Media effects in Nazi Germany*

Maja Adena, Ruben Enikolopov, Maria Petrova, Veronica Santarosa, and Ekaterina Zhuravskaya[1]

March 2012

PRELIMINARY AND INCOMPLETE.
PLEASE DO NOT DISTRIBUTE WITHOUT PERMISSION.

We examine the effect of radio broadcasts on voting for NSDAP in parliamentary elections in Germany in 1930s using detailed data on regional variation in radio signal availability. We show that in the elections of 1932, when radio content was biased against NSDAP, radio had a negative effect on voting for NSDAP. But in elections of 1933, when Hitler already was chancellor, and radio content became strongly biased in favor of NSDAP, radio had a positive effect on voting for NSDAP. We also show that the presence of radio increased the number of Jews that were deported between 1933 and 1939.

* We thank Bundesarchive for kindly providing us with data. We also thank Anton Babkin, Natalia
[1] Maja Adena is from Freie University of Berlin. Ruben Enikolopov and Maria Petrova are from New Economic School, Moscow. Veronica Santarosa is from the Law School of the University of Michigan. Ekaterina Zhuravskaya is from Paris School of Economics and New Economic School. Corresponding author: Maria Petrova, mpetrova@nes.ru.

Introduction

The case of Germany in the 1930s is especially important for the study of media influence. Media studies and communication literature were to a large extent motivated by the experience of Nazi Germany that suggests that propaganda might affect political preferences of people and their behavior. However, so far there was no convincing empirical evidence suggesting that it is the case. In this paper we use quasi-experimental approach based on low-level geographic differences in radio reception and overtime variation in the content of radio broadcasts to identify causal effects of the exposure to radio.

Anecdotal evidence suggests that radio propaganda played an important role in Hitler's coming to power. As Goebbels noted in his diary, after Hitler was appointed the Chancellor of Germany and just a month before the last election in 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)

In this paper, we employ detailed geographic variation in signal availability, as well as over-time variation in radio content, in order to estimate the magnitudes of media effects on voting and other outcomes. Beginning of 1930s was a time of rapid expansion of radio in Germany and all over the world. In Germany, the number of big transmitters (with a power over 10kW) increased from 1 in September 1930 to 3 in April 1932 to 6 in March 1933. This allows us to use not only detailed geographic variation in signal availability, but also a time dimension. We combine the data on the location and power of radio transmitters with engineering software (Irregular Terrain Model, Hufford, 2002, used and updated by Olken, 2008) to predict signal strength in different localities. We construct estimates of signal strength during five parliamentary elections in May 1928, September 1930, July 1932, November 1932, and March 1933.

We deal with potential endogeneity by several approaches. First, we focus on variation in radio signal strength caused by topography, rather than just a distance to transmitters (the same approach is used in Olken, 2009). Second, we exploit over-time variation in the content of the radio. In particular, before 1932 radio broadcasts were not politicized, so that we do not expect to see any effect of radio on voting outcomes. In 1932 radio broadcasts were somewhat biased against NSDAP, so we expect to see

negative effect of radio on votes for NDAP. Finally, after Hitler became German chancellor in January 1933, radio became one of the main channels of Nazi propaganda. By that time, radio was strongly biased in favor of NSDAP and turns into one of the main mouthpieces of anti-Semitic ideology, so we expect to see positive effect of radio on vote for NSDAP in 1933 and higher rates of deportation of Jews in the period between 1933 and 1939.

Consistent with these predictions we find no significant effect of radio on vote for NSDAP in 1930 and marginally significant negative effect in November 1932. In 1933 radio has a strong positive effect on vote for NSDAP. We also find that radio have led to higher number of Jews that were deported between 1933 and 1939. Thus, we find evidence that supports the notion that radio in Germany in 1930s had a noticeable effect on voting outcomes and played an important role in binging NSDAP to power and promoting Nazi ideology after that.

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

Background

Political Landscape

After the formation of the Weimar Republic in 1919 and until the 1932 government was controlled by a coalition of centrist parties that was led by democratically oriented Social Democratic Party of Germany (*Sozialdemokratische Partei Deutschlands*, SPD). Up until 1930 the coalition had a stable majority, but economic problems caused by the depression that have started in 1929 and was exacerbated by the heavy burden of reparation payments have weakened the government and early elections of 14th September 1930 were aimed at strengthening of the government had an opposite resulted. The centrist parties have lost a significant share of votes to opposition parties and the government could only work with the help of presidential decrees. In 1930 NSDAP have received 18.3% of votes as compared with 2.6% in 1928.

Continuing economic depression led to farther radicalization of the population, and in the presidential elections of March 1932 Hitler candidates against the expected winner: President Hindenburg and three other candidates. Though Hindenburg

receives the most votes (49.6 %) of the votes he fails the absolute majority necessary to win in the first round with Hitler getting 30.1% of votes. The second round was won by Hindenburg for himself with 53% of votes against 36.7% for Hitler.

In Reichstag early elections of 31st July 1932 the Nazi Party receives an astonishing 37.3% of votes. Hitler succeeded to convert the rising lines of unemployed to his columns and to attract resources of reach industrialists feared by potential expropriation. But although Hitler has already gained a predominant position at a political scene, yet the president Hindenburg refuses appointing him as a chancellor. Paired with financial ebb, in the elections of November 1932 National Socialists loose approximately 2 million of votes and get only 33.1% of votes. However, as a result of various intrigues, on 30th January 1933 Hitler is appointed as chancellor. NSDAP takes over the control over the police and radio. Communist, social democratic and even other newspapers are seized or forbidden. After the staged Reichstag fire, basic human rights are suspended and the terror spreads over the country. Intensive propaganda campaign is launched to assure NSDAP a clear victory in the Reichstag elections of March 1933 in which NSDAP received 43.9% of votes.

Radio content

Between 1923 and 1924 state post company (*In Reichspost*) with participation of the private capita created nine regional broadcasting companiesıo In 1925-26 a parent company is created (*Reichs-Rundfunk-Gesellschaft mbH*) which takes over technical, economic and to some extent content-related functions. The supervision over the content is divided between the ministry of postal service, the ministry of internal affairs, and state ministries of the states. Before 1929 the content of the radio was deliberately apolitical, mainly cultural, aimed at entertainment. After 1929 radio becomes increasingly politicized and offers more and more pro-governmental content, which includes economic and political news and some political speeches. Electoral campaign for political parties is allowed for all major parties except for KPD and NSDAP and before presidential elections of 1932 radio time was reserved exclusively for the president Hindenburg. However, before parliamentary election of July 1932 electoral campaign in radio extends to NSDAP.[2] However the government reserves disproportionate amount of broadcasting time for itself. After the elections of July 1932 a reform of the radio makes first steps towards centralization and nationalization

[2] Pohle, Heinz, 1955, Der Rundfunk als Instrument der Politik, Hamburg.

of the media and after the elections in November 1932 full centralization and nationalization of radio takes place.

NSDAP had virtually no influence on the content of radio broadcasts before Hitler was appointed as chancellor on 30 January 1933, and up until then the radio was coverage was biased against NSDAP. However, NSDAP has was preparing for the takeover of the radio and had a detailed plan of restructuring of the radio and its content, which was put in action right after Hitler's appointment as a chancellor. Between 1st February and parliamentary elections of 5th March NSDAP launches an intensive, daily electoral campaign on the radio. It minimized participation of its coalition partner DNVP and blocks the use of radio by all other parties.[3] The content of the radio broadcasts becomes dominated by propaganda, directed primarily at the uneducated workers.[4] The broadcasts from demonstrations, marches and rallies were to transmit the illusion of the power of the NSDAP movement and increase its electoral support during the upcoming elections. In 1934 Goebbels admitted that radio played a significant role in winning the war of propaganda[5] that allowed NSDAP to win March elections.

Availability of radio

Beginning of 1930s was a time of rapid expansion of radio in Germany and all over the world. The number of big transmitters (with a power over 10kW) increased from 1 in September 1930 to 3 in April 1932 to 6 in March 1933.[6] While in the 1927 the transmitters covered 1.37% of the surface and the signal was potentially available to 31.3% of the population, the construction of big transmitters in 1930-34 was meant to extend the signal availability to 70% of the population.

The level of radio listenership was significantly higher in big cities and their suburbs, as the reception of the radio signal there was possible with a relatively cheap crystal radio receiver, whereas in rural areas more powerful radios were necessary. [7] Low level of electrification was another reason for lower levels of radio listenership in

[3] Diller, Ansgar, 1980, Rundfunkpolitik im Dritten Reich, München, p.61
[4] Paul, Gerhard, Aufstand der Bilder, Die NS-Propaganda vor 1933, Bonn, second edition 1992, p.39ff.
[5] 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."“
[6] Lerg, Winfried B. Rundfunkpolitik in der Weimarer Republik, 1980
[7] The cheapest crystal radio receiver was available at a price of 25-30 Mark and more involved vacuum detectors at a price from 110 up to 380 Mark. A moderately priced "people's receiver" (*Volksempfänger*) has been introduced in August 1933 for the purpose of propaganda.

rural areas, since 96,5% all receivers were power supply units.[8] In addition, there was a monthly radio licence fee of 2 Mark,[9] which was roughly equivalent to the price of a monthly newspaper subscription.

Overall, radio listenership was higher at places with higher population density, better receiving conditions (e.g. plain), and better economic conditions.[10]

Empirical hypotheses

Our fist prediction is that exposure to radio decreases the vote share of NSDAP at the time when radio was biased against the party (elections before January 1933) and will increase the vote share o NSDAP after the party gets control over radio. Accordingly we formulate the following hypotheses:

Hypothesis 1. Exposure to radio decreased the share of votes for NSDAP in parliamentary elections in Weimar Republic in September 1930, July 1932 and November 1932.

Hypothesis 2. Exposure to radio increased the share of votes for NSDAP parliamentary elections in Weimar Republic in March 1933.

We next prediction is that after NSDAP came to power radio propaganda increased anti-Semitic sentiments which was reflected in higher incidents of the deportation of Jews.

Hypothesis 3. Exposure to radio increased the number of Jews deported between 1933 and 1939.

Data

In the paper, we use several sources of data. Our primary source of data for transmitter location and signal strength is *Mitteilungen der Reichs-Rundfunk-Gesellschaft*, various years. In addition, we used data from *Rundfunk Jahrbuch 1929* for the year of 1928. All the sources cite *Union Internationale de télécommunications* as the primary source of their data.

From radio catalogs, we use data on the location of the transmitter, their power, and frequency. We then use Irregular Terrain Model (Hufford 2002, Olken 2008) to

[8] Numbers for 07. 1933 07.1934. Source: Vollmann, Heinz, 1936, Rechtlich-wirtschaftlich-soziologische Grundlagen der deutschen Rundfunk-Entwicklung,", Leipzig

[9] Which corresponded to around 2 working hours of skilled worker and 4 hours of work of a labourer.

[10] Cebulla, Florian, Rundfunk und ländliche Gesellschaft 1924 - 1945 , 2004, Göttingen, p. 34

predict signal strength in different precincts. For each precinct, we compute signal strength at the point described by GPS coordinates of its center. A similar methodology is also used in Enikolopov et al. (2011), DellaVigna et al. (2011), and Yanagizawa (2010).

As a primary source of data on electoral returns and socio-demographic variables, we use the data, prepared and aggregated by King et al. (2008) that aggregated and made comparable the original electoral data from *Zentralarchiv* and German Census Data. Specifically, we use the data on the number of votes for each party and the data on the number of eligible votes to construct vote shares and turnout figures. As socio-demographic controls, we use the set of variables used by King et al. (2008) and other characteristics relevant to voting patterns such as precinct-level population (logged), the share of protestants, the share of unemployed, the share of workers in white- and blue-collar occupations, the share of self-employed, and the share of those employed in domestic and personal service.

The data on deportations comes from the database of Jewish deportees during the Nazi period which was compiled by the German Federal Archives (Bundesarchiv 2007).

Empirical results

Radio availability

In Table 1, we look at the determinants of radio signal strength in Germany during different elections in 1930s. In all the regressions, we control for free-space signal loss. We report two types of specifications. The results with 1928 voting controls take into account pre-existing voting preferences, as 1928 was the year before rapid development of radio listenership. The results with previous election voting controls show which variables were important for the change in signal strength between elections.

Table 1 shows that though free-space signal loss was indeed a major determinant of signal strength, a number of socio-demographic variables were also associated with our measure of the reception of radio. However, in all the specifications pre-existing voting preferences (voting controls from 1928) were not significantly correlated with radio signal even at 10% significance level. Our baseline identification assumption is that signal strength is not correlated with pre-existing voting preferences controlling for observables.

Main results

Table 2 shows how good reception of radio signal affected the changes in Nazi party vote shares for different elections in the beginning of 1930s. Specifically, it reports the results for the following empirical model:

$$vote\_share_{it} - vote\_share_{i,t-1} = \alpha_0 + \alpha_1 SignalStrength_{it} + \alpha_2 X_{it} + \mu_r + \eta_{it}$$

Note that we control for both our baseline proxy for signal reception and for free-space signal loss, thus focusing on signal variation from topography.

Our main results are summarized in columns 7-8. They suggest that voters were more likely to vote for Nazi in March 1933 in locations with better radio reception, which is consistent with *Hypothesis 1*. Column 8 suggests that this result still hold even if we control for signal strength in November 1932, i.e. before Hitler came to power.

Columns 5-6 show that not only radio did not have any positive influence on Nazi vote in November 1932 elections, but this influence was negative and significant in some specifications, which is consistent with *Hypothesis 2*.

Figure 2 shows that theses effects were not due to some outlier but rather represented uniform shift in Nazi support, which was positive in 1933 (Fig. 2A) and negative in 1932 (Fig. 2B). Fig. 3A plots residual variable graph for regression in column (7). Columns 1-4 show that there was no significant association between radio availability and signal strength in 1928-1930 and 1930-1932 when radio content was less focused on politics.

Listenership

Figure 1 shows how the crude measure of radio listenership that we use is related to our measures of signal strength. The curve on the graph is non-parametric fit. It demonstrates that even controlling for free space signal loss, there is still weakly positive relationship between radio signal strength and listenership. Table 3 further explores the determinants of radio listenership. Among other things, it shows why Nazi propaganda in 1933 was less effective than it could be: one of the main determinants of radio listenership is the share of Jews in the community.

Placebo tests

Non-significant influence of radio between 1930 and 1932 (Table 2) does not constitute clear placebo test, as at that time radio was available, and was becoming popular, though its content was less political. To further demonstrate that our results

are not driven by some third variable, we show that changes in the popularity of Nazi party in 1920s were not correlated with signal strength in 1930s. For 1928-1930 changes, we use plain changes in the vote shares, and for 1924-1928, we use the difference between votes of Nazi party in 1928 and DNVP in 1924 (Nazi party was prohibited in 1924, and most of its supporters voted for DNVP, and some authors (e.g. Voigtländer and Voth forthcoming) use DNVP vote share in 1924 as a proxy for Nazi support.)

The results of placebo exercise are consistent with the premise that the relationship between Nazi vote shares and the presence of radio is not driven by some third variable.

Deportations

Table 5 shows that radio signal strength was also significantly correlated with the number of deported Jews, conditional on the number of Jews in the community. Overall, our results suggest that radio propaganda was an important determinant of anti-semitism in 1930s in Nazi Germany, which is consistent with *Hypothesis 3*.

References

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.

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 (2011). "Cross-border effects of foreign media: Serbian radio and nationalism in Croatia," *mimeo*

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

Enikolopov, Ruben, Maria Petrova, and Ekaterina Zhuravskaya (2011). "Media and political persuasion: Evidence from Russia," forthcoming in *American Economic Review*

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

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

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

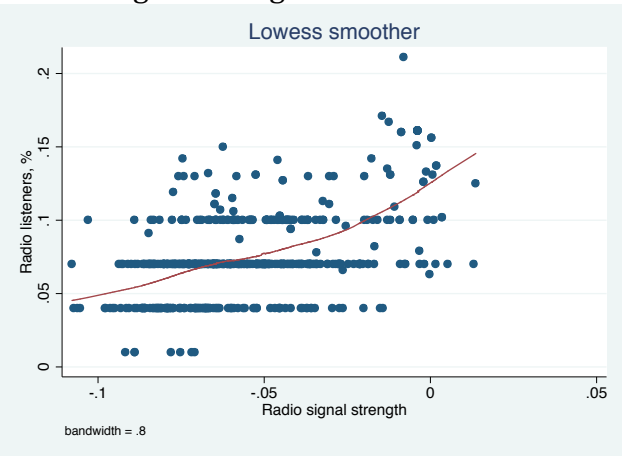
Strömberg, David (2004). "Radio's impact on public spending," *Quarterly Journal of Economics* 119(1), 189-221

Voigtländer, Nico, and Hans-Joachim Voth (2012) "Persecution Perpetuated: Medieval Origins of Anti-Semitic Violence in Nazi Germany," forthcoming in *Quarterly Journal of Economics*

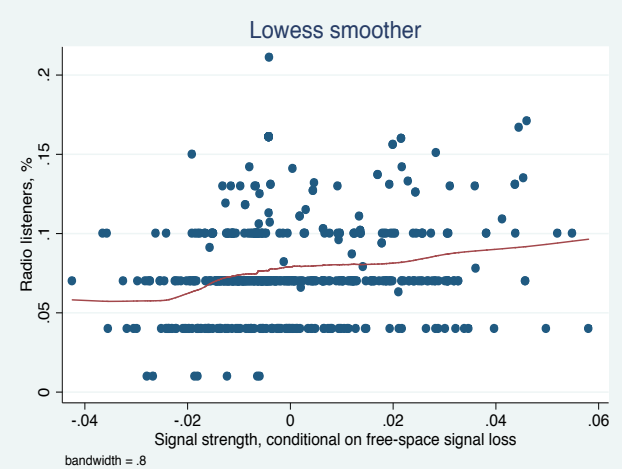
Yanagizawa-Drott, David (2009) "Propaganda and Conflict: Theory and Evidence from the Rwandan Genocide," Mimeo

Fig. 1 Radio listenership and signal strength, 1933

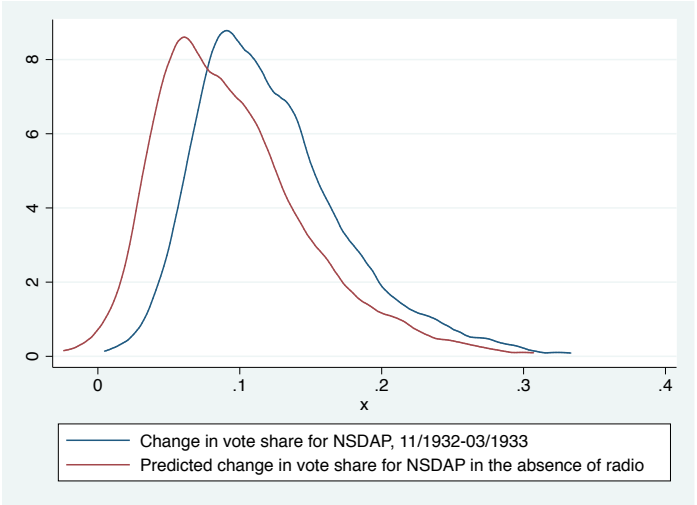
A. Plain signal strength



B. Signal strength, conditional on free-space signal loss (variation from topography isolated)



A. November 1932- March 1933



B. July 1932-November 1932

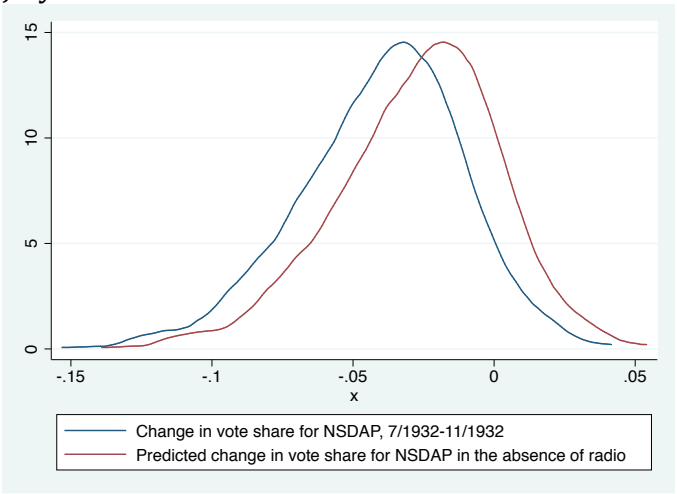


Fig. 3. Conditional scatterplots.

Fig. A. Change in Nazi vote share , 1932-1933, and signal strength.

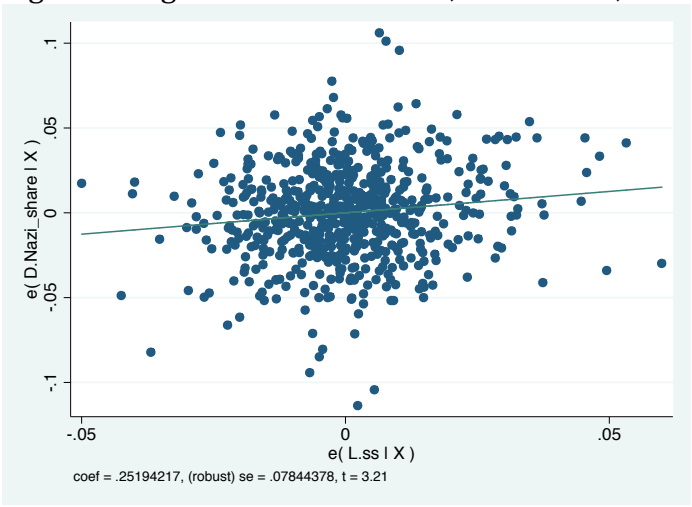


Fig. B. Deportations before 1939 and signal strength in 1933, subsample with non-zero observations only.

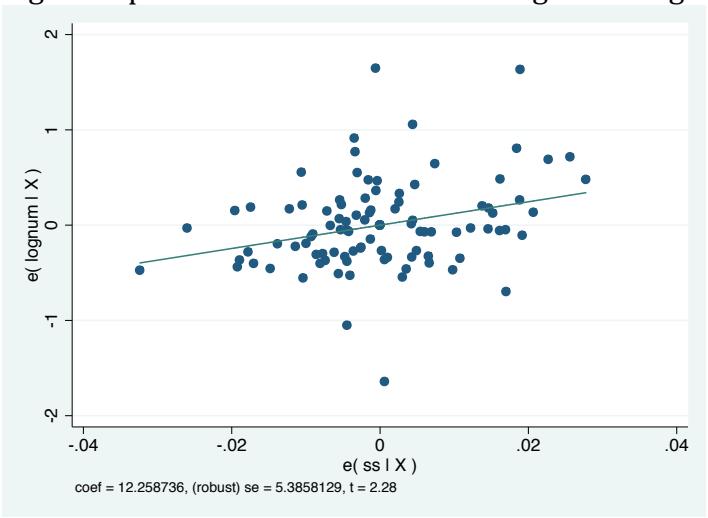


Table 1. Determinants of radio signal

	Radio signal strength							
Elections	September 1930		July 1932		November 1932		March 1933	
Free-space signal strength	0.0031***	0.0031***	0.0029***	0.0028***	0.0030***	0.0029***	0.0032***	0.0032***
	[0.0003]	[0.0003]	[0.0002]	[0.0002]	[0.0002]	[0.0002]	[0.0002]	[0.0002]
Population, logged	0.0028**	0.0028**	0.0035***	0.0033***	0.0028**	0.0025*	0.0025**	0.0021*
	[0.0012]	[0.0012]	[0.0011]	[0.0011]	[0.0011]	[0.0012]	[0.0012]	[0.0011]
Share of Jews	0.1085	0.1085	0.1267	0.1385	0.1069	0.1200	0.1016	0.1184*
	[0.0955]	[0.0955]	[0.0898]	[0.0905]	[0.0790]	[0.0803]	[0.0663]	[0.0696]
Share of working in agriculture	0.0473**	0.0473**	0.0484**	0.0486**	0.0462**	0.0491**	0.0393**	0.0434**
	[0.0213]	[0.0213]	[0.0210]	[0.0202]	[0.0204]	[0.0196]	[0.0172]	[0.0173]
Share of working in manufacture	-0.0786**	-0.0786**	-0.0720**	-0.0826**	-0.0791**	-0.0947***	-0.0641*	-0.0824***
	[0.0343]	[0.0343]	[0.0348]	[0.0307]	[0.0338]	[0.0298]	[0.0321]	[0.0265]
Distance from center of province	-0.0060**	-0.0060**	-0.0057**	-0.0059**	-0.0054**	-0.0052**	-0.0044***	-0.0043**
	[0.0027]	[0.0027]	[0.0025]	[0.0024]	[0.0023]	[0.0023]	[0.0016]	[0.0016]
Share of protestants	0.0015	0.0015	0.0018	0.0044	0.0014	0.0070	0.0014	0.0054
	[0.0059]	[0.0059]	[0.0055]	[0.0048]	[0.0054]	[0.0080]	[0.0052]	[0.0064]
Share of blue-collar workers	-0.0002	-0.0002	0.0011	0.0006	-0.0011	-0.0008	0.0179	0.0267
	[0.0508]	[0.0508]	[0.0469]	[0.0462]	[0.0474]	[0.0472]	[0.0473]	[0.0458]
Share of white-collar workers	-0.0235	-0.0235	-0.0188	-0.0144	-0.0160	-0.0110	0.0004	0.0122
	[0.0434]	[0.0434]	[0.0394]	[0.0385]	[0.0396]	[0.0388]	[0.0411]	[0.0394]
Share of employed in domestic and personal service	-0.0438	-0.0438	-0.0355	-0.0272	-0.0328	-0.0251	-0.0114	0.0021
	[0.0496]	[0.0496]	[0.0462]	[0.0430]	[0.0461]	[0.0424]	[0.0479]	[0.0437]
Share of unemployed	-0.0914	-0.0914	-0.0834	-0.0773	-0.0792	-0.0704	-0.0503	-0.0325
	[0.0620]	[0.0620]	[0.0561]	[0.0529]	[0.0575]	[0.0533]	[0.0614]	[0.0563]
Voting controls	May 1928	May 1928	May 1928	September 1930	May 1928	July 1932	May 1928	November 1932
Electoral district fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	662	662	662	662	662	662	662	662
R-squared	0.6632	0.6632	0.6494	0.6490	0.6638	0.6631	0.6965	0.6950
p-value for socioeconomic controls	0.000122	0.000122	2.49e-05	0.000131	0.000253	0.000380	0.000329	0.000727
p-value for baseline controls	0.00371	0.00371	0.00246	0.00240	0.0117	0.00456	0.00582	0.00228
p-value for other controls	0.613	0.613	0.801	0.739	0.846	0.778	0.893	0.830
p-value for voting controls	0.188	0.188	0.146	0.0359	0.241	0.197	0.106	0.0766

Note. Standard errors are clustered by electoral district. Baseline control include population, share of Jews, share of working in agriculture or manufacture, distance from the center of Electoral district, and share of employed in domestic and social service.

Table 2. Radio and vote share of NSDAP. Lagged vote shares included as controls.

	Change in NSDAP Vote Share							
Elections	September 1930		July 1932		November 1932		March 1933	
Radio signal strength	-0.2103		0.0059		-0.1039*		0.1924**	
	[0.1581]		[0.1865]		[0.0540]		[0.0740]	
Free-space signal strength	-0.0008		-0.0008		0.0006**		0.0002	
	[0.0010]		[0.0011]		[0.0003]		[0.0004]	
Radio signal strength, lagged		-0.2218		0.0075		-0.0728		0.2529***
		[0.1610]		[0.1777]		[0.0516]		[0.0793]
Free-space signal strength, lagged		-0.0008		-0.0004		0.0004		-0.0003
		[0.0010]		[0.0013]		[0.0003]		[0.0004]
Share of Jews	-0.0010	-0.0009	0.0015	0.0011	-0.0014	-0.0013	0.0013	0.0017
	[0.0044]	[0.0044]	[0.0032]	[0.0033]	[0.0014]	[0.0014]	[0.0028]	[0.0029]
Share of working in agriculture	0.3397	0.3400	0.1937	0.2025	0.0475	0.0473	-0.1588	-0.1680
	[0.2327]	[0.2326]	[0.2831]	[0.2845]	[0.1151]	[0.1158]	[0.1656]	[0.1692]
Share of working in manufacture	-0.1437***	-0.1428***	0.1562*	0.1539*	-0.0267	-0.0273	0.1272**	0.1303**
	[0.0505]	[0.0504]	[0.0869]	[0.0874]	[0.0217]	[0.0218]	[0.0545]	[0.0550]
Distance from the center of province								
Share of protestants	0.1189	0.1184	-0.1381	-0.1373	0.0494*	0.0530*	-0.0741	-0.0690
	[0.1073]	[0.1071]	[0.1610]	[0.1639]	[0.0284]	[0.0285]	[0.0459]	[0.0462]
Share of unemployed	-0.0100	-0.0101	0.0095	0.0101	-0.0019	-0.0018	0.0001	-0.0000
	[0.0074]	[0.0074]	[0.0085]	[0.0088]	[0.0030]	[0.0030]	[0.0035]	[0.0033]
Share of blue-collar workers	0.1432***	0.1431***	0.2261***	0.2256***	-0.0400***	-0.0398***	-0.0356***	-0.0357***
	[0.0241]	[0.0241]	[0.0304]	[0.0304]	[0.0106]	[0.0106]	[0.0089]	[0.0091]
Share of white-collar workers	-0.2426	-0.2424	-0.2126	-0.2146	0.2455***	0.2472***	-0.3637***	-0.3601***
	[0.1525]	[0.1527]	[0.1400]	[0.1422]	[0.0698]	[0.0702]	[0.1145]	[0.1136]
Share of employed in domestic and personal service	-0.1254	-0.1253	-0.1796	-0.1774	0.1866***	0.1874***	-0.2581**	-0.2564**
	[0.1269]	[0.1270]	[0.1128]	[0.1128]	[0.0626]	[0.0629]	[0.1066]	[0.1073]
Electoral district fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	662	662	662	662	662	662	662	662
R-squared	0.6553	0.6556	0.7327	0.7320	0.5452	0.5434	0.7374	0.7373

Note. Standard errors are clustered by electoral district. Observations are weighted by population.

Table 3. Radio listenership and signal strength.

	Radio listenership					
Elections	July 1932		November 1932		March 1933	
Radio signal strength	0.1557**		0.1136		0.1498*	
	[0.0740]		[0.0735]		[0.0823]	
Free-space signal strength	0.0005		0.0006		0.0005	
	[0.0004]		[0.0004]		[0.0004]	
Radio signal strength, lagged		0.1279*		0.1555**		0.1136
		[0.0660]		[0.0739]		[0.0735]
Free-space signal strength, lagged		0.0008*		0.0005		0.0006
		[0.0004]		[0.0004]		[0.0004]
Share of Jews	0.0108***	0.0105***	0.0109***	0.0108***	0.0106***	0.0109***
	[0.0015]	[0.0016]	[0.0015]	[0.0015]	[0.0016]	[0.0015]
Share of working in agriculture	0.0883	0.0895	0.0844	0.0868	0.0768	0.0844
	[0.0745]	[0.0734]	[0.0723]	[0.0743]	[0.0722]	[0.0723]
Share of working in manufacture	0.0678**	0.0617**	0.0712**	0.0679**	0.0630**	0.0712**
	[0.0274]	[0.0268]	[0.0277]	[0.0274]	[0.0280]	[0.0277]
Distance from the center of Electoral district	-0.0542	-0.0558	-0.0593	-0.0534	-0.0506	-0.0593
	[0.0670]	[0.0671]	[0.0690]	[0.0669]	[0.0676]	[0.0690]
Share of protestants	-0.0042*	-0.0049**	-0.0042*	-0.0042*	-0.0039*	-0.0042*
	[0.0021]	[0.0020]	[0.0022]	[0.0021]	[0.0021]	[0.0022]
Share of unemployed	0.0107*	0.0097*	0.0105*	0.0107*	0.0113*	0.0105*
	[0.0060]	[0.0057]	[0.0059]	[0.0060]	[0.0059]	[0.0059]
Share of blue-collar workers	-0.1238***	-0.1208***	-0.1241***	-0.1239***	-0.1222***	-0.1241***
	[0.0392]	[0.0375]	[0.0391]	[0.0391]	[0.0392]	[0.0391]
Share of self-employed workers	-0.0841***	-0.0807***	-0.0839***	-0.0843***	-0.0847***	-0.0839***
	[0.0247]	[0.0240]	[0.0246]	[0.0247]	[0.0245]	[0.0246]
Share of employed in domestic	-0.1328***	0.1262	-0.1371***	0.1708***	-0.1414***	-0.1192**
and personal service	[0.0396]	[0.0800]	[0.0394]	[0.0361]	[0.0398]	[0.0483]
Voting controls from 1928	No	Yes	No	Yes	No	Yes
Electoral district fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	521	521	521	521	521	521
R-squared	0.6262	0.7283	0.6252	0.5502	0.6280	0.7315

Note. Standard errors are clustered by electoral district. Observations are weighted by population.

Table 4. Placebo specifications. Changes in Nazi vote share in 1928-1930 and 1924-1928.

	Change in Nazi vote share, 1928-1930				Change in Nazi vote share, 1924-1928				
Radio signal strength, 1930	-0.2103				-0.1042				
	[0.1581]				[0.1117]				
Free-space signal strength, 1930	-0.0008				0.0007				
	[0.0010]				[0.0013]				
Radio signal strength, July 1932		-0.1748				-0.1325			
		[0.1431]				[0.0990]			
Free-space signal strength, July 1932		-0.0013				0.0015			
		[0.0009]				[0.0010]			
Radio signal strength, November 1932			-0.1069				-0.1708		
			[0.1477]				[0.1058]		
Free-space signal strength, November 1932			-0.0013				0.0015		
			[0.0009]				[0.0010]		
Radio signal strength, 1933				-0.0735				-0.1428	
				[0.1293]				[0.1062]	
Free-space signal strength, 1933				-0.0014				0.0012	
				[0.0009]				[0.0009]	
Radio signal strength, 1928									-0.0982
									[0.1096]
Free-space signal strength, 1928									0.0007
									[0.0013]
Electoral district fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	662	662	662	662	661	661	661	661	661
R-squared	0.6553	0.6576	0.6560	0.6564	0.5695	0.5695	0.5738	0.5739	0.5716

Note. Standard errors are clustered by electoral district. Observations are weighted by population.

Table 5. Deportations and signal strength.

VARIABLES	Number of deported Jews (logged)					
	Only precincts with non-zero deportations included			Full sample		
Radio signal strength, 1933	7.7201			3.1102*		
	[5.6475]			[1.6955]		
Free-space signal strength, 1933	0.0565			0.0010		
	[0.0364]			[0.0064]		
Radio signal strength, November 1932		12.2587**			3.1694*	
		[5.3858]			[1.7974]	
Free-space signal strength, November 1932		0.0181			0.0033	
		[0.0299]			[0.0074]	
Radio signal strength, July 1932			16.3317***			3.7498*
			[5.7597]			[1.8695]
Free-space signal strength, July 1932			-0.0035			-0.0008
			[0.0311]			[0.0074]
Number of Jews (logged)	0.1240	0.1204	0.1052	0.0213*	0.0224*	0.0209
	[0.1143]	[0.1103]	[0.1112]	[0.0125]	[0.0126]	[0.0128]
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Electoral district fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	101	101	101	657	657	657
R-squared	0.7773	0.7527	0.7566	0.2477	0.2493	0.2500

Note. Standard errors are clustered by electoral district.