abusive political influence of the masses.⁴ As the result, a majority stake in the news agency Dradag was nationalized and the editors were obliged to report in line with the official position of the government. During the campaign, preceding parliamentary election of December 1924, candidates were not given any airtime. In contrast, in the presidential election campaign of 1925, two candidates, Hindenburg and Marx, were allocated radio time, whereas the communist candidate, Thälman, was not allowed to speak on the air. During this time, the role and the proper place of politics in radio broadcast was a subject of on-going political debate. Democratic parties argued for equal access, while antidemocratic parties criticized “the Jewish influence” and argued that radio represents the politics of the bourgeoisie. As a consequence of this debate, in 1926 a regulation took force forbidding any political and especially partisan content. Thus, between 1926 and 1928 radio was deliberately apolitical. The broadcast consisted of cultural and entertainment programs. For example, during the parliamentary elections of 1928 no content related to electoral campaigns was aired. However, in 1929, the policy regarding radio content changed. The Nazi party in coalition with other right-wing parties organized a referendum against respecting reparation payments required under the Treaty of Versailles (i.e., the so-called Young Plan). In response, the government launched an intensive propaganda directed towards voting “no” in the referendum.⁵ After 1929, radio became increasingly politicized and offered more and more pro-government and pro-democratic content, which included economic and political news, lectures, as well as political speeches. During the parliamentary election campaigns in 1930 and 1932, airtime was given to all major parties with the exception of the Nazi (NSDAP) and the Communists (KPD). During the presidential election campaign in the spring of 1932, airtime was given exclusively to the incumbent president, von Hindenburg. During the campaign preceding parliamentary election of July 1932, the Nazi party was given some time on the air. The government, however, reserved a disproportionate amount of broadcasting time for itself.⁶ After the elections of July 1932, a reform of the regional broadcasting companies took important steps towards further centralization and nationalization of these media. “*The most important changes under [chancellor] von*

⁴ Dussel, Konrad (2010): *Deutsche Rundfunkgeschichte*. 3. überarbeitete Auflage. UVK, Konstanz, S. 34: „dass die vielfältigen Möglichkeiten den Rundfunks, ihn zur politischen Beeinflussung breiter Kreise der Bevölkerung zu benutzen, eine Regelung erfordere, die Missbrauch ausschließe.“

⁵ The referendum failed because of insufficient turnout.

⁶ Pohle, Heinz, 1955, *Der Rundfunk als Instrument der Politik*, Hamburg.

Papen occurred in the area of radio, which was thoroughly reformed and brought under firm state control over the latter half of 1932. As part of this restructuring, Interior Minister von Gayl ordered a daily “Government Hour” for all radio broadcasters, during which ministers could hold supposedly “unpolitical” speeches in support of government policies... [O]ver the six and a half months of his chancellorship, von Papen spoke on the radio eighteen times...” (Ross 2006). After the elections in November 1932, the centralization and nationalization of all radio broadcasts was completed. Overall, the Nazi had virtually no influence on the content of radio broadcasts before Hitler was appointed chancellor on January 30 1933, and up until that point the radio content had a slant against the Nazi party. “[T]he strategy [of the government and pro-democratic parties] was to ridicule Nazi propaganda through reasoned argument” (Ross 2006).

Following Hitler’s appointment as chancellor, the content of the radio broadcasts changed sharply. Between February 1 and the parliamentary elections of March 5 1933, the Nazi launched an intensive daily political advertising campaign on the radio. The Nazi minimized airtime of its coalition partner, the DNVP, and blocked the access to radio for all other parties.⁷ The content of the radio broadcasts became dominated by propaganda aimed primarily at convincing uneducated workers.⁸ The broadcasts from demonstrations, marches, and rallies were to transmit the illusion of the massive popularity of the Nazi movement and increase its electoral support during the upcoming elections. In 1934, Goebbels claimed that radio played a significant role in winning “the war of propaganda” allowed Nazi to win the March 1933 elections.⁹ Since that time and up until the fall of the Nazi Germany, radio was used by the Nazi as one of the main propaganda tools.

Figure 1 portrays the timeline of the key political events and of the measurement of all variables used as outcomes in this paper.

Availability of radio

In the end of 1920s and the beginning of the 1930s radio network rapidly expanded. The number of big transmitters (with a power over 10kW) increased from one in September

⁷ Diller, Ansgar, 1980, Rundfunkpolitik im Dritten Reich, München, p.61

⁸ Paul, Gerhard, Aufstand der Bilder, Die NS-Propaganda vor 1933, Bonn, second edition 1992, p.39ff.

⁹ Handbuch des deutschen Rundfunks 1934, S.9, citation after Bausch 1956: „Mit dem Rundfunk ``haben wir die Propagandaschlacht des Frühjahrs 1933 geschlagen und den Sieg der Bewegung fest uns tief im Volk verwurzelt.““

1930 to three in April 1932 and to six in March 1933.¹⁰ While in the 1920s the transmitters' signal covered the territory with about 31.3% of the German population, the construction of big transmitters in 1930-34 was meant to extend the signal availability to 70% of the population. Radio listenership, measured by subscription rates, also was expanding fast from essentially zero in 1924 to one half a million subscribers in 1925, to 2 million subscribers in 1928, to 3 million in 1930, to little under 5 million by the end of 1933. (See Figure 2 for an illustration of the expansion of listenership in 1924 - 1933). Each year afterwards added about 1 million additional radio listeners (Vaessen 1938). The numbers of listeners evading the subscription fee throughout this period are unknown.

Initially, the country was divided into nine broadcasting districts, each with a diameter of about 200-300 km. In each broadcasting district, one transmitter was built in the center of the major city aimed at making the signal available to the greatest proportion of the population. Each transmitter was operated by the corresponding regional broadcasting company. The range and quality of the signal was far from being sufficient to provide uniform radio signal coverage over the country. The demand for more localized content from the areas with the signal and the demand for radio availability from areas without the signal led to the construction of additional transmitters. The Geneva Frequency Plan, which came into power in November 1926, reduced the number of available frequencies for the radio and led to the creation of single-frequency networks in each of the nine broadcasting districts. This resulted in uniform programs within each of the broadcasting districts despite the demand for more local content. The technical upgrades of more powerful transmitters required moving them from the city center to the outskirts.¹¹ A study of population densities was conducted in order to determine the optimal location for big transmitters.¹² An important rationale for upgrading the power of existing transmitters and building new ones was to reduce the disturbances of the signal due to foreign transmitters near the border. For example, the transmitter in Flensburg was constructed in December 1928 as a response to the nearly built Danish transmitter. The transmitter in Gleiwitz was built in 1925 because of the nearby Polish transmitter in Kattowitz and its power was increased to 12 kW in 1927 after the power of the Kattowitz transmitter was increased to

¹⁰ Lerg, Winfried B. *Rundfunkpolitik in der Weimarer Republik*, 1980.

¹¹ For more information, see for example Schütte, Wolfgang. *Regionalität und Föderalismus im Rundfunk*, 1971.

¹² *Neuordnung des Rundfunks in Deutschland*. *Der Deutsche Rundfunk*, Nr.49, 6.12.1929, p. 1545f.

10kW. This upgrade made the “supplementary” transmitter in Gleiwitz the third most powerful in Germany at that time.¹³

The radio listenership was significantly higher in the big cities with transmitters and suburban area around them, as the signal was sufficiently strong for reception with a relatively cheap crystal radio receiver. In contrast, in rural areas more powerful radio sets were necessary to listen to the radio. The technical progress led to improvement of radio receivers over the time; however, their quality and price varied substantially at each point in time. The cheapest crystal radio receiver was available at a price of 25-30 Mark while more sophisticated vacuum detectors had a price from 110 up to 380 Mark. There is anecdotal evidence that a growing number German houses over 1920s and 30s were equipped by homemade radios. During the First World War 4,000 radio operators were trained to have sufficient knowledge to assemble their own receivers and the members of local radio clubs engaged in the making their own receivers. An affordable radio receiver *Volksempfänger* (people's receiver) was presented during the international radio exhibition in Berlin on August 18 1933. The production of this cheap receiver was ordered by Goebbels and was aimed increase the number of listeners. Overall, radio listenership was higher in places with higher population density, better economic conditions, and better physical conditions of the terrain to receiving the signal (e.g., being in line of sight of the transmitter).¹⁴ An important additional reason for low levels of radio listenership in rural areas was the low level of electrification. 96.5% of receivers required power supply.¹⁵ In addition, there was a monthly radio license fee of 2 Mark, which was roughly equivalent to the price of a monthly newspaper subscription and corresponded to the wage of about 2 hours of skilled and 4 hours of unskilled labour.

From 1933 onward, the Nazi made an effort to make radio available also to those who could not afford a private radio receiver: *“the party through its ‘wireless wardens’ and ‘block wardens’ in every village and town, help[s] to install communal receiving sets, organizes group listening, lays down rules about the erection of aerials, and reports on illegal listening-in to foreign stations”* (Sington and Weidenfeld 1943).

¹³ For more information, see for example Schütte, Wolfgang. *Regionalität und Föderalismus im Rundfunk*, 1971.

¹⁴ Cebulla, Florian, *Rundfunk und ländliche Gesellschaft 1924 - 1945*, 2004, Göttingen, p. 34

¹⁵ Numbers for July 1933 and July 1934. Source: Vollmann, Heinz, 1936, *Rechtlich-wirtschaftlich-soziologische Grundlagen der deutschen Rundfunk-Entwicklung*, Leipzig.

Empirical hypotheses

First, to test whether the radio played a role dismantling of the democratic institutions of the late Weimar republic, we consider how radio availability affected voting for the Nazi party during three periods: 1) when radio was neutral and apolitical, i.e., before 1929; 2) when radio had an anti-Nazi and pro-government and pro-democracy slant, i.e., between 1929 and 1932; and 3) when Nazi used radio as propaganda machine, i.e., after January 1933. Our expectation is that exposure to radio decreased the vote share of the Nazi party at the time when radio had anti-Nazi slant and increased the vote share of the Nazi party after they got control over the radio. An important falsification test is to verify that radio signal was uncorrelated with the Nazi vote share conditional on observables before radio got political content.

Second, we turn to the investigation of the effects of radio on the support for Nazi policies after the establishment of Hitler's dictatorial rule in 1933. We expect the radio propaganda to increase the number of new members in the Nazi party and also increase open expressions of anti-Semitic sentiment among ordinary Germans. We measure expressions of anti-Semitic sentiment by the number of letters with anti-Semitic content to Nazi newspaper "*Der Stürmer*", attacks on synagogues, and higher incidents of the deportation of Jews.

Third, we test whether different means of propaganda are substitutes or complements. Theoretically, both are possible and, therefore, it is an empirical question. Given that the Nazi used a wide range of different propaganda tools, their prior was that the effects are complementary. We are able to test this hypothesis by measuring the effect of combining Hitler's speeches with radio availability.

Fourth, we test the hypothesis about the difference in persuasion power of the propaganda messages between the audience more and less positively predisposed to the content of the message. We expect that in places with higher initial levels of anti-Semitism, Nazi radio propaganda had a larger effect on the expressions of anti-Semitic sentiments compared to places with lower initial levels of anti-Semitism.

Data

Radio Availability. The data on radio availability is calculated using the information on the radio transmitters. Our primary source of data for transmitter location, their frequency and power is *Mitteilungen der Reichs-Rundfunk-Gesellschaft* (various years). In addition, we used data from *Rundfunk Jahrbuch 1929* for the year 1928. All these sources reference *Union Internationale de télécommunications* as the primary source of the data. Based on this information we calculate predicted signal strength of the radio signal in different localities using Irregular Terrain Model (Huffed 2002, employed also by Olken 2008, Enikolopov et al. 2011, and DellaVigna et al. 2012). For each precinct (*Kreis*) and town, we compute signal strength at the point described by GPS coordinates of their geographical centers. The set of precincts comes from the map of administrative borders in 1925. Figure 2 presents the map of radio signal strength computed for March 1933.

Electoral measures. The data on electoral returns comes from ICPSR (1999). We use as the outcome variables the voting outcomes at the five Reichstag elections in 1928-1933, two rounds of presidential elections in March-April 1932 and the referendum on the “Law against the Enslavement of German People” in December 1928. For Reichstag elections we focus primarily on the share of votes received by NSDAP, but we also look at the share of votes received by other major parties and turnout. For presidential elections we look at the share of votes received by Hitler, Von Hindenburg, and Thalmann.

The data on the referendum includes the share of voters that have supported the proposed Law and the number of voters that voted in favor of the Law during the referendum as the share of the registered voters.¹⁶ We focus on vote shares as a percentage of registered voters, rather than on vote shares of valid votes, because the approval of the Law required that more than 50 percent of the voters take part in the referendum and that more than half of them vote in favor of the Law. As the turnout at the referendum was extremely low (about 12 percent), non-voting was equivalent to casting the vote against the Law.

Anti-Semitism measures. The measures of anti-Semitism are based primarily on the data from Voigtländer and Voth (2012). In particular, we use the information on the number of anti-Semitic letters to the *Stürmer* during 1935–38, dummy variable for whether

¹⁶ According to the German constitution of that time if at least ten percent of eligible voters registered their approval of a law proposal it was sent to Reichstag for discussion. If Reichstag rejected the law proposal it was put on a referendum. For a law that did not require changes in the Consitution to pass the referendum majority of eligible voters had to come to polls and majority of them had to vote in favor of the proposal.

synagogues or Jewish prayer rooms were damaged or destroyed during the *Reichskristallnacht* in 1938, and information on the number of Jews that were deported in 1933-1942.

Since deportations of the Jews after the start of the World War II became massive and might be less reflective of the local anti-Semitism, we also collect information on the number of Jews that were deported in 1933-1939 by precincts from the database of Jewish deportees during the Nazi period which was compiled by the German Federal Archives (Bundesarchiv 2007).

NSDAP membership. The information on the NSDAP membership comes from the Burnstein-Falter data set (Burnstein and Falter, 1994). Based on this data we compute the number of people from a particular city who have joined NSDAP in 1932 and 1933. Since the data is stratified at the city and year level, the absence of observations in a particular city does not indicate that there were no new members from this city joining NSDAP. Thus, we restrict the sample only to those cities for which there is at least one observation in both 1932 and 1933.

Control Variables. As a primary source of data on socio-demographic variables, we use the data from *Zentralarchiv* and German Census Data from Falter and Hänisch (1990). In particular, we use the following sociodemographic controls from 1925 Census: the share of Jewish and Catholic population, and the share of workers in white- and blue-collar occupations. From the Census of 1933, we use two unemployment controls, the share of unemployed, and the share of partially employed. We include unemployment controls primarily because scholars of the subject, including Childers (1983) and King et al. (2008), consider unemployment an important determinant of pro-Nazi voting. However, unemployment is measured after most of elections take place, and this might be problematic from econometric point of view. As a result, we report the results with and without 1933 unemployment controls throughout the paper.

In addition to Census data, we also use a number of additional controls from *Statistik des Deutschen Reichs* (various years, see the appendix). Specifically, we use data on property tax payments and the number of participants of World War I, welfare recipients, and pensioners receiving social assistance. We also construct a variable that reflects the number of speeches that Hitler have given in 1932 in each city based on the information from Domarus (1962).

As Voigtländer and Voth (2012) shows that historical anti-Semitism is an important determinant of pro-Nazi voting and anti-Semitic violence, we include in the analysis the data on historical pogrom variables and information on the existence of Jewish settlement in 14th century from the same source.

All the measures are computed at the precinct level using the administrative borders in 1925. The precinct units in election data and socio-demographic data were manually merged to precinct units in 1925.¹⁷ The exception is the data on anti-Semitism from Voigtländer and Voth (2012), which comes at the town level.

All data sources are described in more details in the appendix.

Empirical framework

Specification

In the empirical analysis we examine the effect of radio exposure on a number of outcome of interest that capture electoral support of Nazi and anti-Semiteisms. In particular, we use as the baseline specification the following regression:

$$y_{it} = \beta_0 + \beta_{1t} * radio_support_t * radio_exposure_{it} + \beta_2 X_{it} + \phi_p + \epsilon_{it} \quad (1)$$

where y_{it} , is the outcome of interest in precinct i in time t , $radio_exposure_{it}$ is a measure of exposure to radio, $radio_support_t$ is an indicator for radio bias in favor of Nazi at time t (which takes value zero if there was no bias and -1 if the bias was against Nazi), X_{it} is a set of controls, z_{it} is unobserved heterogeneity that, theoretically, might affect voting for Nazi, and ϕ_p is a province fixed effect. Majority of our results are based on the cross-sectional variation for a particular time period t . In these regressions we omit the variable $radio_support_t$.

We control for province (*Wahlkreis*) fixed effects to take into account regional variations. All existing literature on Nazi voting is focused on regional differences, and we are not aware of any other paper that is focused on such a detailed within-province variation.

As both radio signal strength and vote for Nazi were correlated with urbanization, it is important to control for population as flexible as possible to avoid spurious correlations. To cope with this problem, in most our specifications we control for 5th degree polynomial

¹⁷ When we were not sure how to aggregate different precincts in election and socio-economic data into units in 1925, we used aggregation rule of King et al. (2008). Note that the number of precincts is different in different years because of gerrymandering.

of population and a dummy variable for city status. As a measure of preexisting political preferences, we use vote shares of the main parties and turnout in 1924, the year when radio for general public practically did not exist.

We also control for socioeconomic variables (the share of Jewish and Catholic population in 1925, shares of blue- and white-collar workers, average property tax payments, and the shaper of World War I participants, welfare recipients, and renters of social housing) and historical measures of anti-Semitism (pogroms and the existence of Jewish settlement in 1349). In some specifications we also include measures of unemployment in 1933 (the share of unemployed, and the share of partially employed).

We also show a number of results that are based on variations in specification (1) that add interaction terms of $radio_exposure_{it}$ with measures of exposure to other methods of propaganda or historical variation in anti-Semitism. We also introduce panel specification in which we substitute precinct fixed effects for province fixed effects.

Signal Strength and Listenership

Before moving on to test the effects of radio exposure, we present evidence that the predicted signal strength that we use in our analysis is a relevant measure of radio exposure. As was noted above, each owner of the radio set had to pay a monthly subscription fee to listen to the radio. We use information on the number of subscriptions in each region in different periods of time to measure listenership.¹⁸ Table 1 shows how radio listenership is related to signal strength for 1930-1933, the years for which we have disaggregated listenership data. We include the standard set of controls described above. In all instances, the coefficient for signal strength is positive and highly significant. The relationship holds even in panel regressions in which we include precinct fixed effects. One standard deviation increase in signal strength implies 3.3 percentage points (p.p.) increase in listenership share in 1930, with a mean radio listenership of 18.7 p.p. For 1933, this relationship becomes weaker, and one additional standard deviation in signal strength is associated with 2.1 additional p.p. in listenership, with a mean listenership of 26.0 p.p.

Figure 3A and 3B show non-parametric estimation for the relationship between listenership and signal strength, with and without controls. Both pictures imply that there is

¹⁸ Note that this measure underestimate the actual listenership, since they are based on the number of subscriptions and do not take into account: (1) the fact that several people could listen to each radio with a subscription; (2) people who have used radio sets, but did not pay subscription fee.

a kink at some threshold level of signal strength after which any increase in signal strength is translated into additional listenership. That is consistent with our understanding of signal strength, that only after some threshold the quality of the signal is good enough so that an increase in this quality is associated with a larger share of people willing to listen to this signal (e.g. Olken, 2009).¹⁹

Overall, Table 1 and Figures 3A-3B suggest that the increase in the quality of the signal indeed translates into increase in listenership, and this relationship is very strong. However, in contrast to listenership, signal strength, conditional on controls, is not inherently endogenous and in principle could be considered as a source of exogenous variation. In the next subsection, we investigate whether it is the case, and what were the covariates that determined precinct-level exposure to radio in different years.

Identification Assumptions and Determinants of Radio Availability

Our identification strategy relies on the premise that variation in radio exposure is not correlated with unobserved characteristics that affect Nazi support and anti-Semitism once we control for observable differences between these locations. Variation in the content of the radio broadcasts allows us to relax this strong assumption and identify the effect under a much weaker assumption that the effect of unobservables is similar across time.

In this subsection we provide initial evidence regarding the validity of the strong assumption presented above. Our measure of signal strength, that relies on distance to transmitters, their power and topography, can be potentially correlated with some socio-economic characteristics of precincts that can also affect the outcome of interest.²⁰ As was described in the background section above, population density was the main determinant of the location of the transmitters. Table 2A shows how radio signal strength is associated with the set of controls that we are using. The results confirm that the most significant determinants of radio availability in terms of F-statistics are polynomial terms of population.

¹⁹ Note that the threshold level depends on the quality of the receivers, which is changing with the technology development, so the threshold level for radio in the 1930's is different from the threshold level for TV reception in 1990's, so they our results can not be directly compared with the results in Olken (2009).

²⁰ Though our measure of radio signal strength allows us to potentially isolate the impact of radio based only on the topography of the area, there is not sufficient variation in topography of Germany to isolate the effect of topography.

However, even after flexibly controlling for population size some other characteristics also turn out to be correlated with signal strength. In particular, radio signal strength is associated with a small share of those employed in white-collar occupations, marginally larger (in some specifications) share of those employed in blue-collar occupations, and positively correlated with a city dummy. However, socioeconomic characteristics collectively are not significantly associated with our signal strength measure. In addition, voting results in 1924 turn out to be correlated with the subsequent signal strength of radio, though the only individually significant variable from 1924 is the voter turnout. The fact that signal strength is significantly correlated with pre-radio voting outcomes is a potential concern. As long as unobservable characteristics of precincts that determine Nazi support and anti-Semitism are correlated with these observable characteristics, this can bias our results.

We conduct a number of tests trying to figure out the extent of the problem and the direction in which this correlation may bias our results. In particular, in the spirit of Altonji, Elder, and Taber (2005), we regress our outcome variables on the prediction of signal strength based on all the controls in Table 2A (except for the polynomial terms of populations, which we include directly). Such a regression is an important test of how the observables that are correlated with radio availability are associated with our outcome of interest. The results of this exercise are reported in Table 2B. These results imply that index of observables are positively correlated with vote for NSDAP in 1928 and 1930 and negatively correlated with vote for NSDAP in 1933 and vote for Hindenburg in 1932, whereas there is no significant correlation with the vote for NSDAP in 1932 and other measures of NSDAP support and anti-Semitism.

These results suggest that as long as the index of unobservables is positively correlated with the index of observables in the analysis presented above, this would bias the results *against* finding the negative effect of radio on Nazi support prior to 1933 and *against* finding the positive effect of radio on NSDAP support in 1933. Thus, even if the bias exists, it would work in the direction of not finding effect of radio propaganda, i.e. against most of the results in the paper.

Empirical results

Main results

Table 3 summarizes how signal strength of German radio affected the Nazi party vote shares for different elections in the beginning of 1930s. As things were changing very fast, we use repeated cross-section instead of panel estimates to allow the effect of time-constant controls to flexibly vary with the year. Specifically, the specifications in Table 3 estimate equation (1) with $Nazi_share_{it}$, the vote share of NSDAP in precinct i at time t , as an outcome of interest. Note that we use $SignalStrength_{it}$ as a measure of $radio_support_t * radio_exposure_{it}$, keeping in mind that $radio_support_t$ was negative before 1933 and became positive in 1933. We report two types of specifications with and without unemployment controls. In all regressions we control for pre-existing voting preferences, measured by vote shares of main parties (DNVP, SPD, KPD, Zentrum) and turnout in 1924, the year before rapid development of radio listenership. Full list of controls also includes shares of Jewish and Catholic population, shares of working in blue- and white-collar occupations, historical pogrom variable from Voigtländer and Voth (2012), share of those participating in World War I, local property tax revenues, share of social renters, and the share of welfare recipients.

The results show that radio availability had a significant negative effect on voting for NSDAP in the elections of September 1930, July 1932 and November 1932. In the elections in March 1933, nearly 6 weeks after the seizure of power, this negative effect becomes less pronounced and insignificant. The coefficient estimates for signal strength almost tripled between 1928 and 1930, stay approximately the same through the end of 1932, and reduces by almost one half in 1933. We discuss the meaning of magnitudes of these coefficients in more details below, in a special subsection on magnitudes.

Table 4 shows how the coefficient for one of the years, 1930, changes if controls are added one group by another (we obtain similar results for other years and for the specifications in differences). The results imply that the coefficient for radio signal strength does not change much from bivariate relationship to the full set of controls (decreasing from 0.118 for a bivariate relationship to 0.101 when region fixed effects are included to 0.091 when full set of controls is included). Note that from R-squared of 0.03 in a bivariate specification, R-squared increases up to 0.645 in the most demanding specification. The fact that the coefficient does not change much even in a specification with a substantial part of variation explained reassures that it is unlikely that unobservables can substantially affect the radio coefficient.

Table 5 shows the results of estimation of equation (3) and reports how differences in radio exposure translate into changes in Nazi party vote shares for different elections since the beginning of 1930s. As predicted, there is a negative and significant effect of radio on $\Delta \text{Nazi_share}_{it}$ in 1930, and a positive and significant effect of radio on $\Delta \text{Nazi_share}_{it}$ in 1933. We evaluate and compare the meaning of corresponding coefficients in the subsection on magnitudes below.

As a simple exercise to assess the robustness of our results, we estimate equations (1) and (3) using leads and lags of signal strength measure. We report the results of this exercise in a graphical form on Figure 3. Here we plot coefficients with their confidence intervals for different specifications in different elections for cross-sectional regressions (Fig. 3A) and first differences regressions (Fig. 3B). Unfortunately, the change in signal availability was not that large to ensure that the effect of radio signal is notably larger when dependent variable is a signal strength corresponding to the year for which dependent variable is used. One exception is the change in NSDAP vote share in 1933, which seem to have substantially larger and more significant effect for signal strength in 1933 than for signal strength in 1932 or 1930. Nevertheless, all the results in Fig. 3 are consistent with hypothesise of substantial radio effects in certain years. We present these results here as a robustness check rather than any sort of placebo test, as both signal strength and radio listenership are very much autocorrelated. As placebo tests, we report the results for different voting outcomes in 1924 and before below in a special subsection.

Overall, the results of this section are consistent with sizable radio impact on voting for NSDAP.

Other voting outcomes

Weimar Republic was rich in electoral events, and that allows us an additional way to test whether media coverage not favorable to Nazi was associated with sizable effects on electoral outcomes. In particular, we look at radio effects on voting for Nazi-initiated referendum for the “Law against the Enslavement of German People” which would effectively be one-sided cancelation of the Treaty of Versailles. We look at two different outcomes: approval of the Referendum, and percentage of “yes” votes in the Referendum (Table 6). We focus on vote shares as a percentage of registered voters, rather than on vote shares of casted votes, as non-adoption of Law was a status quo policy, and non-voting was sufficient for the expression of “no” vote.

The results in Table 6 suggest that in all specifications the support of Nazi-promoted law was negatively associated with precinct-level radio exposure. These results remain similar if we control for vote share of Nazi party in 1928, only 1.5 years before Referendum took place. Overall, these results are consistent with substantial radio effects during that time.

Table 7 presents the results of estimation of equation (1) with vote for presidential candidates in 1932 elections. Again, positive effect for von Hindenburg and negative effect for Hitler is consistent with strong radio effects.

Turnout

Table 8 presents the results of estimation of equation (1) with turnout as a dependent variable. Note that previous literature proposes too many hypotheses on how turnout can be related to media exposure, so it is easy to explain any sort of effect that we could find. The negative effects in the cross section for 1932 and 1933 are consistent with disenchantment with politics, caused by conflicting messages. The fact that the effect for 1933 is smaller in magnitude as compared with 1932 is consistent with hypothesis that Nazi propaganda was somewhat effective in mobilizing Nazi supporters. However, as the correlation between turnout in all years and turnout in 1924 is positive and significant at 1% level, the main takeaway point from this table is that it is unlikely that the correlation between signal strength and turnout in 1924 is driven all our results, as it would bias our results in favor of finding positive rather than negative effect of signal strength on turnout in subsequent years.

Party membership

In Table 9, we show how Nazi party membership is associated with the presence of radio. Because our data is based on a random sample of party membership cards, we focus our analysis only on the subsample of precincts with non-zero observations of membership, looking at 633 out of 958 precincts. For 1932 (columns 1-2), the number of party members is not significantly associated with radio. For 1933 (columns 3-4), the situation changes, and we observe more party members in places in which radio was available, other things being equal. These results remain very similar in regressions for party membership in 1933 we control for party membership in 1932. The coefficient implies that approximately 0.3 percent of new NSDAP members were persuaded by radio. Note that aggregate party membership in 1933 approached 1.6 million people, and 0.3 percent effect is equal to 5 thousand people, that is not a small number.

Overall, the results of Table 9 are consistent with the hypothesis that radio propaganda increased the number of new members in the Nazi party. Note that while we do not find positive effects of Nazi radio propaganda in the beginning of 1933, unless it was magnified by Hitler's speeches in 1932, the sizable effect on party membership implies that propaganda can work for outcomes other than voting.

Deportations

In this section, we look at the effect of radio on deportations in 1933-1939, before massive deportations of Jews took place. We do that to try to isolate the effect of radio on individual behavior from country-wide policy. Historical evidence suggests that much of deportations before 1940s happened as a result of denunciations, i.e. driven by individual-level behavior rather than country- or region-wide shocks, and we expect that exposure to radio propaganda might convince some people to write denunciations. The drawback of focusing on 1933-1939 deportations is that the dataset that we are looking at does not have observations for the vast majority of precincts in our sample.

Table 10 summarizes these results for two separate samples: one with only non-missing observations included, and a full sample with all missing observations replaced with zeros. The results for subsample (columns 1-2) imply that in places with a larger exposure to radio the number of deported was significantly larger, with one standard deviation increase in signal strength being associated with 24-28% (depending on specification) increase in the number of deported. If we replace missing observations for the number of deported with zeros and consider the full sample of precincts, the coefficients for signal strength remain positive but become insignificant, which is probably not surprising as we add a lot of noise in our data. Overall, our results are consistent with hypothesis that radio exposure after 1933 led to more deportations, presumably associated with more denunciations.

Radio and anti-Semitism, city-level results

In this section, we look whether radio had any effect on the expressions of anti-Semitism after Hitler came to power. Specifically, we look at the city-level variables of Voigtländer and Voth (2012), including letters to *Der Stürmer*, official Nazi newspaper, attacks on synagogues during the Night of Broken Glass (*Reichskristallnacht*), and city-level deportations before 1942 and report how these

events were associated with radio exposure in Table 11. In addition to a plain reduced-form specification, reported in every odd column, we also look whether potential effect of radio is enhanced or mitigated by historical predisposition to anti-Semitism, captured by pogroms in 1349. Specifically, in every even column we report the results of estimation of the following specification:

$$y_{it} = \beta_0 + \beta_1 radio_{it} + \beta_2 radio_{it} * POG_i^{1349} + \beta_3 POG_i^{1349} + \beta_4 X_{it} + \phi_p + \epsilon_{it} \quad (3)$$

here $radio_{it}$ denotes exposure to radio in precinct i at time t , and POG_i^{1349} is a dummy for anti-Jewish pogrom in precinct i in 1349.

Columns (1)-(6) report the results of estimation for the whole sample, conditional on existence of Jewish settlement in 1349, while columns (7)-(12) report the results of estimation for the subsample of cities with Jewish settlements in 1349, following Voigtländer and Voth (2012).²¹ Our set of controls is the same as for precinct-level analysis, with exception of population. In city level analysis, population does not vary as much as between cities and rural areas, so we control for log of population instead of 5th polynomial of population.

The results in Table 11 suggest that at least for some outcomes exposure to Nazi radio increased the frequency of expressions of anti-Semitism. Radio exposure seems to substantially increase the number of letters to *Der Stürmer* (in both full sample and cities with historic Jewish settlements subsample) and number of deported before 1942 (in full sample only, see more on deportations). Direct effect for attacks on synagogues is not significant in both samples.

The results with interactions (every even column) reveal an interesting pattern: the effect of radio is stronger in places with historical predisposition to anti-Semitism. The interaction coefficient is positive and significant at least at 5% level for letters and deportations for both samples. An interaction coefficient even becomes positive and significant even for a synagogue variable. Overall, these results are consistent with hypothesis that propaganda works the best in places in which people are already predisposed in favor of propaganda's message.

Radio effects and Hitler's speeches

²¹ Note, however, that the results for the subsample of Jewish settlements should be interpreted with caution, as we cannot rule out selection on observables and unobservables in this subsample.

In Table 12, we further investigate the hypothesis about differential effect of predisposition in favor of propaganda message. In particular, we look how the effect of radio is conditioned by the presence of another means of Nazi propaganda: Hitler's speeches. These results are reported for the number of speeches in 1932 (columns 1 and 2) and for a dummy for speeches in 1932 (columns 3 and 4). In all the cases, Hitler's speeches in 1932 and radio exposure in 1933 demonstrate strong complementarity between each other, with interaction being positive and significant at 1% level. The aggregate impact of radio exposure thus becomes from negative significant at 10% (occasionally 5%) level becomes positive when combined with at least one speech (p-values 0.11 and 0.15), and becomes positive and significant at 1% level when combined with at least two speeches.

We focus on the effect of speeches in 1932 for one simple reason: historical evidence suggests that in 1933 the choice of places for the speeches was driven by the availability of radio in 1933: Hitler preferred to go to places in which his speeches could be immediately retranslated with the help of radio. As a result, the number of Hitler's speeches in 1933 is itself a function of the presence of radio in a precinct, and it is not possible to convincingly identify the effect of interaction for 1933 alone. Columns 5-8 report similar results for total number of Hitler's speeches in 1932-1933 as a robustness check, though it is more difficult to interpret these results

Overall, the results of Table 12 adds one more evidence in favor of hypothesis that propaganda works better when people are already predisposed in favor of its message.

Timing of changes in signal strength

To look at the complementarity between radio exposure and predispositions from a different angle, we also try to separate radio effect into the effect of past exposure (exposure up to the last elections) and the effect of recent exposure (change in radio exposure since the last elections). In particular, we estimate the following specification:

$$y_{it} = \beta_0 + \beta_1 \text{radio_exposure}_{it-1} + \beta_2 \Delta \text{radio_exposure}_{it} + \beta_3 X_{it} + \phi_p + \epsilon_{it} \quad (4)$$

Table 13 presents the results of this estimation. For 1933 (columns 7-8), the effect seems to be decomposed into the effect of past signal strength and the effect of a

change in signal strength, with the magnitude of the latter effect being around two times larger than the former. In the most demanding specification with 1933 controls, both coefficients are positive and significant at least at 10% level. These results are consistent with interaction hypothesis we are looking at: it suggests that propaganda was two times more effective for those previously not exposed to any radio message as compared with those previously exposed to anti-Nazi radio message.

We repeat this exercise for previous elections (columns 1-6). For 1930, we find that the coefficient for a lagged signal strength is negative and significant, and the effect of changes in signal strength is not significant, that suggests that in 1930 the main effect of radio was because of old radio listeners. However, as in 1928 radio was not political, our interaction hypothesis does not actually does any strong prediction for this case. So, the main results in Table 13 remain results for differential efficiency of pro-Nazi propaganda for 1933.

Overall, the results of Table 13 are also consistent with a baseline hypothesis that propaganda works better for those previously predisposed in favor of its message (or for those previously not exposed to the opposite message). In sum, the results of Tables 11-13, taken together, suggest that the evidence in favor of this hypothesis is quite persuasive, and the effects of propaganda indeed depend on pre-existing conditions. To the best of our knowledge, this is the first paper in the literature that consistently derives this effect for different sets of data.

Voting for Nazi and listenership: OLS and IV estimates

Our results so far do not use listenership in any other way than in signal strength calculation. However, listenership is potentially a better estimate of radio exposure, as compared with predicted signal strength. The downside of listenership, however, is that it is a choice variable, which is clearly endogenous and is potentially driven by self-selection. One might argue that with sharp changes of content lagged listenership could be used to address this problem, but using radio signal strength as an instrument for listenership is a more conservative way to produce consistent estimates of radio effects. Our estimates are consistent as long as the instrument is not correlated with unexplained component of Nazi voting, conditional on controls. Table 14 reports the results of these estimates.

The results indicate that if we use listenership instead of signal strength in OLS specifications, results are very similar to the results for a reduced form model reported in Table 5 (see odd columns). In particular, the effect is negative for the change in Nazi vote share between 1928 and 1930, is non-significant for corresponding changes in 1930-1932 and in July- November 1932, and, finally, is positive for the change in 1932-1933. OLS results for 1928-1930 and 1932-1933 are significant on at least 5% level, and imply that a change in one standard deviation of listenership is associated with a 0.88 p.p. smaller change in Nazi vote share in 1930 and a 0.37 p.p. larger change in Nazi vote share in 1932. IV results, reported in even columns, have the same level of significance as OLS results, but are substantially larger in magnitudes. In particular, according to IV results, one standard deviation in listenership is associated with 2.38 p.p. decrease in Nazi vote share in 1930 and with 1.46 increase in Nazi vote share in 1933. A section on persuasion rates discusses magnitudes of radio effects in more details.

Overall, results in Table 14 suggest that our baseline results are robust to using an alternative measure of radio exposure, listenership rate, and to using different estimation techniques (OLS and IV).

Results with precinct fixed effects

In this section, we report a series of results with precinct fixed effects that allow us to better control for time-invariant unobserved heterogeneity between precincts. Though it is a very demanding specification, nevertheless we were able to obtain some results for changes in signal strength being associated with corresponding changes in Nazi vote share. These results, based on precinct fixed effect estimates for three elections between 1930 and 1932, are reported in columns (1) and (2) of Table 15. These results imply that conditional on all controls, interacted with time dummies, and controlling for time-invariant unobserved characteristics of locations, an increase in radio audience was indeed associated with a smaller Nazi vote share, with a magnitude of the effect being 50% smaller as compared with a cross-section estimate.

In addition to the results for 1930-1932, we also report two other sets of results. In columns (3) and (4) we present estimation results for a panel model for 1928-1933 with precinct fixed effects and with signal strength interacted with time dummies.

Consistent with cross-sectional estimates, we see negative and significant effect of radio on Nazi voting in 1930, and a positive and significant effect of radio on Nazi voting in 1933. Note that with precinct fixed effects, coefficients for 1930 are smaller than coefficients for 1933.

Finally, in column (5) and (6) of Table 15 report the only direct estimation of equation (1) where the measure of radio support of Nazi is equal to 0 in 1928, to -1 in 1930-1932, and to 1 in 1933. In this specification, we see an effect of radio exposure*radio support that is positive and significant on 1% level, with a magnitude similar to a negative magnitude for 1930-1932 results in columns (1) and (2). Note that specifications in columns (5) and (6), as all specifications in this Table, control for precinct and time fixed effects, for controls interacted with time fixed effects, and cluster standard errors at province (*Walzkreis*) level.

Overall, the results of Table 15 suggest that time-invariant unobserved heterogeneity cannot explain our results, and our results remain valid even when we include very flexible controls for observables, as well as location and time fixed effects.

Placebo tests

Though the previous section shows that our results are robust to controlling for time-invariant unobserved heterogeneity, it could be the case that there is some time-varying unobserved heterogeneity that can explain the relationship between signal strength and Nazi vote share that we identify. Though it is unlikely that unobserved heterogeneity first moves pro-Nazi voting downward and then upward precisely when radio changes its content, it would be nice to establish that radio variables are not associated with outcomes they are not supposed to affect. Our results for 1928 so far provide the first placebo test among different specifications. Specifically, in this section we look if radio signal strength in 1930 (the first year of large radio effects) was associated with any of voting outcomes in 1924, when non-military radio listening was practically non-existent (Table 16), with voting in Presidential elections in 1925, when radio coverage was neutral (Table 17), and with earlier city-level violence outcomes (Table 18). In all placebo specifications, we did not find significant relationship between radio variable and an outcome of interest. Table 16 suggests that the results for voting are not driven by some unobserved heterogeneity in political preferences. Table 17 confirms that our results for voting for von

Hindenburg in 1932 (Table 6) are unlikely to be driven by unobserved preferences for von Hindenburg who won elections in 1925. Table 18 implies that the results with violence are also unlikely to be driven by some unobserved anti-Semitism that is correlated with our radio variables.

Violence, precinct level

In addition to all the analysis above, we also have some results for precinct-level violence based on 50% random sample of cities in encyclopedias of anti-Jewish violence. These results are summarized in Fig. 8. In some, the only significant radio effects that we found were negative for 1930 and a positive for 1934, which is consistent with our basic story. In addition, this finding speaks against potential unobserved heterogeneity that is associated with anti-Semitism and signal strength at the same time. However, as these results are not based on the full sample (in fact, we are still collecting these data), we should interpret them with caution.

Persuasion rates

In order to understand the magnitudes and assess relative effectiveness of pro-Nazi and anti-Nazi propaganda, we compute persuasion rates, as they help to compare our estimates with others available in the literature (DellaVigna and Gentzkow 2010; DellaVigna and Kaplan 2007; Enikolopov et al. 2011). The persuasion rate is the fraction of the audience of a media outlet who were convinced to change their behavior as a result of being exposed to this media outlet, German radio, in our case. As our key independent variable is a continuous rather than binary measure of exposure, we use a formula from Enikolopov et al. (2011) that computes persuasion rate for a continuous media exposure, taking into account that media might have negative effect on turnout, and a media message might be either encouraging to vote for Nazi or discouraging to do that.²²

²² The formula that we use is different from the formula derived in DellaVigna and Kaplan (2007) in the following three respects: (1) it focuses on the case of continuous exposure by analyzing the effect of an infinitesimal change in radio exposure; (2) it allows turnout to either increase or decrease for voters exposed to radio broadcast, as some people who would have voted in the absence of the message may decide to abstain from turning up for the election, that is observed in our data; (3) it allows to compute separately persuasion rates for a positive message (i.e., the encouragement to vote for a specific party) or as for a negative message (i.e., the discouragement to vote for a specific party). Note that the difference between the two interpretations is particularly important in multi-party systems (such as Germany).

The formula that we use looks at the effect of infinitely small change in media exposure taking into account the effect of turnout and controlling for the fraction of people who could be persuaded (i.e. who would vote for Nazi even without a radio). In particular, for 1933 we compute persuasion rate by the following formula:

$$f = \frac{1}{1-v_0 t_0} \left(t \frac{dv}{de} + v \frac{dt}{de} \right) = \frac{1}{1-v_0 t_0} \left(t \frac{dv/ds}{de/ds} + v \frac{dt/ds}{de/ds} \right) \quad (2)$$

$f = \frac{1}{1-t_0 v_0} \left(t \frac{dv}{de} + v \frac{dt}{de} \right)$ here v is vote share of NSDAP, t is turnout, v_0 and t_0 are Nazi vote share and turnout in the absence of radio (as implied by our estimates in Tables 3 and 7), dv/ds is the effect of change in radio signal strength on Nazi vote share, dt/ds is corresponding effect for turnout, and de/ds is the effect of change in radio signal strength on listenership share. Basically, instead of looking directly at the relationship between listenership and Nazi vote share, which we cannot consistently estimate in a simple OLS framework, we estimate the relationships between vote share and signal strength and between listenership and signal strength.

We evaluate f at $t = t_0$. Note that our listenership measure is subscription rate, so in order to obtain a corresponding proxy for listenership, we have to multiply subscription rate by the average number of adult radio listeners per subscription. Under assumption that average number of listeners is 4 people, the persuasion rate of the positive (pro-Nazi) message of radio is equal to 13.1 percent: $f=1/(1-0.485*0.903)[1/(0.00185*4)*(0.0444*0.903+0.0296*0.485)]=13.1$ percent. Thus, the persuasion rate of pro-Nazi positive message of the radio is comparable to the one found in DellaVigna and Kaplan (2007), i.e., 12 percent, and lower than the persuasion rate of 20.0 percent found in Gerber, Karlan, and Bergan (2009).

Voters who can potentially respond to the negative message (“do not vote for Nazi”) are only those who in the absence of radio would have voted for Nazi. Thus, the formula for the negative message takes the following form:

$$f = \frac{1}{-v_0 t_0} \left(t \frac{dv}{de} + v \frac{dt}{de} \right) = \frac{1}{-v_0 t_0} \left(t \frac{dv/ds}{de/ds} + v \frac{dt/ds}{de/ds} \right) \quad (3)$$

where μ is the vote share of parties opposed by radio. As in the case of positive message, we estimate persuasion rate at $t = t_0$ and $\mu = \mu_0$. As dv/ds , we take the

coefficient on the effect of radio signal strength on change in Nazi vote share from Table 5 multiplied by the inverse of the share of voters who listen to radio when it is available. Again, under assumption that there were, on average, 4 listeners per subscription, the persuasion rate for Nazi party in 1930 is equal 30.8 percent: $f = -1 / (0.238 * 0.861) * [0.861 * 0.057] / (0.00252 * 4) = 30.8$ percent. The persuasion rate of the negative message of radio is much higher than the one found in DellaVigna and Kaplan (2007) but is smaller than a persuasion rate for an anti-Putin channel in Russia found in Enikolopov et al. (2011). The results of these calculations are reported in Table 5, which, among other results, computes persuasion rates for all specifications for last four parliamentary elections in Weimar Republic.

Conclusions

In a context of the late Weimar Republic and early Third Reich, we study whether mass media played a role in dismantling democratic institutions and in assuring public support for the dictator. We find that relatively mild anti-Nazi slant in the radio news programs between 1929-1932 was effective in substantially reducing the Nazi party results in three consecutive parliamentary elections. In 1933 Nazi got control over radio and changed its content to heavy pro-Nazi propaganda, which fully undid the effect of anti-Nazi radio messages of the previous 4 years in just a one-month period. Second, we examine the impact of the radio after Nazi fully consolidated power and show that it was instrumental in assuring public support for the regime. Radio propaganda helped Nazi to enroll new party members and encouraged denunciations of Jews leading to their deportation to concentration camps and caused open expressions of anti-Semitism, such as burning of synagogues and anti-Semitic letters to the national newspaper. Third, we find important interaction effects of propaganda through mass media with other means of propaganda and with listeners' priors. In particular, radio was most effective as propaganda tool when combined with other tools, such as Hitler's speeches, and when the message was more aligned with listeners' priors, in particular, more anti-Semitic audience was more convinced by the Nazi propaganda as measured by historical variation in anti-Semitism several centuries before.

References

Acemoglu, Daron and Robinson, James A. 2006. *Economic Origins of Dictatorship and Democracy*. Cambridge, UK: Cambridge University Press.

Achen, Christopher (2001) "Why Lagged Dependent Variables Can Suppress the Explanatory Power of Other Independent Variables," paper prepared for the presentation at the American Political Science Association Meeting.

Childers, Thomas (1983) *The Nazi Voter: The Social Foundations of Fascism in Germany, 1919-1933*. Chapel Hill: University of North Carolina Press.

DellaVigna, Stefano, and Ethan Kaplan (2007). "The fox news effect: Media bias and voting." *Quarterly Journal of Economics* 122(3), 807-860.

DellaVigna, Stefano, Ruben Enikolopov, Vera Mironova, Maria Petrova, and Ekaterina Zhuravskaya (2012). "Cross-border effects of foreign media: Serbian radio and nationalism in Croatia," NBER Working Paper 16989.

DellaVigna, Stefano and Gentzkow, Matthew (2010), "Persuasion: Empirical Evidence," *Annual Review of Economics*, forthcoming.

Egorov, Georgy, Sergei Guriev and Konstantin Sonin. 2009. "Why Resource-Poor Dictators Allow Freer Media: A Theory and Evidence from Panel Data." *American Political Science Review*. 103(4): 645-668.

Eitner, Hans-Jürgen. Hitlers Deutsche. Das Ende eines Tabus. Casimir Katz Verlag, Gernsbach 1991

Enikolopov, Ruben, Maria Petrova, and Ekaterina Zhuravskaya (2011). "Media and political persuasion: Evidence from Russia," *American Economic Review*, December 2011, 111(7): 3253-85.

Falter, Jürgen and Dirk Hänisch (1990) "Wahl- und Sozialdaten der Kreise und Gemeinden des Deutschen Reiches von 1920 bis 1933". *GESIS Datenarchiv, Köln. ZA8013 Datenfile Version 1.0.0*, [doi:10.4232/1.8013](https://doi.org/10.4232/1.8013)

Ferguson, Thomas and Hans-Joachim Voth (2008) "Betting on Hitler: The Value of Political Connections in Nazi Germany", *Quarterly Journal of Economics*, 123(1): 101–137.

Gerber, Alan, Dean Karlan and Daniel Bergan, D. (2009), "Does the Media Matter? A Field Experiment Measuring the Effect of Newspapers on Voting Behavior and Political Opinions," *American Economic Journal: Applied Economics*, 1(2):35-52

Hänisch, Dieter (1988) *Wahl- und Sozialdaten der Kreise und Gemeinden des Deutschen Reiches 1920-1933, Database ZA8013* (Berlin: Leibniz-Institut für Sozialwissenschaften-GEIS, 1988).

King, Gary; Ori Rosen; Martin A. Tanner; and Alexander F. Wagner (2008) "Ordinary Economic Voting Behavior in the Extraordinary Election of Adolf Hitler," *Journal of Economic History*, 68(4): 951-996

King, Gary; Ori Rosen; Martin A. Tanner; Alexander F. Wagner (2008) "Replication data for: Ordinary Economic Voting Behavior in the Extraordinary Election of Adolf Hitler"

Olken Benjamin (2009) Do TV and Radio Destroy Social Capital? Evidence from Indonesian Villages. *American Economic Journal: Applied Economics* 1 (4), 1-33.

Ross, Corey (2006) "Mass Politics and the Techniques of Leadership: The Promise and Perils of Propaganda in Weimar Germany" *German History* Vol. 24 No. 2.

Shirer, William (1960) *The Rise and Fall of the Third Reich: A History of Nazi Germany*. Simon & Schuster.

Sington, C and A. Weidenfeld (1943) "The Goebbels Experiment: A Study of the Nazi Propaganda Machine", New Haven.

Somerville (2012) "Radio propaganda and the broadcasting of hatred" Palgrave MacMillan, New York

Strömberg, David (2004). "Radio's impact on public spending," *Quarterly Journal of Economics* 119(1), 189-221

Voigtländer, Nico, and Hans-Joachim Voth (2012) "Persecution Perpetuated: Medieval Origins of Anti-Semitic Violence in Nazi Germany," forthcoming in *Quarterly Journal of Economics*, Oxford University Press, vol. 127(3), pages 1339-1392

Yanagizawa-Drott, David (2009) "Propaganda and Conflict: Theory and Evidence from the Rwandan Genocide," Mimeo

Zimmermann, Clemens (2006) "From Propaganda to Modernization: Media Policy and Media Audiences under National Socialism," *German History* Vol. 24 No. 3

Appendix: Data sources

Data on transmitters: "Rundfunk Jahrbuch 1929", 1929, Sept 1930 – "Mitteilungen der Reichs-Rundfunk-Gesellschaft", 211, 1930, April 1932 – "Mitteilungen der Reichs-Rundfunk-Gesellschaft", 303, 1932, October 1932 – "Mitteilungen der Reichs-Rundfunk-Gesellschaft", 330, 1932, March 1933 – "Mitteilungen der Reichs-Rundfunk-Gesellschaft", 351, 1933, And other till 1938. All those sources cite as primary source "Union Internationale de télécommunications". Signal strength has been calculated using Irregular Terrain Model (Hufford 2002, Olken 2008)

Electoral and socio-demographic data: "Wahl- und Sozialdaten der Gemeinden und Kreise des Deutschen Reiches 1920-1933"²³(ZA study number 8013), Principal investigator: J.W. Falter, available through the Zentralarchiv für empirische Sozialforschung in Köln, Germany, (March/April 1988).

Data on listeners1: "Mitteilungen der Reichsrundfunkgesellschaft" at the end of 1933/ begin of 1934

Data on listeners 2: „Teilnahme am Rundfunk in den einzelnen OPD-Bezirken in Orten mit mehr als 2500 Einwohnern am... “ (1933) Veröffentlichungen des Verbandes der Funkindustrie e. V, nr.12

Number of registered listeners (paying radio license fee or exempt from paying) divided by the number of households (1931,1932, 1933).

Deportations: „Gedenkbuch“, Bundesarchiv.

Letters to Der Stürmer, pogroms¹³⁴⁹, attacks on synagogues: Voigtländer and Voth (2012).

Hitler electoral speeches: Domarus, Max (1962) "Hitler Reden und Proklamationen 1932-1945", Band 1, Würzburg, p.115ff.,p.139ff.

Statistik des Deutschen Reichs

Woodland: Statistik des Deutschen Reichs, Band 386 (1927) Ergebnisse der Forstwirtschaftlichen Erhebung

²³ Principal investigator: J.W. Falter, available through the Zentralarchiv für empirische Sozialforschung in Köln, Germany, (March/April 1988).

Welfare: Statistik des Deutschen Reichs, Band 421, Die öffentliche Fürsorge im Deutschen Reich in den Rechnungsjahren 1927 bis 1931, Berlin 1933, Verlag Hobbing

Statistik der Bezirksfürsorgeverbände. Einzelergebnisse, Tabelle 5. Gesamter Personenkreis der unterstützten Hilfsbedürftigen und Fürsorgekosten im Rechnungsjahr 1929, Spalten: Einwohnerzahl in 1000, 3- Auf 1000 Einwohner, 4- Kriegsbeschädigte, Kriegshinterbliebene und Gleichgestellt, 5- Sozialrentner, 6- Kleinrentner und Gleichgestellte, S. 114-135

Income tax

Statistik des Deutschen Reichs, Band 482, Die Einkommen- und Körperschaftssteueranlagen für 1932 und 1933, Berlin 1936, Verlag für Sozialpolitik, Wirtschaft und Statistik

Teil I Abschnitt A, Einkommensteueranlage, Steuerpflichtige, Einkünfte und festgesetzte Steuer 1932 und 1933, S. 62-93

Corporate tax

Statistik des Deutschen Reichs, Band 482, Die Einkommen- und Körperschaftssteueranlagen für 1932 und 1933, Berlin 1936, Verlag für Sozialpolitik, Wirtschaft und Statistik

Teil II Abschnitt A, Körperschaftsteueranlage, S. 302-310

Property tax

Statistik des Deutschen Reichs, Band 519, Die Hauptanlage der Vermögensteuer nach dem Stand vom 1. Januar 1935, Berlin 1938, Verlag für Sozialpolitik, Wirtschaft und Statistik.

Anhang, Abschnitt A, Vermögensteueranlage 1931, S. 194-209

NSDAP Party membership, Project by Prof. Falter: NSDAP-members in Germany, who joined the party in the years before 1933/34. The samples were taken at random by members of the Arbeitsbereich Vergleichende Faschismusforschung des ZI6 der FU Berlin in cooperation with the Department of Sociology, University of Minnesota, Minneapolis. Sample description: Historical Social Research, Vol. 16 — 1991 — No. 3, 113-151. We use only 1932 and 1933 data.

Figure 1. Timeline of key events we look at.

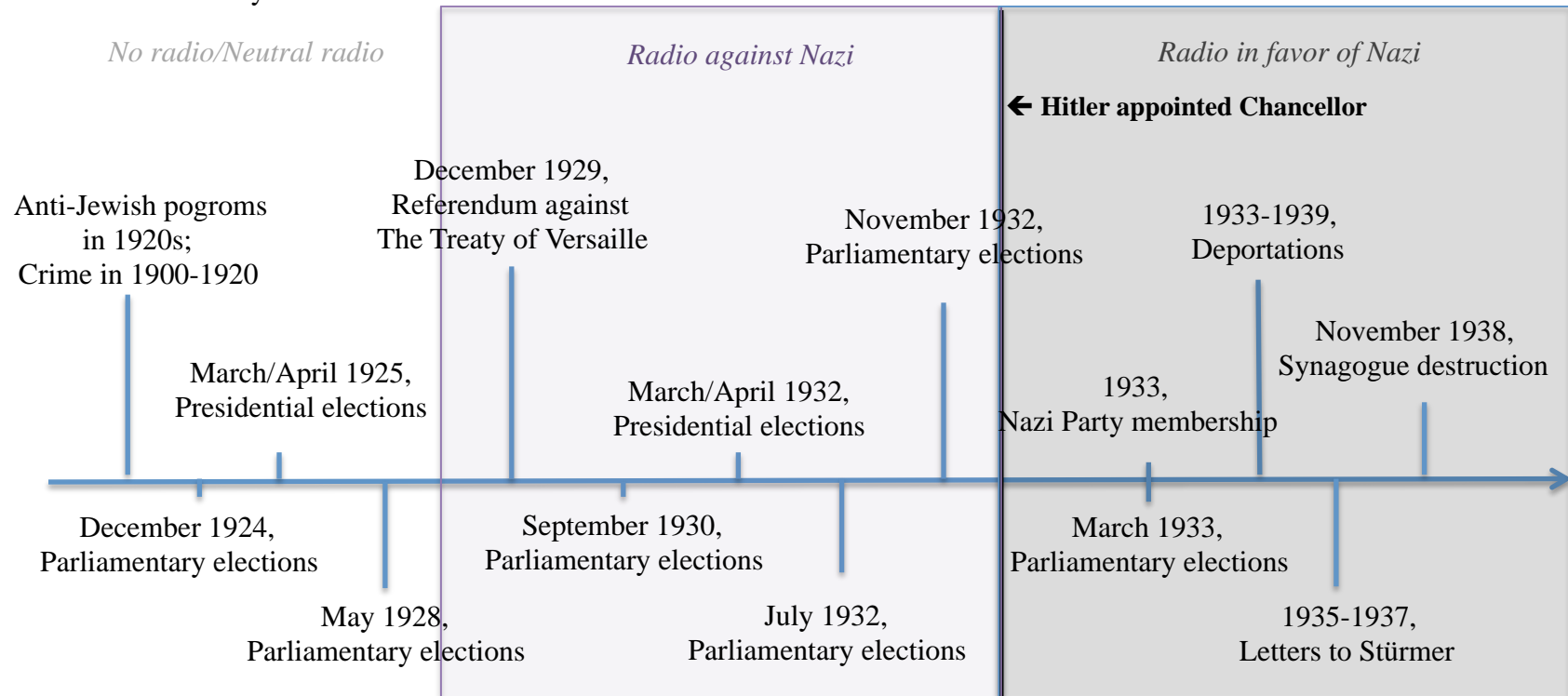


Figure 2. Total number of radio listeners in Germany, 1924-1933.

Green lines – dates of Parliamentary elections

Red lines – dates of Presidential elections

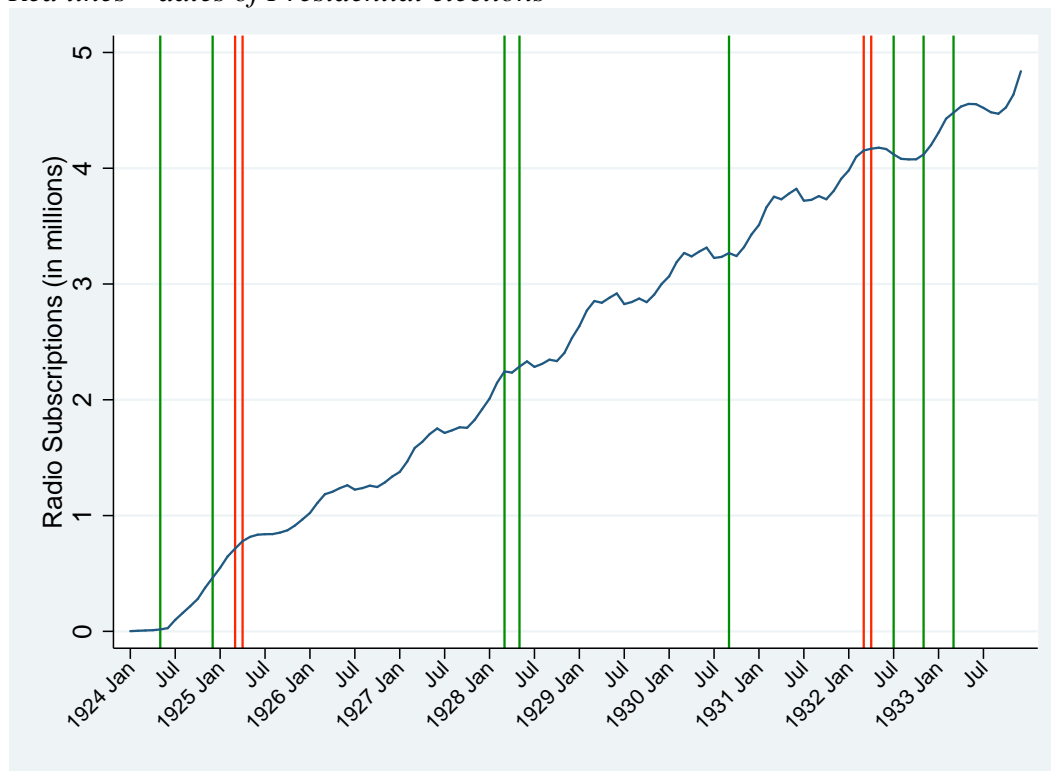


Figure 3. Radio signal strength in Germany, March 1933.

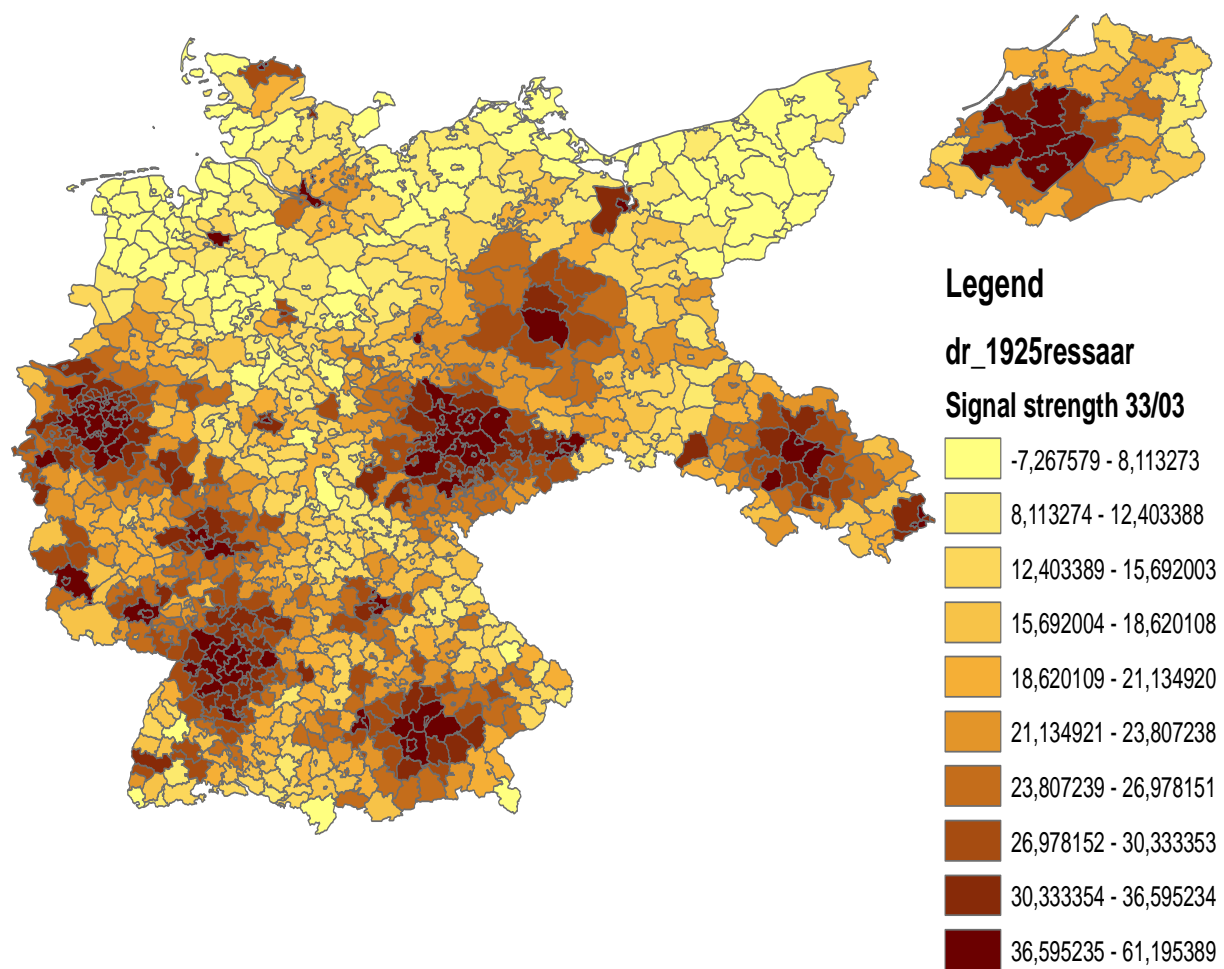


Figure 4A. Radio listenership and signal strength, 1931, no controls
t-statistics for bivariate relationship: 11.92

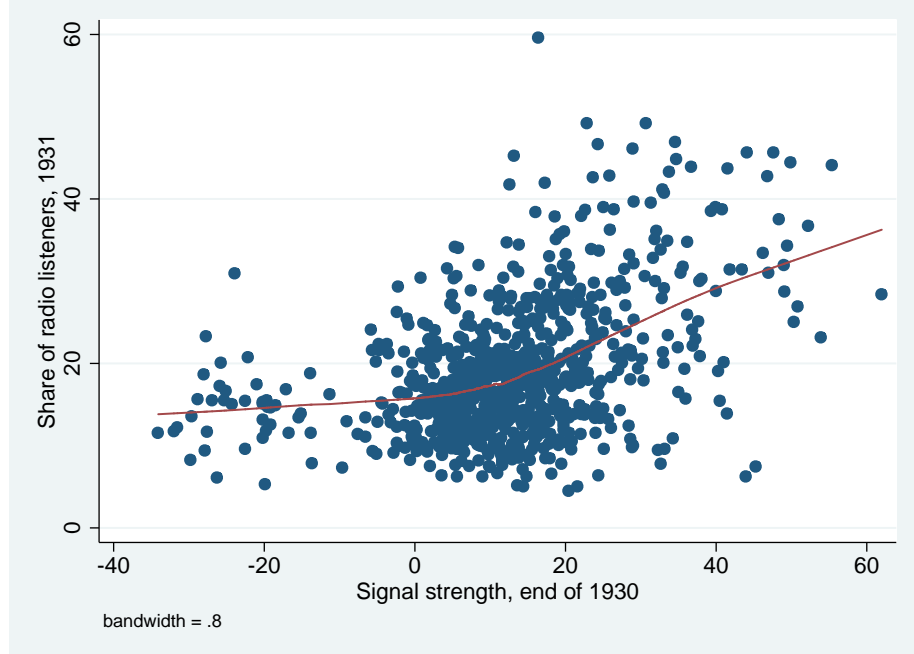


Figure 4B. Radio listenership and signal strength, 1931, with controls
t-statistics for signal strength conditional on all controls: 7.45

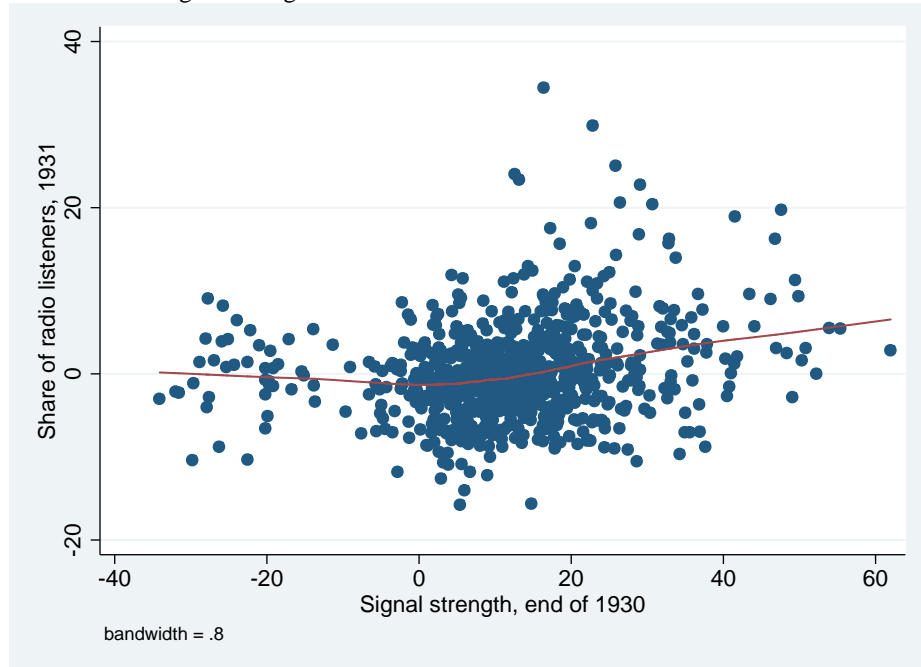
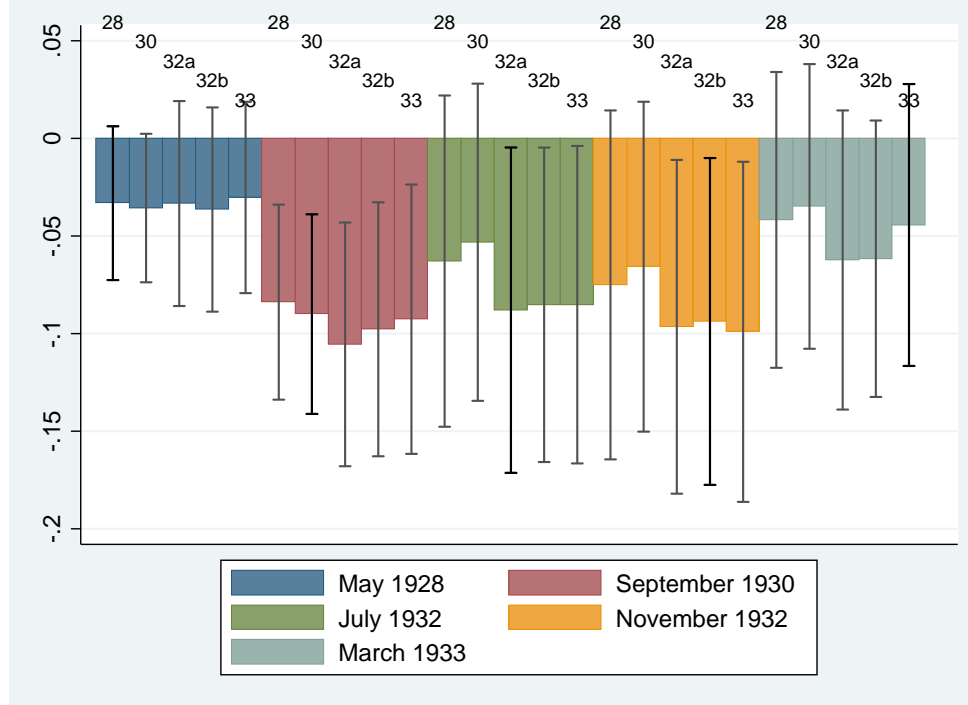


Figure 5. Radio effect estimates for signal strength and its leads and lags.

A. Dependent variable: vote share for Nazi party in corresponding elections. Different colors correspond to different elections; different bars of the same color represent results for leads and lags of signal strength.



B. Dependent variable: change in vote share for Nazi party since previous elections. Different colors correspond to different elections; different bars of the same color represent results for leads and lags of signal strength.

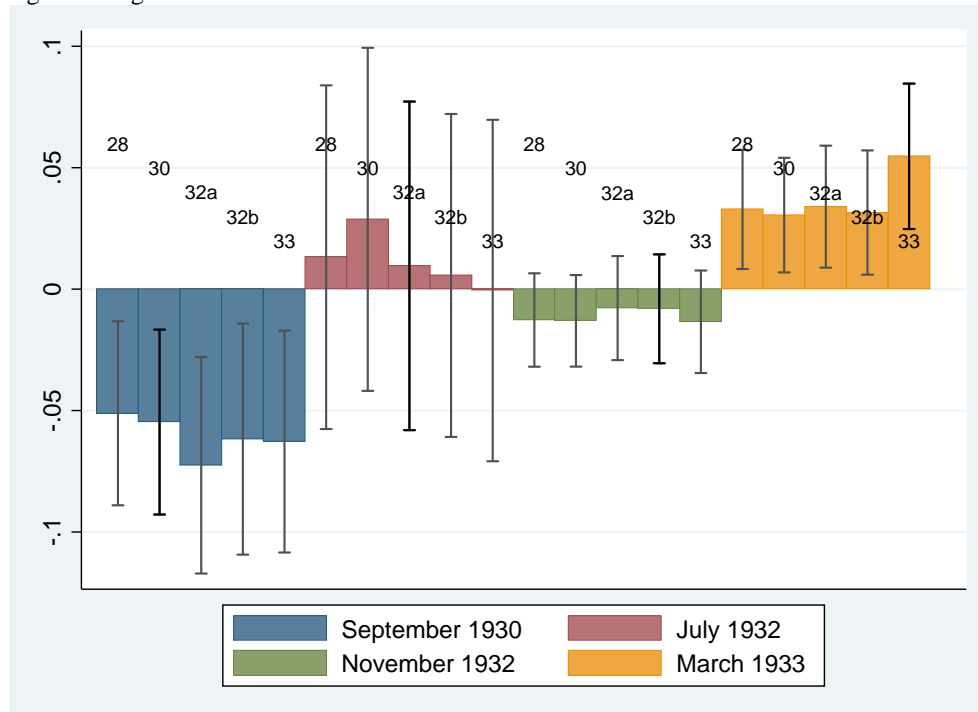
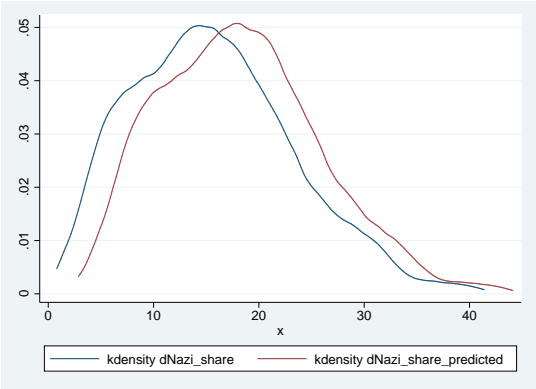
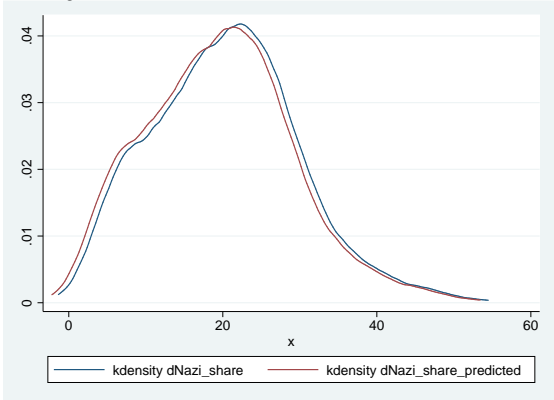


Figure 6. Change in Nazi party vote share and the change in Nazi party vote share predicted for signal strength set to a sample minimum. Kernel density estimates. Blue lines – raw data, red lines – prediction for the case of minimal signal strength.

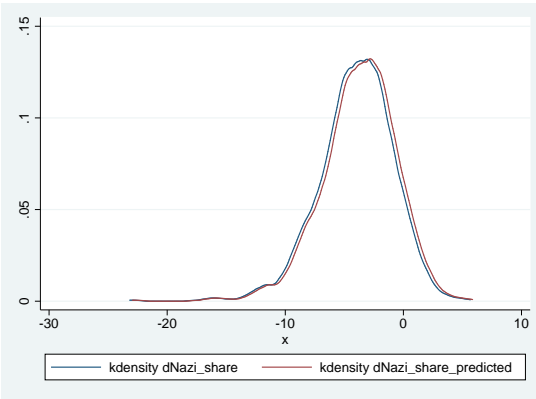
September 1930



July 1932



November 1932



March 1933

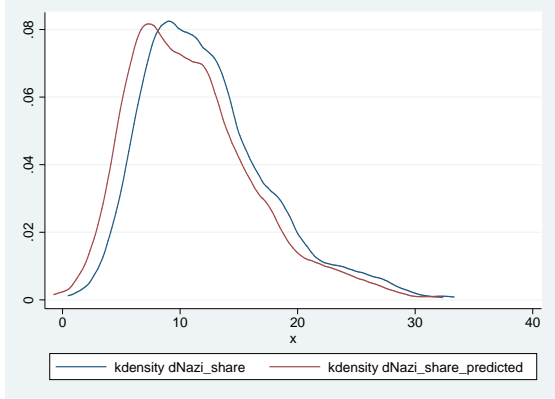
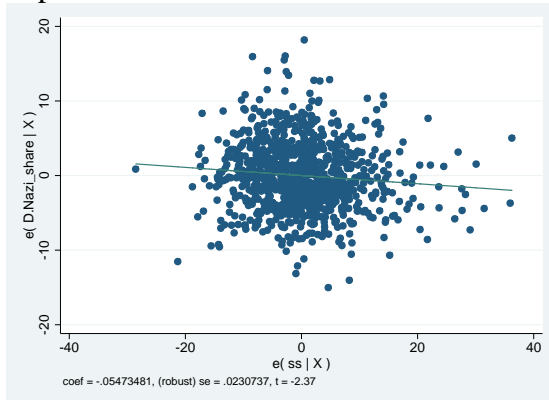
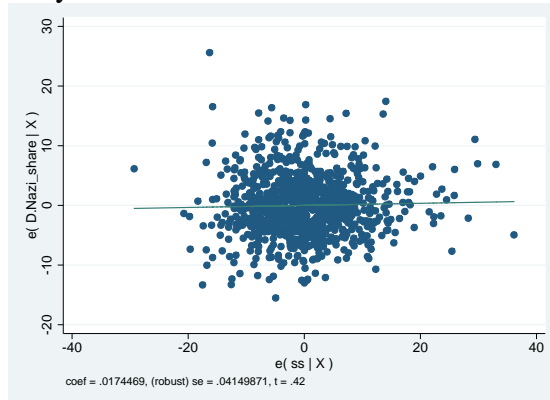


Figure 7. Changes in vote share for Nazi Party. Residual plots

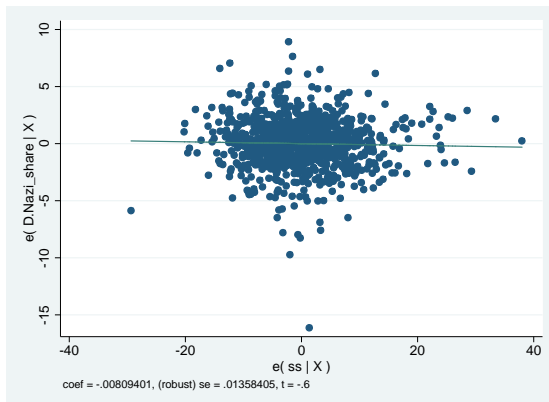
September 1930



July 1932



November 1932



March 1933

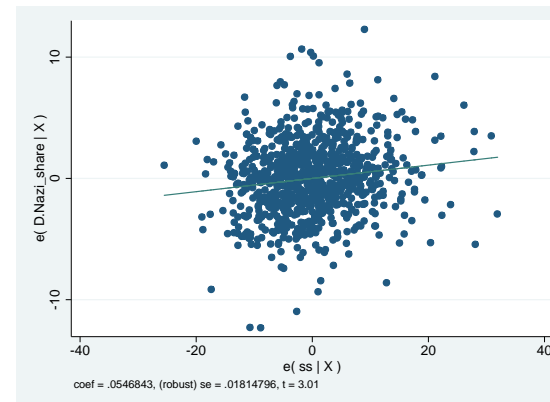
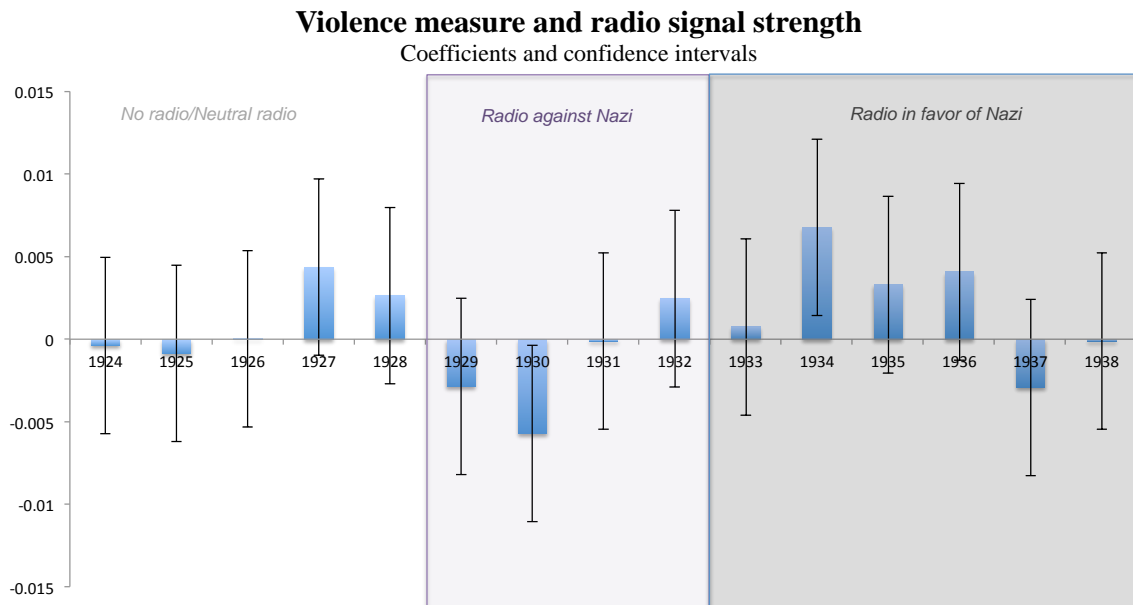


Figure 8. Anti-Jewish violence and radio signal strength, by year.



Note: This picture is based on the analysis of 50% quasi-random sample of cities with anti-Jewish violent events. The only significant coefficients here are for 1930 (negative, significant at 10% level) and for 1934 (positive, significant at 5% level). Violence scale varies from 1 to 6, from most modest to most violent event.

Table 1. Radio listenership and radio availability.

VARIABLES	Share of population with a license to listen to radio				
	September 1930	July 1932	November 1932	March 1933	Panel 1930-1933
Radio signal strength	0.252*** [0.033]	0.220*** [0.028]	0.208*** [0.031]	0.187*** [0.039]	0.055*** [0.020]
Share of Jewish population, 1925	56.437 [64.279]	56.873 [65.258]	56.099 [66.740]	99.05 [72.527]	
Share of Catholic population, 1925	-5.338* [2.918]	-5.184 [3.340]	-5.3 [3.271]	-4.601 [3.382]	
Share of blue-collar workers, 1925	-6.017 [3.714]	-9.234** [3.476]	-8.760** [3.540]	-8.778** [3.568]	
Share of white-collar workers, 1925	7.079 [8.839]	14.492 [9.191]	12.969 [9.372]	20.596** [9.849]	
City (stadtkreis)	0.515 [1.258]	0.492 [1.279]	0.876 [1.307]	-0.96 [1.327]	
War participants per 1000	0.115 [0.106]	0.129 [0.101]	0.12 [0.103]	0.031 [0.124]	
Welfare recipients per 1000	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0 [0.001]	
Social renters per 1000	-0.021 [0.055]	-0.053 [0.053]	-0.054 [0.053]	-0.083 [0.057]	
Average property tax payment, logged	0.926 [0.626]	1.216* [0.611]	1.196* [0.629]	1.698** [0.635]	
Population, 5th polynomial	Yes	Yes	Yes	Yes	No
Voting controls, 1924	Yes	Yes	Yes	Yes	No
Province fixed effects	Yes	Yes	Yes	Yes	No
Pogrom controls, 1349	Yes	Yes	Yes	Yes	No
Control variables interacted with period fixed effects	No	No	No	No	Yes
Period fixed effects	No	No	No	No	Yes
Precinct fixed effects	No	No	No	No	Yes
Observations	809	834	834	835	3,312
R-squared	0.58	0.53	0.52	0.50	0.96

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Pogrom controls include dummy for pogrom in 1349, and a dummy for a Jewish settlement in 1349. Pogrom controls are not significant in all specifications. Number of observations

Table 2A. Determinants of radio availability

VARIABLES	Signal strength of radio									
	March 1928		September 1930		July 1932		November 1932		March 1933	
Share of Jewish population, 1925	-90.618	-93.467	-101.994	-105.602	-27.379	-33.019	-25.755	-30.035	-87.042	-93.887
	[119.447]	[123.412]	[114.621]	[118.433]	[138.476]	[142.015]	[127.901]	[130.700]	[99.321]	[101.254]
Share of Catholic population, 1925	0.791	0.689	-1.107	-1.188	-0.361	-0.416	-0.304	-0.321	0.670	0.646
	[3.976]	[3.937]	[3.981]	[3.939]	[3.798]	[3.822]	[3.824]	[3.865]	[3.982]	[3.971]
Share of blue-collar workers, 1925	4.475	3.819	7.265	6.490	9.017*	8.194	7.747	7.150	9.539*	8.727
	[4.751]	[4.605]	[4.497]	[4.375]	[5.288]	[5.263]	[5.227]	[5.238]	[5.409]	[5.417]
Share of white-collar workers, 1925	-15.739**	-17.433**	-13.793*	-15.145**	-21.284**	-21.219**	-16.855**	-16.461*	-15.798*	-14.800
	[6.953]	[6.634]	[6.821]	[6.513]	[8.642]	[8.889]	[8.229]	[8.545]	[8.711]	[8.938]
City (stadtkreis)	4.342***	3.746***	4.455***	3.834***	5.016***	4.515***	4.427***	4.090***	4.768***	4.356***
	[1.271]	[1.216]	[1.415]	[1.349]	[1.473]	[1.380]	[1.484]	[1.392]	[1.638]	[1.561]
War participatnts per 1000	-0.110	-0.125	-0.164	-0.179*	-0.127	-0.139	-0.046	-0.054	-0.182	-0.193
	[0.089]	[0.085]	[0.104]	[0.099]	[0.094]	[0.089]	[0.108]	[0.105]	[0.141]	[0.136]
Welfare recipients per 1000	0.001	0.001	0.001	0.001	-0.000	0.000	0.000	0.001	0.002	0.003
	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]
Social renters per 1000	-0.105	-0.105	-0.067	-0.065	-0.116	-0.108	-0.112	-0.106	-0.089	-0.077
	[0.108]	[0.107]	[0.105]	[0.105]	[0.093]	[0.095]	[0.095]	[0.098]	[0.089]	[0.092]
Average property tax payment, logged	-0.017	0.056	-0.261	-0.179	-0.595	-0.523	-0.608	-0.561	-0.082	-0.023
	[0.704]	[0.703]	[0.691]	[0.687]	[0.581]	[0.571]	[0.575]	[0.560]	[0.690]	[0.683]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pogrom controls, 1349	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes		Yes
Observations	959	959	959	959	959	959	959	959	959	959
R-squared	0.624	0.627	0.629	0.632	0.546	0.548	0.567	0.568	0.525	0.527
F-statistics, population controls	7.684	7.023	8.989	8.096	10.70	9.706	9.736	9.725	10.27	10.18
F-statistics, other socioeconomic controls	2.296	2.807	2.445	3.489	1.994	1.810	1.643	1.510	1.679	1.540
F-statistics, voting controls from 1924	6.549	6.191	7.318	6.697	5.160	4.811	4.736	4.651	4.803	4.612

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Pogrom controls include dummy for pogrom in 1349, and a dummy for a Jewish settlement in 1349. Pogrom controls are not significant in all specifications.

Table 2B. Altonji-Elder-Taber test.

	Vote share of NSDAP party				
	<i>March 1928</i>	<i>September 1930</i>	<i>July 1932</i>	<i>November 1932</i>	<i>March 1933</i>
Prediction of signal strength (based on all controls)	0.294*	0.687**	0.181	0.227	-1.280***
	[0.170]	[0.303]	[0.349]	[0.332]	[0.273]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	960	961	960	920	920
R-squared	0.333	0.363	0.437	0.42	0.359
	Voted "Yes" on the Referendum	Vote share of von Hindenburg in April 1932	Vote share of Hitler in April 1932	Party members of NSDAP in 1933	Log (number of deported) in 1930-1939
Prediction of signal strength (based on all controls)	-0.135	-0.971***	0.131	0.003	0.004
	[0.403]	[0.323]	[0.348]	[0.010]	[0.012]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	951	954	954	961	961
R-squared	0.46	0.46	0.40	0.40	0.17

Table 3. Radio availability and voting for Nazi. Cross-sectional estimates

VARIABLES	Vote share of Nazi party									
	March 1928		September 1930		July 1932		November 1932		March 1933	
Radio signal strength	-0.028	-0.030	-0.090***	-0.091***	-0.083**	-0.082**	-0.090**	-0.088**	-0.055	-0.050
	[0.018]	[0.019]	[0.027]	[0.027]	[0.038]	[0.038]	[0.039]	[0.039]	[0.034]	[0.034]
Share of Jewish population, 1925	-30.608	-32.148	5.878	3.408	70.184	70.464	140.976***	142.270***	128.796**	133.218***
	[38.878]	[39.781]	[59.504]	[59.836]	[43.902]	[44.583]	[41.075]	[43.248]	[47.502]	[44.512]
Share of Catholic population, 1925	-9.630***	-9.666***	-15.480***	-15.500***	-39.732***	-39.726***	-35.104***	-35.117***	-31.839***	-31.842***
	[2.834]	[2.805]	[4.126]	[4.119]	[4.139]	[4.158]	[3.761]	[3.753]	[4.675]	[4.729]
Share of blue-collar workers, 1925	2.977	2.768	-0.655	-0.937	-1.326	-1.267	-0.767	-0.427	-3.393	-2.616
	[1.811]	[1.667]	[4.613]	[4.571]	[3.873]	[4.081]	[4.530]	[4.862]	[4.955]	[5.054]
Share of white-collar workers, 1925	7.524**	7.332**	13.186**	13.230**	-3.771	-3.654	-8.614	-7.125	-18.077**	-15.166**
	[2.759]	[2.836]	[6.015]	[5.945]	[7.370]	[7.894]	[6.826]	[7.294]	[6.732]	[7.182]
City (stadtkreis)	0.443	0.246	0.825	0.648	-0.247	-0.202	-0.900	-0.584	-0.874	-0.204
	[0.607]	[0.529]	[1.052]	[0.988]	[1.048]	[1.038]	[1.056]	[0.992]	[0.829]	[0.790]
Pogroms in 1349	0.616*	0.630*	0.888*	0.910*	0.164	0.161	0.434	0.405	0.592	0.530
	[0.341]	[0.357]	[0.522]	[0.529]	[0.738]	[0.744]	[0.740]	[0.742]	[0.826]	[0.818]
Jewish settlement in 1349	-0.481*	-0.525*	-0.274	-0.309	-0.206	-0.195	-0.240	-0.177	-1.300*	-1.168
	[0.253]	[0.272]	[0.525]	[0.543]	[0.696]	[0.701]	[0.666]	[0.682]	[0.733]	[0.737]
War participants per 1000	0.018	0.013	0.033	0.028	0.002	0.003	0.069	0.076	-0.009	0.007
	[0.036]	[0.037]	[0.068]	[0.068]	[0.063]	[0.063]	[0.055]	[0.056]	[0.063]	[0.063]
Welfare recipients per 1000	0.000	0.000	-0.001	-0.001	-0.001	-0.001	-0.003**	-0.003**	0.001	0.000
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Social renters per 1000	0.049*	0.050*	0.023	0.026	0.018	0.018	0.029	0.034	-0.029	-0.021
	[0.027]	[0.027]	[0.053]	[0.053]	[0.055]	[0.054]	[0.058]	[0.056]	[0.056]	[0.051]
Average property tax payment, logged	0.257	0.280	0.299	0.324	-0.214	-0.220	-0.745*	-0.781*	-0.471	-0.550
	[0.186]	[0.192]	[0.361]	[0.370]	[0.414]	[0.410]	[0.421]	[0.419]	[0.506]	[0.502]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes		Yes
Observations	959	959	960	960	959	959	919	919	919	919
R-squared	0.449	0.455	0.635	0.635	0.868	0.87	0.828	0.831	0.791	0.805

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population. Number of observations changes between July and November of 1932 because of redistricting.

Table 4. Radio availability and voting for Nazi in 1930. Effect of adding controls.

	Vote share of Nazi party, September 1930								
Radio signal strength	-0.118*** [0.030]	-0.101** [0.040]	-0.101** [0.042]	-0.088*** [0.025]	-0.088*** [0.025]	-0.090*** [0.026]	-0.091*** [0.027]	-0.090*** [0.027]	-0.091*** [0.027]
Share of Jewish population, 1925					20.403 [55.842]	16.800 [55.970]	9.510 [56.194]	5.878 [59.504]	3.408 [59.836]
Share of Catholic population, 1925					-15.660*** [4.216]	-15.486*** [4.109]	-15.540*** [4.148]	-15.480*** [4.126]	-15.500*** [4.119]
Share of blue-collar workers, 1925					-1.432 [4.331]	-0.824 [4.643]	-0.653 [4.689]	-0.655 [4.613]	-0.937 [4.571]
Share of white-collar workers, 1925					19.238*** [4.683]	15.452*** [5.388]	14.754** [5.652]	13.186** [6.015]	13.230** [5.945]
City (stadtkreis)						0.883 [0.999]	0.890 [1.001]	0.825 [1.052]	0.648 [0.988]
Pogroms in 1349							0.925* [0.517]	0.888* [0.522]	0.910* [0.529]
Jewish settlement in 1349							-0.289 [0.524]	-0.274 [0.525]	-0.309 [0.543]
War participants per 1000								0.033 [0.068]	0.028 [0.068]
Welfare recipients per 1000								-0.001 [0.001]	-0.001 [0.001]
Social renters per 1000								0.023 [0.053]	0.026 [0.053]
Average property tax payment, logged								0.299 [0.361]	0.324 [0.370]
Province fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population, 5th polynomial			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924				Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933									Yes
Observations	959	959	959	959	959	959	959	959	959
R-squared	0.030	0.338	0.348	0.595	0.641	0.642	0.643	0.643	0.645

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population.

Table 5. Radio availability and voting for Nazi. First difference estimates

VARIABLES	Change in vote share of Nazi party since previous elections							
	September 1930		July 1932		November 1932		March 1933	
Radio signal strength	-0.057**	-0.057**	0.022	0.024	-0.007	-0.007	0.044**	0.048**
	[0.024]	[0.024]	[0.038]	[0.039]	[0.013]	[0.013]	[0.019]	[0.018]
Share of Jewish population, 1925	34.907	34.005	59.943	62.710	59.204**	60.207**	-4.808	-1.713
	[43.984]	[43.230]	[61.202]	[60.244]	[22.430]	[22.943]	[48.176]	[44.463]
Share of Catholic population, 1925	-5.852**	-5.846**	-24.295***	-24.267***	4.422***	4.427***	3.320	3.320
	[2.774]	[2.781]	[3.295]	[3.289]	[1.429]	[1.421]	[2.217]	[2.294]
Share of blue-collar workers, 1925	-3.697	-3.742	-0.929	-0.549	0.359	0.480	-2.906	-2.424
	[3.574]	[3.593]	[3.317]	[3.288]	[1.348]	[1.467]	[2.506]	[2.371]
Share of white-collar workers, 1925	5.973	6.331	-15.747***	-15.669***	-4.355*	-4.304	-9.521**	-8.081**
	[4.941]	[4.858]	[3.650]	[4.300]	[2.393]	[2.567]	[3.527]	[3.230]
City (stadtkreis)	0.313	0.316	-1.211	-0.976	-0.359	-0.287	-0.025	0.358
	[0.805]	[0.804]	[0.895]	[0.916]	[0.303]	[0.331]	[0.529]	[0.537]
Pogroms in 1349	0.275	0.282	-0.751	-0.779	0.275	0.263	0.237	0.198
	[0.390]	[0.387]	[0.813]	[0.807]	[0.413]	[0.409]	[0.344]	[0.339]
Jewish settlement in 1349	0.210	0.220	-0.024	0.024	-0.127	-0.114	-1.005***	-0.930***
	[0.417]	[0.421]	[0.502]	[0.509]	[0.288]	[0.289]	[0.302]	[0.283]
War participants per 1000	0.033	0.032	-0.034	-0.027	0.037	0.039	-0.064	-0.055
	[0.053]	[0.054]	[0.054]	[0.055]	[0.026]	[0.026]	[0.049]	[0.049]
Welfare recipients per 1000	-0.001	-0.001	-0.000	-0.000	-0.001	-0.001*	0.003**	0.003*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.002]
Social renters per 1000	-0.026	-0.024	0.000	-0.003	-0.002	-0.003	-0.059*	-0.057*
	[0.046]	[0.047]	[0.046]	[0.043]	[0.023]	[0.024]	[0.030]	[0.031]
Average property tax payment, logged	0.074	0.075	-0.478	-0.512	-0.609***	-0.619***	0.233	0.186
	[0.292]	[0.297]	[0.417]	[0.406]	[0.157]	[0.156]	[0.229]	[0.225]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes
Persuasion rates, in percentage points	30.5	30.8	0.913	0.7	0.201	-0.208	12.6	13.1
Observations	958	958	958	958	918	918	917	917
R-squared	0.658	0.658	0.732	0.735	0.520	0.527	0.691	0.704

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924.

Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population. Number of observations changes between July and November of 1932 because of redistricting. Persuasion rates are computed under a conservative assumption that there were 4 radio listeners per one radio subscription.

Table 6. Radio availability and anti-treaty Referendum.

VARIABLES	Referendum on "Law against the Enslavement of the German People"							
	Approval of the Referendum (share of eligible voters)				Voted "Yes" on the Referendum (share of eligible voters)			
Radio signal strength	-0.095** [0.045]	-0.093* [0.046]	-0.074** [0.035]	-0.071* [0.035]	-0.095** [0.037]	-0.095** [0.037]	-0.071*** [0.025]	-0.070*** [0.025]
Share of Jewish population, 1925	-78.463 [60.158]	-79.637 [62.021]	-55.585 [43.358]	-55.511 [44.224]	-70.253 [66.439]	-71.946 [67.483]	-43.420 [48.361]	-43.826 [48.451]
Share of Catholic population, 1925	-10.479** [3.830]	-10.449** [3.869]	-4.013 [3.260]	-3.907 [3.274]	-22.150*** [4.434]	-22.142*** [4.453]	-14.565*** [3.818]	-14.517*** [3.829]
Share of blue-collar workers, 1925	15.110*** [3.320]	15.198*** [3.383]	13.202*** [2.838]	13.447*** [2.874]	13.504*** [3.009]	13.392*** [2.954]	11.266*** [2.392]	11.351*** [2.349]
Share of white-collar workers, 1925	-24.518*** [7.095]	-23.345*** [6.852]	-29.844*** [6.334]	-28.676*** [6.034]	-14.768* [7.643]	-14.089* [7.627]	-21.015*** [6.866]	-20.303*** [6.879]
City (stadtkreis)	1.635 [1.198]	1.821 [1.091]	1.341 [0.926]	1.674* [0.915]	0.630 [1.441]	0.604 [1.270]	0.285 [1.093]	0.432 [1.061]
Pogroms in 1349	0.263 [0.817]	0.273 [0.830]	-0.201 [0.774]	-0.205 [0.783]	0.030 [0.970]	0.046 [0.990]	-0.514 [0.948]	-0.512 [0.966]
Jewish settlement in 1349	-0.191 [0.590]	-0.125 [0.606]	0.151 [0.531]	0.253 [0.532]	-0.009 [0.610]	0.001 [0.640]	0.392 [0.504]	0.441 [0.514]
War participants per 1000	0.021 [0.104]	0.025 [0.105]	0.009 [0.091]	0.016 [0.091]	0.070 [0.107]	0.069 [0.108]	0.056 [0.087]	0.059 [0.088]
Welfare recipients per 1000	-0.008*** [0.001]	-0.007*** [0.001]	-0.008*** [0.001]	-0.007*** [0.001]	-0.009*** [0.001]	-0.009*** [0.001]	-0.009*** [0.001]	-0.009*** [0.001]
Social renters per 1000	-0.066 [0.053]	-0.061 [0.052]	-0.098** [0.046]	-0.094* [0.046]	-0.032 [0.065]	-0.028 [0.063]	-0.070 [0.059]	-0.067 [0.060]
Average property tax payment, logged	1.294*** [0.423]	1.270*** [0.417]	1.133** [0.421]	1.088** [0.413]	0.845* [0.453]	0.848* [0.444]	0.656 [0.461]	0.636 [0.450]
Nazi party vote share in 1928			0.635*** [0.076]	0.639*** [0.078]			0.760*** [0.108]	0.761*** [0.109]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes
Observations	949	949	949	949	949	949	949	949
R-squared	0.810	0.810	0.834	0.834	0.822	0.822	0.850	0.850

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population.

Table 7. Radio availability and voting in 1932 Presidential Elections. April 1932

VARIABLES	von Hindenburg		Vote share of ...		Thalmann		Turnout	
			Hitler					
Radio signal strength	0.092***	0.098***	-0.085**	-0.087**	0.003	0.000	-0.021	-0.021
	[0.031]	[0.031]	[0.040]	[0.041]	[0.019]	[0.018]	[0.022]	[0.021]
Share of Jewish population, 1925	-24.268	-16.432	81.460*	77.329	9.195	5.722	40.228	41.079
	[50.632]	[52.061]	[45.331]	[46.741]	[14.266]	[15.094]	[27.179]	[27.284]
Share of Catholic population, 1925	34.620***	34.705***	-32.628***	-32.648***	3.009***	2.960***	-3.721**	-3.730**
	[4.012]	[3.955]	[3.856]	[3.856]	[0.945]	[0.956]	[1.643]	[1.652]
Share of blue-collar workers, 1925	-7.061*	-5.987	-1.808	-2.233	2.276*	1.735	2.674	2.697
	[3.469]	[3.537]	[4.270]	[4.558]	[1.281]	[1.109]	[2.278]	[2.249]
Share of white-collar workers, 1925	21.514***	21.330**	-16.335**	-15.565*	-3.895	-4.123	6.591**	6.123*
	[7.440]	[7.933]	[8.014]	[8.005]	[2.671]	[2.900]	[3.234]	[3.407]
City (stadtkreis)	-1.537	-0.827	0.214	-0.004	0.487	0.101	0.067	0.039
	[1.262]	[1.111]	[1.336]	[1.201]	[0.482]	[0.469]	[0.561]	[0.571]
Pogroms in 1349	-0.235	-0.313	0.125	0.165	-0.401	-0.366	0.137	0.130
	[0.784]	[0.792]	[0.771]	[0.803]	[0.318]	[0.316]	[0.397]	[0.392]
Jewish settlement in 1349	0.009	0.134	-0.576	-0.600	0.421	0.346	0.465	0.450
	[0.794]	[0.835]	[0.892]	[0.905]	[0.316]	[0.317]	[0.353]	[0.347]
War participants per 1000	0.004	0.022	0.050	0.045	0.015	0.006	0.093*	0.093*
	[0.113]	[0.111]	[0.063]	[0.060]	[0.038]	[0.037]	[0.049]	[0.051]
Welfare recipients per 1000	0.004***	0.004***	-0.003***	-0.003**	0.001**	0.001***	-0.002**	-0.002**
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]
Social renters per 1000	0.023	0.014	0.015	0.022	0.005	0.008	0.060**	0.058**
	[0.069]	[0.067]	[0.063]	[0.064]	[0.023]	[0.024]	[0.025]	[0.025]
Average property tax payment, logged	0.839***	0.735**	-0.910**	-0.879**	-0.259	-0.202	0.199	0.204
	[0.302]	[0.289]	[0.340]	[0.348]	[0.160]	[0.146]	[0.226]	[0.220]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes
Observations	952	952	952	952	952	952	952	952
R-squared	0.856	0.858	0.770	0.771	0.880	0.883	0.692	0.692

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924.

Unemployment controls include share of unemployed and the share of people without full-time occupation. The results for the second round of elections (May 1932) are qualitatively and quantitatively similar. Observations are weighted by precinct-level population.

Table 8. Radio availability and turnout. Cross-sectional estimates

VARIABLES	Turnout									
	March 1928		September 1930		July 1932		November 1932		March 1933	
Radio signal strength	0.004	0.005	-0.012	-0.012	-0.051*	-0.051*	-0.046*	-0.046*	-0.028*	-0.029*
	[0.019]	[0.019]	[0.018]	[0.018]	[0.025]	[0.025]	[0.026]	[0.026]	[0.015]	[0.015]
Share of Jewish population, 1925	50.589	52.826	48.673	49.385	89.208**	90.988**	115.325**	119.963**	34.365	33.903
	[42.365]	[42.094]	[32.531]	[32.821]	[38.668]	[38.576]	[51.413]	[50.629]	[22.029]	[21.834]
Share of Catholic population, 1925	1.580	1.606	1.407	1.416	-2.527	-2.552	-3.167	-3.101	-2.641***	-2.635***
	[1.239]	[1.251]	[1.528]	[1.526]	[2.201]	[2.213]	[2.285]	[2.273]	[0.905]	[0.921]
Share of blue-collar workers, 1925	7.868***	8.093***	6.390**	6.483**	8.399***	8.403***	5.808**	5.996**	3.299**	3.154**
	[2.366]	[2.488]	[2.676]	[2.755]	[2.773]	[2.763]	[2.650]	[2.680]	[1.269]	[1.199]
Share of white-collar workers, 1925	-6.483	-6.694	11.216***	11.271***	0.468	-0.733	-0.486	-3.100	0.069	-0.800
	[4.499]	[4.350]	[3.407]	[3.477]	[4.773]	[4.840]	[4.355]	[4.562]	[2.968]	[3.078]
City (stadtkreis)	2.275***	2.444***	1.747**	1.812**	0.225	0.130	0.619	0.508	0.811	0.660
	[0.678]	[0.688]	[0.771]	[0.801]	[0.763]	[0.768]	[0.829]	[0.818]	[0.545]	[0.556]
Pogroms in 1349	0.201	0.182	-0.819*	-0.826*	-0.038	-0.051	-0.106	-0.136	0.361	0.371
	[0.628]	[0.615]	[0.454]	[0.449]	[0.431]	[0.433]	[0.554]	[0.553]	[0.292]	[0.299]
Jewish settlement in 1349	0.061	0.090	0.553*	0.568*	0.580*	0.536*	0.708*	0.674*	0.159	0.128
	[0.438]	[0.437]	[0.326]	[0.324]	[0.302]	[0.296]	[0.390]	[0.387]	[0.229]	[0.227]
War participants per 1000	-0.042	-0.037	0.087**	0.089**	0.084**	0.083**	0.131**	0.131**	0.041*	0.038
	[0.057]	[0.058]	[0.041]	[0.042]	[0.039]	[0.040]	[0.057]	[0.057]	[0.023]	[0.024]
Welfare recipients per 1000	0.003	0.002	0.001	0.001	-0.000	-0.001	-0.002***	-0.002***	-0.001***	-0.001***
	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]
Social renters per 1000	0.117***	0.114***	0.048	0.047	0.130***	0.125***	0.139***	0.124***	0.051***	0.048***
	[0.034]	[0.035]	[0.039]	[0.039]	[0.028]	[0.029]	[0.027]	[0.030]	[0.018]	[0.017]
Average property tax payment, logged	0.596**	0.575*	0.861**	0.851**	0.293	0.303	0.310	0.308	0.053	0.069
	[0.284]	[0.285]	[0.315]	[0.314]	[0.247]	[0.246]	[0.276]	[0.270]	[0.138]	[0.141]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes		Yes
Observations	959	959	960	960	959	959	919	919	919	919
R-squared	0.449	0.455	0.635	0.635	0.868	0.87	0.828	0.831	0.791	0.805

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population. Number of observations changes between July and November of 1932 because of redistricting.

Table 9. Radio availability and Nazi party membership. Cross-sectional estimates

VARIABLES	Party members of NSDAP, logged					
	November 1932		March 1933			
Radio signal strength	0.002 [0.003]	0.002 [0.003]	0.004* [0.002]	0.003* [0.002]	0.003* [0.002]	0.003* [0.002]
Share of Jewish population, 1925	-5.858 [5.652]	-5.590 [5.770]	3.204 [3.464]	2.574 [3.579]	3.827 [3.256]	3.177 [3.375]
Share of Catholic population, 1925	-0.725** [0.266]	-0.734*** [0.264]	-0.011 [0.138]	-0.021 [0.143]	0.067 [0.132]	0.058 [0.138]
Share of blue-collar workers, 1925	-0.175 [0.417]	-0.157 [0.411]	-0.043 [0.344]	-0.108 [0.342]	-0.024 [0.337]	-0.091 [0.333]
Share of white-collar workers, 1925	2.377*** [0.667]	2.705*** [0.700]	0.967* [0.547]	1.062* [0.531]	0.712 [0.524]	0.770 [0.508]
City (stadtkreis)	-0.093 [0.108]	-0.047 [0.115]	-0.033 [0.065]	-0.048 [0.069]	-0.024 [0.064]	-0.044 [0.065]
Pogroms in 1349	-0.054 [0.076]	-0.053 [0.074]	0.044 [0.076]	0.045 [0.077]	0.050 [0.077]	0.051 [0.078]
Jewish settlement in 1349	-0.072 [0.068]	-0.059 [0.067]	-0.008 [0.048]	-0.006 [0.049]	-0.000 [0.050]	0.000 [0.050]
War participants per 1000	0.000 [0.012]	-0.000 [0.012]	0.013 [0.011]	0.013 [0.011]	0.013 [0.010]	0.013 [0.010]
Welfare recipients per 1000	-0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]	-0.000 [0.000]
Social renters per 1000	0.010 [0.007]	0.012* [0.007]	-0.003 [0.006]	-0.003 [0.006]	-0.004 [0.006]	-0.004 [0.006]
Average property tax payment, logged	-0.009 [0.053]	-0.015 [0.053]	-0.016 [0.043]	-0.010 [0.043]	-0.015 [0.042]	-0.009 [0.042]
Party membership in 1932, logged					0.107*** [0.031]	0.108*** [0.032]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes
Observations	633	593	633	633	633	633
R-squared	0.555	0.575	0.407	0.414	0.419	0.425

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation.

Table 10. Radio availability and deportations 1933-1939. Cross-sectional estimates

VARIABLES	Log (number of deported)			
	Only places with non-missing observations for deportations included		All precincts, missings replaced with zeros	
Radio signal strength, 1933	0.028**	0.024*	0.001	0.001
	[0.012]	[0.012]	[0.002]	[0.002]
Share of Jewish population, 1925	39.037	40.777	3.226	3.518
	[26.374]	[26.275]	[3.551]	[3.743]
Share of Catholic population, 1925	-0.137	-0.071	-0.065	-0.066
	[1.466]	[1.473]	[0.166]	[0.166]
Share of blue-collar workers, 1925	-0.836	-1.092	0.264	0.272
	[0.625]	[0.686]	[0.266]	[0.275]
Share of white-collar workers, 1925	4.465	4.757	1.580***	1.457**
	[2.966]	[3.403]	[0.573]	[0.571]
City (stadtkreis)	-1.415**	-1.653**	-0.337***	-0.347***
	[0.578]	[0.618]	[0.090]	[0.096]
Pogroms in 1349	0.141	0.158	0.107	0.105
	[0.406]	[0.430]	[0.080]	[0.080]
Jewish settlement in 1349	-0.312	-0.345	-0.077	-0.081
	[0.297]	[0.327]	[0.056]	[0.059]
War participants per 1000	-0.054	-0.042	-0.007	-0.007
	[0.039]	[0.039]	[0.010]	[0.010]
Welfare recipients per 1000	0.003	-0.004	0.000	-0.000
	[0.013]	[0.012]	[0.000]	[0.000]
Social renters per 1000	0.012	0.025	-0.002	-0.003
	[0.026]	[0.026]	[0.003]	[0.004]
Average property tax payment, logged	0.124	0.100	-0.008	-0.008
	[0.143]	[0.144]	[0.033]	[0.034]
Population, 5th polynomial	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes
Observations	100	100	959	959
R-squared	0.758	0.775	0.193	0.195

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Province fixed effects are not included. Results become significant at 1% level if province fixed effects are excluded in the first two columns.

Table 11. Radio availability and Antisemitism.

VARIABLES	All cities						Only cities with Jewish settlements in 1349					
	Letters to <i>Der Stürmer</i>		Attacks on synagogues		Log(Deportations before 1942)		Letters to <i>Der Stürmer</i>		Attacks on synagogues		Log(Deportations before 1942)	
Radio signal strength (1935)	0.006** [2.394]	0.001 [0.508]	0.001 [0.545]	-0.000 [-0.077]	0.013*** [2.678]	0.009* [1.714]	0.008** [2.019]	-0.021* [-1.890]	-0.001 [-0.431]	-0.014** [-2.470]	0.005 [0.579]	-0.036** [-2.029]
Pogroms in 1349 * Radio signal strength		0.014*** [3.090]		0.002 [1.187]		0.017* [1.772]		0.032*** [2.740]		0.014** [2.555]		0.047** [2.504]
Population, logged	0.176*** [5.222]	0.169*** [5.117]	-0.013 [-1.092]	-0.015 [-1.171]	0.282*** [4.812]	0.272*** [4.716]	0.262*** [4.195]	0.265*** [4.321]	-0.019 [-1.194]	-0.017 [-1.085]	0.485*** [4.719]	0.482*** [4.751]
Share of Jewish population, 1925	11.733*** [4.802]	11.647*** [4.833]	3.653*** [3.954]	3.644*** [3.968]	44.299*** [8.890]	44.111*** [8.856]	15.018*** [3.247]	14.627*** [3.253]	1.513 [0.740]	1.335 [0.673]	52.862*** [4.202]	51.940*** [4.191]
Share of Catholic population, 1925	-0.059 [-0.523]	-0.058 [-0.511]	0.050 [0.642]	0.050 [0.639]	0.395* [1.771]	0.399* [1.794]	-0.066 [-0.221]	-0.090 [-0.311]	-0.182 [-1.406]	-0.193 [-1.604]	0.502 [0.996]	0.471 [0.921]
Share of blue-collar workers, 1925	-0.035*** [-4.344]	-0.035*** [-4.343]	-0.015** [-2.419]	-0.015** [-2.411]	-0.120*** [-7.240]	-0.121*** [-7.306]	-0.075** [-2.488]	-0.076** [-2.558]	-0.007 [-0.636]	-0.007 [-0.699]	-0.180*** [-3.655]	-0.180*** [-3.792]
Share of white-collar workers, 1925	0.034** [2.285]	0.035** [2.349]	0.031*** [2.679]	0.031*** [2.700]	0.159*** [4.768]	0.161*** [4.913]	0.078 [1.244]	0.078 [1.305]	0.015 [0.843]	0.015 [0.879]	0.186* [1.758]	0.185* [1.835]
Pogroms in 1349	0.345*** [3.661]	-0.017 [-0.114]	0.137** [2.417]	0.074 [1.119]	0.716*** [4.510]	0.268 [0.931]	0.332*** [3.190]	-0.455 [-1.634]	0.128* [1.853]	-0.226* [-1.662]	0.593*** [3.221]	-0.561 [-1.140]
Jewish settlement in 1349	0.156** [1.974]	0.156** [1.990]	-0.022 [-0.431]	-0.022 [-0.433]	0.238* [1.682]	0.238* [1.698]						
War participants per 1000	-0.012 [-0.881]	-0.012 [-0.947]	-0.003 [-0.547]	-0.003 [-0.576]	-0.046* [-1.812]	-0.047* [-1.883]	0.004 [0.154]	0.007 [0.271]	-0.000 [-0.028]	-0.001 [-0.121]	-0.025 [-0.832]	-0.021 [-0.764]
Welfare recipients per 1000	0.000 [0.977]	0.000 [0.822]	-0.001*** [-5.311]	-0.001*** [-5.356]	0.001 [1.086]	0.001 [0.996]	-0.000** [-2.242]	-0.001** [-2.580]	-0.000* [-1.653]	-0.000** [-2.216]	-0.000 [-0.217]	-0.000 [-0.648]
Social renters per 1000	0.006 [0.987]	0.006 [1.019]	0.003 [0.994]	0.003 [1.010]	0.033*** [2.769]	0.033*** [2.830]	0.019 [1.648]	0.022* [1.904]	0.001 [0.180]	0.002 [0.556]	0.049** [2.212]	0.053** [2.522]
Average property tax payment, logged	0.192*** [5.237]	0.192*** [5.233]	0.002 [0.114]	0.002 [0.111]	0.197*** [2.763]	0.194*** [2.740]	0.240*** [3.428]	0.227*** [3.339]	-0.006 [-0.235]	-0.011 [-0.408]	0.405*** [3.066]	0.391*** [2.995]
Synagogue in 1933			0.608*** [16.709]	0.608*** [16.668]					0.682*** [8.086]	0.682*** [8.491]		
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,216	1,216	1,181	1,181	1,156	1,156	308	308	302	302	286	286
R-squared	0.385	0.391	0.374	0.374	0.436	0.438	0.538	0.551	0.520	0.537	0.628	0.636

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Unit of observation is city from Voightlaender and Voth (2012) sample. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. The results are qualitatively similar if we use only the set of controls of Voightlaender and Voth (2012), i.e. share of Jews, share of Catholics, population, and pogroms in 1349.

Table 12. Radio availability, Hitler's speeches, and voting for Nazi in 1933. Interactions.

	Vote share of Nazi party, March 1933							
	Number of speeches in 1932		Dummy for a speech in 1932		Number of speeches in 1932-33		Dummy for a speech in 1932-33	
Hitler's speeches variable:								
Radio signal strength	-0.072** [0.035]	-0.065* [0.036]	-0.071* [0.035]	-0.064* [0.035]	-0.069* [0.035]	-0.062* [0.036]	-0.058 [0.035]	-0.052 [0.035]
Signal strength x Hitler's speeches	0.129*** [0.037]	0.117*** [0.037]	0.124*** [0.038]	0.111*** [0.039]	0.093*** [0.032]	0.084** [0.033]	0.180** [0.083]	0.136 [0.085]
Speech variable	-1.844* [0.971]	-1.640* [0.966]	-1.788* [1.028]	-1.598 [1.027]	-1.335 [0.892]	-1.154 [0.905]	-6.049 [3.881]	-4.186 [3.869]
Share of Jewish population, 1925	131.306*** [45.703]	135.314*** [43.054]	132.679*** [45.635]	136.442*** [42.938]	129.564*** [47.086]	133.806*** [44.178]	129.217** [47.980]	133.293*** [45.002]
Share of Catholic population, 1925	-31.482*** [4.779]	-31.504*** [4.847]	-31.608*** [4.759]	-31.638*** [4.825]	-31.540*** [4.768]	-31.549*** [4.834]	-31.832*** [4.664]	-31.827*** [4.719]
Share of blue-collar workers, 1925	-3.627 [4.886]	-2.867 [5.017]	-3.616 [4.906]	-2.858 [5.040]	-3.482 [4.886]	-2.719 [5.007]	-3.365 [4.934]	-2.585 [5.048]
Share of white-collar workers, 1925	-18.344*** [6.512]	-15.619** [6.900]	-18.230*** [6.580]	-15.473** [6.991]	-18.343*** [6.473]	-15.623** [6.891]	-18.265** [6.776]	-15.367** [7.229]
City (stadtkreis)	-1.074 [0.813]	-0.424 [0.776]	-1.096 [0.816]	-0.439 [0.781]	-1.005 [0.815]	-0.354 [0.777]	-0.868 [0.831]	-0.204 [0.791]
Pogroms in 1349	0.478 [0.825]	0.428 [0.815]	0.515 [0.827]	0.465 [0.817]	0.463 [0.825]	0.412 [0.815]	0.564 [0.830]	0.501 [0.820]
Jewish settlement in 1349	-1.360* [0.732]	-1.230 [0.737]	-1.391* [0.734]	-1.256* [0.738]	-1.303* [0.730]	-1.177 [0.735]	-1.289* [0.731]	-1.153 [0.736]
War participants per 1000	-0.002 [0.063]	0.013 [0.063]	-0.005 [0.063]	0.010 [0.063]	-0.005 [0.064]	0.010 [0.064]	-0.009 [0.062]	0.007 [0.063]
Welfare recipients per 1000	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.000 [0.001]
Social renters per 1000	-0.033 [0.057]	-0.026 [0.052]	-0.030 [0.057]	-0.023 [0.052]	-0.038 [0.058]	-0.030 [0.053]	-0.034 [0.057]	-0.026 [0.052]
Average property tax payment, logged	-0.475 [0.493]	-0.549 [0.490]	-0.456 [0.495]	-0.532 [0.493]	-0.490 [0.496]	-0.564 [0.492]	-0.465 [0.514]	-0.549 [0.508]
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes
Observations	918	918	918	918	918	918	918	918
R-squared	0.825	0.827	0.825	0.827	0.825	0.827	0.824	0.826

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population.

Table 13. Recent and past exposure to radio and voting for Nazi.

VARIABLES	Change in vote share of Nazi party since previous elections							
	September 1930		July 1932		November 1932		March 1933	
Signal strength, lagged one elections	-0.054**	-0.054**	0.030	0.032	-0.007	-0.007	0.037**	0.041**
	[0.024]	[0.024]	[0.040]	[0.040]	[0.012]	[0.013]	[0.017]	[0.017]
Change in signal strength since last elections	-0.103	-0.104	-0.065	-0.064	-0.002	-0.004	0.078	0.082*
	[0.088]	[0.088]	[0.051]	[0.052]	[0.040]	[0.041]	[0.047]	[0.045]
Share of Jewish population, 1925	34.110	33.176	66.692	69.415	59.208**	60.203**	-2.823	0.324
	[43.676]	[42.880]	[60.210]	[59.364]	[22.453]	[22.955]	[49.121]	[45.290]
Share of Catholic population, 1925	-5.935**	-5.930**	-24.249***	-24.217***	4.421***	4.427***	3.302	3.302
	[2.794]	[2.800]	[3.314]	[3.307]	[1.428]	[1.421]	[2.161]	[2.236]
Share of blue-collar workers, 1925	-3.670	-3.716	-0.912	-0.528	0.369	0.486	-2.904	-2.420
	[3.577]	[3.597]	[3.373]	[3.341]	[1.352]	[1.468]	[2.484]	[2.346]
Share of white-collar workers, 1925	6.000	6.369	-16.334***	-16.142***	-4.378*	-4.318	-9.646**	-8.208**
	[4.945]	[4.859]	[3.588]	[4.274]	[2.402]	[2.579]	[3.571]	[3.235]
City (stadtkreis)	0.318	0.320	-1.204	-0.956	-0.355	-0.284	-0.008	0.376
	[0.802]	[0.802]	[0.892]	[0.915]	[0.305]	[0.332]	[0.516]	[0.526]
Pogroms in 1349	0.296	0.303	-0.738	-0.765	0.276	0.263	0.281	0.242
	[0.393]	[0.390]	[0.790]	[0.783]	[0.414]	[0.409]	[0.352]	[0.348]
Jewish settlement in 1349	0.205	0.215	0.051	0.104	-0.128	-0.115	-0.989***	-0.914***
	[0.418]	[0.422]	[0.485]	[0.493]	[0.287]	[0.289]	[0.294]	[0.274]
War participants per 1000	0.032	0.032	-0.029	-0.022	0.037	0.039	-0.060	-0.050
	[0.053]	[0.054]	[0.053]	[0.054]	[0.027]	[0.027]	[0.048]	[0.048]
Welfare recipients per 1000	-0.001	-0.001	-0.000	-0.000	-0.001	-0.001*	0.003**	0.003*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]
Social renters per 1000	-0.024	-0.022	-0.004	-0.007	-0.002	-0.003	-0.061*	-0.059*
	[0.046]	[0.048]	[0.045]	[0.042]	[0.023]	[0.024]	[0.031]	[0.032]
Average property tax payment, logged	0.068	0.069	-0.501	-0.537	-0.609***	-0.619***	0.211	0.163
	[0.293]	[0.297]	[0.408]	[0.398]	[0.157]	[0.156]	[0.221]	[0.217]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	958	958	958	958	918	918	917	917
R-squared	0.658	0.658	0.733	0.734	0.520	0.520	0.692	0.696

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population. Number of observations changes between July and November of 1932 because of redistricting.

Table 14. Radio listenership and voting for Nazi. First difference OLS and IV estimates

VARIABLES	Change in vote share of Nazi party since previous elections							
	September 1930		July 1932		November 1932		March 1933	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Radio listenership rate (in percentage points)	-0.103*** [0.037]	-0.289*** [0.105]	0.027 [0.028]	0.070 [0.171]	-0.023 [0.015]	-0.024 [0.067]	0.044** [0.019]	0.172** [0.074]
Share of Jewish population, 1925	49.927 [46.304]	57.055 [55.140]	43.423 [64.697]	40.883 [66.789]	57.419** [21.914]	57.460*** [20.809]	-8.154 [46.448]	-16.405 [40.520]
Share of Catholic population, 1925	-7.447** [3.199]	-8.622** [3.162]	-22.299*** [4.058]	-22.044*** [3.943]	3.757** [1.755]	3.753** [1.627]	3.730 [2.469]	4.507* [2.442]
Share of blue-collar workers, 1925	-4.243 [3.527]	-5.011 [3.592]	-0.120 [3.094]	0.193 [3.525]	0.344 [1.465]	0.339 [1.636]	-2.206 [2.311]	-1.283 [2.228]
Share of white-collar workers, 1925	9.300* [5.372]	9.871* [5.523]	-15.164*** [3.907]	-15.607*** [4.998]	-3.872 [2.528]	-3.866 [3.028]	-9.725*** [3.406]	-11.031*** [3.907]
City (stadtkreis)	-0.087 [0.928]	0.278 [1.061]	-1.288 [0.792]	-1.365 [0.843]	-0.328 [0.360]	-0.327 [0.309]	-0.011 [0.489]	-0.269 [0.566]
Pogroms in 1349	0.146 [0.381]	0.093 [0.437]	-0.591 [0.853]	-0.586 [0.849]	0.245 [0.436]	0.245 [0.440]	0.116 [0.278]	0.131 [0.286]
Jewish settlement in 1349	0.211 [0.461]	0.121 [0.547]	0.079 [0.554]	0.092 [0.565]	-0.145 [0.312]	-0.145 [0.309]	-0.928*** [0.316]	-0.887** [0.367]
War participants per 1000	0.039 [0.059]	0.055 [0.072]	0.013 [0.067]	0.008 [0.076]	0.043 [0.031]	0.043 [0.032]	-0.065 [0.055]	-0.079 [0.054]
Welfare recipients per 1000	-0.000 [0.001]	-0.000 [0.001]	-0.002 [0.001]	-0.002 [0.001]	-0.001 [0.001]	-0.001 [0.001]	0.004* [0.002]	0.003* [0.002]
Social renters per 1000	-0.035 [0.043]	-0.044 [0.042]	-0.020 [0.040]	-0.017 [0.046]	-0.003 [0.024]	-0.003 [0.023]	-0.059* [0.031]	-0.046 [0.031]
Average property tax payment, logged	0.217 [0.319]	0.357 [0.345]	-0.619 [0.441]	-0.662 [0.496]	-0.674*** [0.169]	-0.673*** [0.192]	0.256 [0.218]	0.136 [0.234]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	808	808	833	833	810	810	809	809
R-squared	0.645	0.624	0.733	0.732	0.506	0.506	0.669	0.645

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population. Because of concerns about the quality of data, we take subscription numbers from 1932 for 1933 elections. Number of observations changes between July and November of 1932 because of redistricting.

Table 15. Radio availability and voting for Nazi. Precinct fixed effect estimates.

sample	Vote share of Nazi party					
	September 1930, July 1932, and November 1932		All parliamentary elections 1928-1933, combined		All parliamentary elections 1928-1933, combined	
Radio signal strength	-0.036**	-0.036**				
	[0.017]	[0.017]				
Radio signal strength, May 1928			-0.001	-0.000		
			[0.017]	[0.017]		
Radio signal strength, September 1930			-0.038**	-0.043***		
			[0.016]	[0.016]		
Radio signal strength, July 1932			0.005	0.005		
			[0.016]	[0.016]		
Radio signal strength, November 1932			0.021	0.022		
			[0.016]	[0.015]		
Radio signal strength, March 1933			0.070***	0.076***		
			[0.017]	[0.017]		
Radio signal strength * Indicator for pro-Nazi content (0 for 1928, -1 for 1930-1932, +1 for 1933)					0.029***	0.032***
					[0.007]	[0.007]
Standard controls, interacted with time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Precinct fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933, interacted with time fixed effects		Yes		Yes		Yes
p-value for test signal strength in 33=average signal strength in 1930-1932			7.60e-07	5.75e-08		
p-value for test signal strength in 28=average signal strength in 1930-1932			0.853	0.763		
Observations	2,835	2,835	4,711	4,711	4,711	4,711
R-squared	0.966	0.966	0.968	0.969	0.968	0.969

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls include 5th polynomial of population, share of Jewish and Catholic population, shares of blue- and white-collar workers in 1925, city dummy, dummy for pogroms in 1349 and a dummy for existence of a Jewish settlement in 1349, number of war participants per 1000, number of welfare recipients per 1000, number of renters of social housing per 1000, average property tax, logged, turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by average precinct-level population.

Table 16. Radio availability in 1930 and voting in 1924. Placebo tests.

VARIABLES	Vote share of DNVP		Vote share of KPD		Vote share of SPD		Vote share of Zentrum		Turnout	
Radio signal strength	-0.001	-0.001	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.003	-0.004
	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.020]	[0.020]
Share of Jewish population, 1925	-1.663**	-1.565**	-0.190	-0.264	-0.296	-0.408	0.096	0.068	76.128	73.550
	[0.614]	[0.605]	[0.291]	[0.279]	[0.410]	[0.424]	[0.208]	[0.203]	[51.588]	[51.807]
Share of Catholic population, 1925	-0.187***	-0.187***	-0.007	-0.006	-0.150***	-0.150***	0.029	0.029	0.009	0.003
	[0.037]	[0.037]	[0.014]	[0.013]	[0.018]	[0.017]	[0.018]	[0.017]	[1.656]	[1.665]
Share of blue-collar workers, 1925	-0.014	0.007	0.135***	0.117***	0.205***	0.182***	-0.004	-0.008	5.830**	5.512**
	[0.026]	[0.023]	[0.032]	[0.030]	[0.050]	[0.045]	[0.010]	[0.009]	[2.200]	[2.268]
Share of white-collar workers, 1925	0.207***	0.198***	-0.054	-0.054	-0.017	-0.005	0.023	0.031	2.414	3.247
	[0.064]	[0.065]	[0.054]	[0.053]	[0.066]	[0.072]	[0.027]	[0.028]	[4.104]	[4.058]
City (stadtkreis)	-0.034**	-0.028**	0.020**	0.015*	0.012	0.006	-0.005	-0.006	1.770*	1.736*
	[0.014]	[0.013]	[0.008]	[0.007]	[0.011]	[0.011]	[0.004]	[0.004]	[0.918]	[0.942]
Pogroms in 1349	0.023**	0.022**	0.005	0.006	-0.011**	-0.010*	-0.004	-0.004	-0.785	-0.768
	[0.009]	[0.009]	[0.004]	[0.004]	[0.005]	[0.005]	[0.005]	[0.005]	[0.577]	[0.577]
Jewish settlement in 1349	0.000	0.001	-0.006	-0.007*	0.004	0.004	0.003	0.003*	1.013**	1.038**
	[0.005]	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]	[0.002]	[0.002]	[0.489]	[0.483]
War participants per 1000	0.000	0.000	0.001	0.001	-0.000	-0.000	-0.000	-0.000	0.025	0.025
	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.062]	[0.062]
Welfare recipients per 1000	-0.000***	-0.000***	0.000	0.000	0.000**	0.000***	0.000	0.000	0.002	0.002*
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
Social renters per 1000	-0.001**	-0.001**	-0.000	-0.000	0.003***	0.003***	-0.000	-0.000	0.051	0.055
	[0.001]	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]	[0.000]	[0.000]	[0.047]	[0.045]
Average property tax payment, logged	0.013**	0.012**	-0.002	-0.001	-0.005	-0.004	0.002	0.002*	0.149	0.152
	[0.006]	[0.006]	[0.002]	[0.002]	[0.004]	[0.004]	[0.001]	[0.001]	[0.284]	[0.282]
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voting controls in 1920	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unemployment controls, 1933		Yes		Yes		Yes		Yes		Yes
Observations	895	895	895	895	895	895	895	895	895	895
R-squared	0.860	0.862	0.699	0.708	0.854	0.857	0.992	0.992	0.730	0.731

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1920. Unemployment controls include share of unemployed and the share of people without full-time occupation. Observations are weighted by precinct-level population.

Table 17. Radio availability in 1930 and voting in 1925 Presidential Elections. Placebo test.

		Vote share of ...							
VARIABLES	von Hindenburg		Marx		Thalmann		Turnout		
Radio signal strength	-0.019	-0.024	0.011	0.015	0.008	0.009	-0.004	-0.004	
	[0.032]	[0.033]	[0.030]	[0.031]	[0.006]	[0.007]	[0.023]	[0.024]	
Share of Jewish population, 1925	-30.504	-32.393	26.002	27.334	4.952	5.539	115.889**	121.327***	
	[71.268]	[69.589]	[67.094]	[65.806]	[7.936]	[8.007]	[43.228]	[40.944]	
Share of Catholic population, 1925	-28.270***	-28.317***	28.832***	28.872***	-0.634	-0.628	-16.489***	-16.531***	
	[4.833]	[4.742]	[4.510]	[4.436]	[0.536]	[0.521]	[1.845]	[1.798]	
Share of blue-collar workers, 1925	7.249*	6.681*	-6.768*	-6.309	-0.449	-0.340	8.834***	9.070***	
	[4.078]	[3.854]	[3.967]	[3.802]	[0.615]	[0.613]	[3.045]	[3.048]	
Share of white-collar workers, 1925	-1.531	-3.687	3.444	5.334	-1.680	-1.433	11.488	8.906	
	[5.818]	[6.133]	[5.172]	[5.416]	[1.601]	[1.571]	[7.455]	[6.907]	
City (stadtkreis)	1.294	0.795	-0.815	-0.400	-0.466*	-0.384	2.416**	2.328**	
	[1.288]	[1.176]	[1.162]	[1.085]	[0.269]	[0.264]	[1.112]	[1.112]	
Pogroms in 1349	0.075	0.090	-0.017	-0.027	-0.061	-0.066	0.329	0.284	
	[0.648]	[0.637]	[0.657]	[0.648]	[0.119]	[0.118]	[0.641]	[0.647]	
Jewish settlement in 1349	-0.284	-0.439	0.168	0.299	0.111	0.134	-0.355	-0.432	
	[0.771]	[0.821]	[0.835]	[0.878]	[0.141]	[0.139]	[0.506]	[0.505]	
War participants per 1000	-0.067	-0.081	0.080	0.092	-0.013	-0.011	0.096	0.096	
	[0.060]	[0.062]	[0.063]	[0.066]	[0.029]	[0.029]	[0.087]	[0.086]	
Welfare recipients per 1000	-0.006*	-0.006	0.005	0.005	0.001**	0.001**	0.001	0.000	
	[0.003]	[0.004]	[0.003]	[0.003]	[0.000]	[0.000]	[0.001]	[0.001]	
Social renters per 1000	0.101	0.097	-0.104*	-0.100	0.004	0.004	0.121***	0.108**	
	[0.061]	[0.062]	[0.061]	[0.062]	[0.012]	[0.012]	[0.043]	[0.040]	
Average property tax payment, logged	-0.765	-0.682	0.750	0.681	0.019	0.006	0.749**	0.764**	
	[0.504]	[0.502]	[0.498]	[0.496]	[0.065]	[0.067]	[0.325]	[0.326]	
Population, 5th polynomial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Unemployment controls, 1933		Yes		Yes		Yes		Yes	
Observations	953	953	953	953	953	953	953	953	
R-squared	0.923	0.924	0.927	0.927	0.949	0.949	0.862	0.863	

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924. Unemployment controls include share of unemployed and the share of people without full-time occupation. The results for the first round of elections (without Hindenburg) are qualitatively and similar. Observations are weighted by precinct-level population.

Table 18. Radio availability and city-level violence before 1930s. Placebo test.

VARIABLES	All cities				Only cities with Jewish settlements in 1349			
	Crime rate in 1900-1920		Pogroms in 1920s		Crime rate in 1900-1920		Pogroms in 1920s	
Radio signal strength (1935)	-0.000	-0.000	0.001	-0.000	-0.000	-0.000	0.003	0.003
	[-1.407]	[-0.705]	[0.777]	[-0.460]	[-1.348]	[-0.275]	[1.288]	[1.297]
Pogroms in 1349 * Radio signal strength		-0.000		0.003		-0.000		-0.000
		[-1.262]		[1.489]		[-0.744]		[-0.094]
Population, logged	-0.003***	-0.003***	0.023***	0.021**	-0.006***	-0.006***	0.041**	0.041**
	[-4.124]	[-3.962]	[2.671]	[2.502]	[-3.033]	[-3.045]	[2.314]	[2.311]
Share of Jewish population, 1925	-0.007	-0.005	1.076*	1.056*	-0.049	-0.046	1.096	1.098
	[-0.100]	[-0.080]	[1.855]	[1.826]	[-0.317]	[-0.301]	[0.852]	[0.852]
Share of Catholic population, 1925	-0.004	-0.004	-0.033	-0.032	-0.004	-0.004	-0.063	-0.063
	[-0.814]	[-0.823]	[-1.219]	[-1.210]	[-0.401]	[-0.387]	[-0.702]	[-0.701]
Share of blue-collar workers, 1925	-0.000	-0.000	-0.004***	-0.004***	-0.000	-0.000	-0.006	-0.006
	[-0.865]	[-0.889]	[-3.041]	[-3.052]	[-0.507]	[-0.464]	[-1.403]	[-1.391]
Share of white-collar workers, 1925	-0.000	-0.000	0.006**	0.006**	-0.001	-0.001	0.012	0.012
	[-0.749]	[-0.762]	[2.221]	[2.336]	[-0.776]	[-0.791]	[1.640]	[1.631]
Pogroms in 1349	0.003	0.010	0.049**	-0.033	0.003	0.010	0.045*	0.051
	[1.057]	[1.375]	[2.313]	[-0.543]	[0.856]	[0.841]	[1.728]	[0.727]
Jewish settlement in 1349	-0.002	-0.002	0.001	0.001				
	[-0.923]	[-0.931]	[0.046]	[0.049]				
War participants per 1000	-0.000	-0.000	-0.002	-0.002	-0.000	-0.000	-0.002	-0.002
	[-1.027]	[-0.985]	[-1.164]	[-1.238]	[-0.061]	[-0.096]	[-0.518]	[-0.522]
Welfare recipients per 1000	0.000***	0.000***	0.001***	0.001***	0.000***	0.000***	0.001***	0.001***
	[6.249]	[6.314]	[26.532]	[25.167]	[6.453]	[6.526]	[14.472]	[14.833]
Social renters per 1000	0.000**	0.000**	0.002	0.002	0.001	0.000	0.005	0.005
	[2.007]	[1.966]	[1.117]	[1.145]	[1.201]	[1.081]	[1.164]	[1.151]
Average property tax payment, logged	0.002*	0.002*	-0.000	-0.000	0.004	0.004	-0.011	-0.011
	[1.701]	[1.700]	[-0.054]	[-0.068]	[1.381]	[1.386]	[-0.664]	[-0.649]
Voting controls, 1924	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,142	1,142	1,194	1,194	301	301	303	303
R-squared	0.415	0.418	0.150	0.157	0.425	0.426	0.234	0.234

Standard errors are clustered by province (Wahlkreis). *** p<0.01, ** p<0.05, * p<0.1. Unit of observation is city from Voightlaender and Voth (2012) sample. Voting controls include turnout and vote shares of DNVP, KPD, SPD, and Zentrum in 1924.

APPENDIX.

Table A1. Summary statistics, precinct-level

Panel A. Voting variables					
Variable	Observations	Mean	Std. Dev.	Min	Max
Vote share of SPD, 1924	1021	0.227	0.119	0.007	0.55
Vote share of KPD, 1924	1021	0.063	0.06	0.002	0.427
Vote share of DNVP, 1924	1021	0.207	0.156	0.006	0.848
Vote share of Zentrum, 1924	1021	0.146	0.232	0	0.922
Turnout, 1924	1021	78.939	6.835	55.449	94.059
Turnout, April 1925	1007	75.602	11.212	24.469	99.296
Vote share of von Hindenburg, 1925	1007	53.303	19.466	5.506	96.472
Vote share of Marx, April 1925	1007	42.293	19.394	3.354	94.064
Vote share of Thalmann, 1925	1007	4.345	4.885	0.119	36.373
Vote share of NSDAP, 1928	1016	3.172	4.008	0.144	36.152
Vote share of SPD, 1928	1016	0.262	0.13	0.013	0.591
Vote share of KPD, 1928	1016	0.063	0.065	0.001	0.425
Vote share of DNVP, 1928	1016	0.147	0.133	0.005	0.787
Vote share of Zentrum, 1928	1016	0.202	0.226	0.001	0.811
Turnout, 1928	1016	74.676	7.98	41.552	93.548
Approval of anti-Treaty Referendum, 1929	986	12.661	12.632	0.016	64.717
Share of votes "yes" for anti-Treaty Referendum, 1929	986	17.608	13.75	0.212	76.06
Vote share of NSDAP, 1930	998	19.036	8.999	1.011	58.803
Vote share of SPD, 1930	998	0.219	0.116	0.012	0.558
Vote share of KPD, 1930	998	0.085	0.069	0.002	0.444
Vote share of DNVP, 1930	998	0.07	0.074	0.003	0.492
Vote share of Zentrum, 1930	998	0.197	0.224	0.001	0.832
Turnout, 1930	998	80.807	6.424	56.704	94.967
Vote share of von Hindenburg, 1932	984	50.043	15.744	8.202	88.522
Vote share of Hitler, 1932	984	32.995	12.196	6.737	80.035
Vote share of Thalmann, 1932	984	9.207	6.672	0.287	42.235
Turnout, April 1932	984	85.347	5.082	58.196	99.42
Vote share of NSDAP, July 1932	993	39.449	14.721	5.865	83.004
Vote share of SPD, July 1932	993	0.186	0.101	0.009	0.495
Vote share of KPD, July 1932	993	0.101	0.067	0.004	0.395
Vote share of DNVP, July 1932	993	0.059	0.043	0.003	0.32
Vote share of Zentrum, July 1932	993	0.201	0.225	0.001	0.864
Turnout, July 1932	993	83.608	6.151	54.242	95.079
Vote share of NSDAP, November 1932	939	34.992	13.454	5.328	76.424
Vote share of SPD, November 1932	939	0.178	0.096	0.012	0.502
Vote share of KPD, November 1932	939	0.122	0.07	0.005	0.436
Vote share of DNVP, November 1932	939	0.08	0.06	0.005	0.358
Vote share of Zentrum, November 1932	939	0.2	0.222	0.001	0.826
Turnout, November 1932	939	79.77	7.051	49.193	98.269
Vote share of NSDAP, 1933	939	47.221	12.17	13.293	83.006
Vote share of SPD, 1933	939	0.156	0.091	0.007	0.464
Vote share of KPD, 1933	939	0.083	0.06	0.002	0.36
Vote share of Zentrum, 1933	939	0.175	0.191	0	0.777
Turnout, 1933	939	88.566	3.68	69.749	96.046
Panel B. Signal and listener variables					
Variable	Observations	Mean	Std. Dev.	Min	Max
Radio signal strength, 1928	1023	11.159	12.748	-34.748	61.195
Radio signal strength, 1929	1023	11.344	12.827	-34.748	61.195
Radio signal strength, 1930	1023	12.364	12.902	-34.079	61.987
Radio listenership (subscriptions per 100), 1931	844	18.795	8.123	4.467	59.6
Radio signal strength, July 1932	1023	17.25	11.472	-20.224	61.195
Radio listenership (subscriptions per 100), 1932	877	22.167	8.141	4.867	71.8
Radio signal strength, November 1932	1023	17.754	11.636	-20.224	64.206
Radio signal strength, 1933	1023	21.801	11.127	-7.268	61.195
Radio listenership (subscriptions per 100), 1933	878	26.311	8.653	0.443	79.337
Radio signal strength, 1935	1023	25.112	10.204	-1.985	69.971

Table A1. Summary statistics, precinct-level, continued

Panel C. Census and official statistics variables					
Variable	Observations	Mean	Std. Dev.	Min	Max
Population (in thousands), 1924	1021	54.225	67.483	1.576	1050.359
Population (in thousands), 1928	1023	57.495	75.055	1.577	1152.523
Population (in thousands), 1930	1023	59.13	79.071	1.577	1152.523
Population (in thousands), July 1932	1023	59.376	79.341	1.577	1152.523
Population (in thousands), November 1932	1023	61.01	79.469	1.577	1152.523
Population (in thousands), 1933	1023	61.031	79.518	1.577	1152.523
Share of Jewish population, 1925	987	0.005	0.006	0	0.053
Share of Catholic population, 1925	987	0.368	0.379	0.003	0.998
Share of blue-collar workers, 1925	987	0.382	0.129	0.113	1.61
Share of white-collar workers, 1925	987	0.122	0.068	0.024	0.379
War participants per 1000, 1930	990	0.61	1.941	0	28.778
Welfare recipients, 1930	990	27.479	51.47	3.5	1531
Social renters, 1930	990	8.753	5.117	0	36.879
Average property tax payment, logged, 1930	976	6.198	0.728	2.228	8.446
Panel D. Other variables					
Variable	Observations	Mean	Std. Dev.	Min	Max
City (Stadtkreis) dummy	1023	0.223	0.416	0	1
Pogroms in 1349	1023	0.196	0.397	0	1
Jewish settlement in 1349	1023	0.304	0.46	0	1
NSDAP new members, 1932	1024	1.643	0.897	0	4.844
NSDAP new members, 1933	1024	0.765	0.69	0	3.611
Number of deported in 1933-1939, logged	106	1.596	0.853	0.693	4.369
Number of deported in 1933-1939, missings replaced with zeros	1024	0.165	0.558	0	4.369
Number of Hitler's speeches, 1932	1024	0.094	0.311	0	2
Number of Hitler's speeches, 1932-1933	1024	0.103	0.357	0	3