

Cross-border media and nationalism: Evidence from Serbian radio in Croatia ¹

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Abstract

How do nationalistic media affect animosity between ethnic groups? We consider one of Europe's deadliest conflicts since WWII: the Serbo-Croatian conflict. We show that, after a decade of peace, cross-border nationalistic Serbian radio triggers ethnic hatred towards Serbs in Croatia. Mostly attracted by non-political content, many Croats listen to Serbian public radio (intended for Serbs in Serbia) whenever signal is available. As a result, the vote for extreme nationalist parties is higher, and ethnically offensive graffiti are more common, in Croatian villages with Serbian radio reception. A laboratory experiment confirms that Serbian radio exposure causes anti-Serbian sentiment among Croats.

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1. Introduction

Which factors fuel animosity between ethnic groups? What stands in the way of a durable peace and cooperation between groups that were formerly at war? A substantial literature has considered the importance of differences in income and resources, political institutions, aid, and the history of relationships between ethnic groups, among other factors, as reviewed in Blattman and Miguel (2010) and Jackson and Morelli (2011).

In this paper, we consider the impact of an understudied factor: how the exposure to media intended to strengthen nationalistic identification of a particular ethnic group affects nationalistic feelings of a rival group. As radio and television waves travel across political and ethnic boundaries, ethnic groups often get exposed to nationalistic media of their rivals. Oftentimes, such exposure occurs across borders, when neighboring ethnic groups share a language, as is common for countries that formerly belonged to one larger entity, i.e., the U.S.S.R, Yugoslavia, or Sudan. Such exposure also often occurs within countries when rival ethnic and religious groups speak the same language. Examples range from Muslims and Hindus in India to Basques and Spanish in Spain.

The effect of exposure to nationalistic content of a rival's media is not a priori obvious. On the one hand, it may trigger ethnic animosity, increasing the polarization of political views (Glaeser and Sunstein 2008), and thus making future conflict more likely. An alternate possibility is that such exposure may instead reduce informational asymmetries between groups and alleviate ethnic tensions (Allport 1954). Finally, the cross-group impact of media may be negligible, if people mostly consume media that support their own views (Sunstein, 2001; Durante and Knight, 2012).

This paper examines the impact of cross-border media exposure on nationalistic behavior in the aftermath of one of Europe's deadliest conflicts since WWII, namely, the Serbo-Croatian conflict in the 1991-95 Yugoslavian wars. The region of Croatia near the Serbian-Croatian border was the site of a full-scale armed conflict between Serbs and Croats in 1991 and was under Serbian occupation till 1995. The military operations of the Serbian-Croatian conflict ended in 1995, and Slobodan Milošević—the former president of Serbia—was overthrown in 2000 and handed to the Hague International Criminal Tribunal. Still, in the following decade the public media in Serbia has continued to promote Serbian nationalism. In particular, public radio stations (i.e., radios of the *Radio-Television of Serbia* group, RTS, also known as Serbian Broadcasting Corporation) operate with the official mission to strengthen Serbian national identity (IREX 2010). This raises the question of the impact of the Serbian nationalistic radio on nationalistic sentiment in Croatia, which we address in this paper.

The Serb-Croat case is a nearly ideal setting to study cross-group effects of media. The signal of Serbian public radio intended for internal consumption inside Serbia reaches several, but not all, villages in this region of Croatia. As Serbs and Croats speak the same language, despite using different alphabets, Croats can fully understand the Serbian radio.¹ We are able to

¹ According to Greenberg (2004), the difference between Serbian and Croatian spoken language is similar in

narrow down the analysis of cross-group effects of media exposure to radio because it is the primary media source in this area.

We focus on the region in Croatia neighboring the border with Serbia. We use detailed village-level information on media reception, voting, and other nationalistic behavior to answer two key questions: Do Croats actually listen to Serbian radio when it is available? If so, does Serbian radio have any effect on nationalistic political views and attitudes towards Serbs?

Using a street survey of residents of Croatian villages located close to the Serbian border, we find that the answer to the first question is positive. In areas where Serbian radio signal is available for representative radio sets, 78% of respondents acknowledge that they listen to Serbian radio occasionally. The high percentage of listeners of Serbian radio among Croats stands in contrast with an extreme view of political polarization -- that consumers only listen to media outlets that conform to their political beliefs -- and is consistent with more moderate evidence of polarization in the US media (Gentzkow and Shapiro 2011). Both survey and anecdotal evidence suggests that, in addition to a desire for alternative information, Croats tune in to Serbian radio to listen to its non-political content, such as popular Serbian singers from the times of Socialist Yugoslavia whose music is restricted in public spaces in Croatia, and in doing so encounter also political content.² This is consistent with the social psychology literature suggesting that people choose media outlets broadcasting messages that disagree with their priors either because of strong interest in a particular sub-set of a broadcasted content (Iyengar, et al. 2008). It is also possible that Croatian listeners tune in to the Serbian radio to learn about rival's point of view to be able to defend better their own view point (Valentino et al. 2009).

Does Serbian radio trigger ethnic animosity and nationalistic behavior among Croats who get exposed to it? We estimate the effect of Serbian radio on the propensity to vote for extremist nationalistic parties as well as expressions of ethnic hatred, namely anti-Serbian graffiti. Our identification strategy relies on variation in the availability of Serbian radio among different villages in the border region.

We use two measures of availability of Serbian radio. As the first measure, we use hand-collected data on actual availability of Serbian radios in 139 villages in the region adjacent to Serbian border (our baseline sample), measured using an ordinary receiver. As the second measure, we compute signal strength of Serbian radios using information on Serbian transmitters and the topography of the region for all 417 villages in Croatia within 75 kilometers of the Croatian-Serbian border (our extended sample). The two measures, which are positively correlated, are complementary: the hand-collected measure captures fine variation in radio reception which the signal strength calculations do not, but is affected by unavoidable errors in hand measurement; the signal strength is available for a larger sample, but does not measure the impact of non-topographic obstacles such as forests.

magnitude to the difference between British and American English.

² A number of former Socialist Yugoslavian singers, popular among Croats, are banned from Croatia for political reasons.

In both samples, the availability of Serbian radio significantly increased the votes for extremist nationalist political parties during the Parliamentary election of 2007. The estimates imply that a substantial part of the vote for ultra-nationalist parties in the border region of Croatia is explained by the reception of Serbian radio. The exposure to Serbian radio also reduces the vote share for the moderate nationalistic party and, in some specifications, increases the vote share for the social-democratic party, suggesting an increased polarization of the electorate. To quantify the main effect, we combine election and street survey results to compute a persuasion rate, i.e., the fraction of Croats who changed their voting behavior in response to Serbian radio among those who were exposed (DellaVigna and Kaplan 2007; DellaVigna and Gentzkow 2010). The implied persuasion rate of 3% to 4% is on the lower end of the distribution of the estimates of persuasion rates of media on their intended recipients obtained by the literature on political effects of media.

As a measure of non-political expression of nationalistic sentiment, we consider the presence of graffiti offensive to Serbs in the open spaces in the village. We find that Serbian radio availability is associated with a significantly higher likelihood of having ethnically-offensive graffiti in the village center. Hence, the impact of radio exposure on nationalistic feelings extends beyond political choices.

As the measures of availability of Serbian radio may correlate with other determinants of nationalistic sentiment and generate spurious results, we document what determines the variation in radio availability. The hand-collected radio reception measure is orthogonal to a large set of all available observables. This result is consistent with the variation in reception being idiosyncratic. The signal strength measure, in contrast, is correlated with distance from the border and with the percentage of disabled after the war. We show, however, that adding extra geographic and demographic controls to the specification estimating the effect of signal strength leaves point estimates essentially unaffected. As the size and direction of a potential bias due to omitted confounds depends on their effect on dependent variable, we use an index of control variables to show that the observables are mostly negatively correlated (though insignificantly so) with nationalistic voting. In the spirit of the Altonji, Elder, and Taber (2005), we conclude that, to the extent that the unobservables are positively correlated with the observables, our estimates are likely to be biased towards zero, i.e., against finding the results.

In addition, as a quasi-placebo experiment, we examine the impact of radios that are not expected to affect nationalistic feelings. In particular, we show that cross-border exposure to Hungarian radio, which broadcasts in a language understood by very few Croats, does not have any impact. We also find no evidence that villages with exposure to popular Croatian radios vote more for nationalistic parties. Hence, the estimated effect of Serbian radio is unlikely to be due to omitted geographic features associated with better radio signal reception in general.

We also consider a number of robustness checks to address possible alternative explanations. The main results are robust to controlling for driving time and distance to the border, and war experience. The results are also unaffected by a correction for spatial

correlation, using alternative measures of nationalistic voting, or using a matching estimator instead of OLS. The effects are smaller but qualitatively consistent when controlling for free-space signal strength, which addresses the possibility that the location of Serbian radio transmitters was endogenous to spatial variation in Croatian nationalism. Finally, additional controls for the signal strength of major Croatian radios do not eliminate the impact of Serbian radio, suggesting that substitution away from Croatian radio is not the main channel of influence of Serbian radio.

We also consider the impact on election results in 2011 and 2003. The results for the 2011 elections are largely consistent with the 2007 results: exposure to Serbian radio is associated with an increase in voting for the extremely nationalistic party. In contrast to the results for 2007 and 2011, there is only limited evidence of an effect of Serbian radio exposure measured in 2009 on the election results in 2003. The data quality for 2003, however, is lower.

Overall, these results suggest that Serbian public radio hostile to Croats appears to have an important effect working across the border resulting in a substantial increase in extremist nationalistic sentiment among the Croatian population. We also conduct a laboratory experiment, which confirms that Serbian public radio has content offensive to Croats, as they express higher anti-Serbian sentiment after being exposed to this radio as opposed to other radio stations. The experimental results also suggest that it is the nationalistic content of Serbian radio that triggers ethnic animosity among Croats, since the exposure to non-nationalistic Serbian radio has a smaller effect on nationalistic sentiment in the laboratory.

This paper contributes to several literatures. First, it speaks to the literature on the effect of media on political behavior.³ Within this literature, our paper is related to work examining the effect of media on ethnic conflict, including Yanagizawa (2009) who investigates the effect of “hate speech” on casualties from the genocide in Rwanda in 1994 and Gentzkow and Shapiro (2004) who argue that media in Arabic countries reinforces anti-American sentiment in the population. In contrast to these papers, which largely focused on the effects of propaganda in fueling ethnic animosity on the intended on-target audiences, we identify what is likely to be an unintended media effect on an off-target audience as a catalyst of ethnic hatred.⁴ A complementary angle is taken by Paluck and Green (2009) who study the impact of an appeasing educational broadcast via radio in post-conflict Rwanda with a field experiment.⁵ Our paper also contributes to the broader literature on the determinants of conflict and ethnic hatred.⁶

³ Important contributions include, but not limited to Strömberg 2004; Gentzkow 2006; DellaVigna and Kaplan 2007; Gerber, Karlan, and Bergan 2009; Snyder and Strömberg 2010; Knight and Chiang 2011 for United States, and Lawson and McCann 2005; Olken 2009; Enikolopov, Petrova, and Zhuravskaya 2011 for other countries.

⁴ While we cannot completely rule out the possibility that the Serbian radios have the intent to trigger animosity among Croats, it is unlikely since the vast majority of listeners to these radios are Serbs in Serbia. If these radios were targeted at Croats, the transmitters would have been placed closer to the Croatian border to increase the penetration into the Croatian territory.

⁵ Our findings are also related to the papers on cross-border effects of the media, e.g., Hainmueller and Kern (2009), Bursztyn and Cantoni (2011), or Butler and De La O (2011).

⁶ See, e.g., Hess and Orphanides (1995), Glaeser (2005), Jackson and Morelli (2007), Chassang and Padró i Miquel (2010), Dube and Vargas (2011), Caselli et al. (2012), Dube and Naidu (2012), Jha (2013), Voigtländer and Voth (2012), Grosfeld et al. (2013).

This paper is the first one to consider cross-group media exposure. Our work is also related to the literature on attitudes in post-conflict societies (e.g., Acemoglu and Wolitsky 2012, Rohner et al. 2012, Bellows and Miguel 2009, Blattman 2009, and Voors et al. 2012).

The rest of the paper is organized as follows. Section 2 provides background information as well as a description of the data. Section 3 presents the empirical results of the survey, the laboratory experiment, and the village-level nationalistic choices. Section 4 presents a battery of robustness checks. Section 5 concludes.

2. Background and the data

2.1. Conflict. The Croatian-Serbian conflict (1991-1995) was one of several major open-armed conflicts in the former Socialist Yugoslavia, known as Yugoslavian wars. Croats are predominantly Catholic Christians, whereas Serbs are predominantly Orthodox Christians. Ethnic animosity between the two groups goes back at least to the beginning of the 20th century and had been escalating since the 1980s. The armed conflict started in 1991. The Croatian side aimed at establishing a sovereign state independent of Yugoslavia, while the Serbian minority, which quickly got military support from Serbia, opposed the secession and wanted Croatia to remain a part of Yugoslavia (with the center in Belgrade, Serbian capital city). Subsequently there was a series of deadly military operations, which included massacres of civilians and ethnic cleansing on both sides. The conflict ended in 1995 with Croatia achieving the goal of becoming an independent country within the borders that it claimed in 1991. Estimates of the number of victims for the Croatian-Serbian conflict alone amount to roughly 250,000 displaced civilians and 20,000 casualties (the vast majority of which were civilians).⁷ Some episodes of the Yugoslavian wars were formally characterized as genocide. To investigate and prosecute Yugoslavian war crimes, the UN established the International Criminal Tribunal.

The mass media played a crucial role in fueling ethnic animosity and escalating the conflict before and during disintegration of Socialist Yugoslavia. In particular, the RTS media group actively supported the Milošević regime, denied Serbian aggression, and selectively covered information on victims of war from the Serbian side.⁸

The border region of Croatia that we focus on is called *Eastern Slavonia, Baranja and Western Srijem* (it is indicated on the map on Figure 1a). This region was particularly affected by the war. It consists of areas occupied by Serbs during the war and adjacent communities.⁹ There are two counties in this region, which differ in political and war history (see the Online

⁷ "Presidents apologize over Croatian war". *BBC News Online*. BBC. September 10, 2003. <http://news.bbc.co.uk/2/hi/europe/3095774.stm>

⁸ See, for instance, Thompson (1994); Smajlović (1997), Skiljan (2000), Hockenos (2003), Kurspahić (2003), and MacDonald and Bruce (2002).

⁹ Our baseline sample consists of villages close to the Serbian-Croatian border. These villages had been particularly affected during the war, and most had been occupied. We tried to visit all such villages, excluding the cities of Vukovar and Osijek which are not comparable to the relatively small villages of the rural areas of the region. As Figure 1a shows, we missed a small number of villages in this region (the purple dots near the Serbian-Croatian border) largely because their administrative status had changed. We show below that the results are robust to the inclusion of these villages.

Appendix for details). In the empirical analysis, we always include county fixed effects to control for these differences.

2.2. Serbian radio in Croatia and measures of its availability. There are four major types of media today in the region of our study, close to the Serbo-Croatian border: Croatian television, Croatian print media, Croatian radio, and Serbian radio. Croatian television and print media, however, play smaller roles relative to the radio because of a low penetration of television sets and newspapers in the rural areas, which are our main focus of our study. Being relatively cheap and easily accessible, radio has been the most important source of information about politics since the times of Socialist Yugoslavia. A typical Croatian listens to radio for approximately 250 minutes a day (Peruško and Jurlin 2006). Most people in the region do not turn off the radio during the day, and many listen to it on the streets. Local radio stations dominate the radio market: three national public channels have a joint share of just 10% of radio audiences. Local radio stations are controlled by local governments who own 70% of the local media and also indirectly control the remaining stations (Peruško and Jurlin 2006).

The long diffusion of radio waves implies that the main alternative to Croatian radio for the majority of population in the border region is Serbian and Bosnian radio stations broadcasts from the other side of the border.

There are four Serbian public radio stations: RTS Radio 1 (news), RTS Radio 2 (art), RTS Radio 3 (intellectual programs), and Radio Belgrade 202 (popular music), in addition to numerous private stations. With the exception of one private station, Radio B92, founded in 1989 by the Soros foundation and USAID, all Serbian radio stations with some news and political content support the Serbian government, in part because of a centralized license allocation process. In particular, Serbian public radios aim at reinforcing the Serbian national identity, with 9% of coverage dedicated to neighboring countries including Croatia, focusing primarily on war and war crimes in these countries. Many observers point out that news broadcasts are biased in favor of Serbia, particularly, in the coverage of the conflict (IREX 2010, Nedeljkovic, Dubravka and Bacanovic 2007, pp. 214-219, Udovicic 2005, p. 21). In addition, some non-political broadcasts, such as so-called *turbo-folk* music, invented during Milosevic rule, are considered offensive by many Croats and Bosnians as it glorifies Serbs during the war (Kronja 2004).

We construct two measures of the reception of Serbian radio in a village. The first measure, which is available for the baseline sample of 139 villages, is based on hand-collected data obtained while travelling throughout the region in June 2009 and June 2010. In the center of each village (near the church or the war monument), we used a portable radio receiver to test whether the RTS Serbian stations were available. We count a radio station as available if its quality was good enough to listen to it based on subjective assessment of two people. The measure of availability is an indicator for whether at least one RTS radio station is available.

The second measure of reception of Serbian radio is the signal strength constructed using

the location and power of RTS transmitters.¹⁰ This measure is available for the extended sample of all 417 villages located within 75 kilometers from the Croatian-Serbian border.¹¹

Similarly to Olken (2009) and Enikolopov et al. (2011), we apply the Irregular Terrain Model (Hufford 2002) to calculate the signal loss caused by physical distance and topography between transmitting and receiving locations. Figure 1a portrays both samples on the map. Figure 1b displays the geographic variation in both measures for the baseline sample of villages. The signal strength and the manually-measured reception line up, though the overlap is far from complete. Online Appendix Figure 1a presents a map of signal strength in the extended sample. On average, the availability declines with the distance from the Serbian border, though in a jagged way.¹²

2.3. Croatian political landscape and the measures of nationalistic voting. The Croatian Parliament (*Sabor*) has one chamber with members elected every four years. There are 10 multi-member electoral districts in mainland Croatia and an additional electoral district giving representation to Croatians living abroad. The electoral rule in each district is proportional representation with closed party lists and the minimum of 5% of total vote to get representation, with 8 seats reserved for ethnic minorities. Our main focus is on the election that took place in November 2007. This was the third post-war parliamentary election and the first one taking place in a relatively stable economic and political environment. In total, 145 representatives were elected from 11 districts representing 8 parties (and party alliances). We also report results using the 2003 and 2011 elections. However, the 2007 elections provide a cleaner measure of nationalistic sentiments on the local population. In 2003, a large number of refugees from the region still had not returned to their homes. The 2011 election was the last one before Croatia's accession to the European Union, and nationalistic issues were deliberately kept out of the campaign in fear of a EU negative reaction.¹³

The two main political parties in Croatia (HDZ and SDP) have very different views on the issue of nationalism. The political party that got the largest share of the total vote in 2007 (36.6%) and most seats (66) is the Croatian Democratic Union (HDZ, *Hrvatska demokratska zajednica*). It is the main center-right political party with a moderate nationalist pro-Croatian

¹⁰ The location data came from the RTS website and the technical characteristics of the transmitters from www.fmscan.org.

¹¹ Villages located more than 75 kilometers from the border have very low signal strength; the reception of the Serbian radio is highly unlikely in these villages and, therefore, there is no meaningful variation among them. In the Online Appendix, we show that the results for the extended sample are robust to using a more restrictive sample of villages within 50 kilometers from the border.

¹² The two measures have advantages and disadvantages. The ITM model does not capture non-topographic obstacles, such as forest on the line of sight between the transmitter and the receiver. A manually collected measure takes into account all such obstacles, but depends on the characteristics of the receiver actually used, and is unavailable for a larger sample.

¹³ An important caveat is that both radio reception variables were measured in 2009 and 2010, whereas the election data are from 2007 (or 2003, or 2011). Our analysis is valid under the assumption that the radio reception did not change much in this period. We believe that this assumption is reasonable for 2007-2011. During the war some of Serbian or Croatian transmitters, built in the times of socialist Yugoslavia, were damaged, but the vast majority was repaired by the beginning of 2000s and was left largely unchanged since. In particular, transmitters, both Serbian and Croatian, remained the same in 2007-2011.

ideology. The party entered parliament in 1990 and positioned itself as anti-Communist and anti-Serbian-nationalism of Slobodan Milošević. The second largest political party in Croatia (with 56 seats and 31.2% of total vote in 2007) is the Social Democratic Party of Croatia (SDP, *Socijaldemokratska partija Hrvatske*). This center-left opposition party is usually considered as the heir of the Communist Party of Croatia. Among all major political parties, SDP has the most neutral position vis-à-vis Serbia, and it is the most popular party among the Serbian minority in Croatia.

The remaining 23 seats of the 2007 Sabor are shared among 6 smaller political parties. Our main focus is on voting for the ultra-nationalist political party, the Croatian Party of Rights (HSP, *Hrvatska stranka prava*) as a measure of nationalistic sentiment. This party is fairly popular in the border region with Serbia. It got 8% of the total vote in the northern part of the border region and 5.2% in the southern part; as a result, it gained one seat in the Croatian parliament of 2007. This party is the main extreme nationalist party in Croatia (Laqueur 1997, Hislope 1996) with the ideology of supporting "the Great Croatia."¹⁴ After the war, two wings of HSP seceded because of internal party conflicts and formed independent political parties (HP-HPP and HCSP). These parties share the same ultra-nationalist ideology and find some (insignificant) support in the border region.¹⁵

We characterize the main Croatian political parties according to the strength of their nationalistic rhetoric in 2007-2010. We consider HSP together with its former factions (HP-HPP and HCSP) as extreme nationalistic; HDZ as moderately nationalistic; and SDP as neutral.¹⁶

For each election, we obtained the election results at the level of polling stations from the Central Election Commission of Croatia. We matched and aggregated these data to the village level. The vast majority of villages include up to 4 polling stations. Our main electoral outcomes are vote shares for the extreme nationalist parties (HSP, HP-HPP and HCSP), for the moderate nationalist parties (HDZ), and for the main party without nationalistic ideology (SDP). Turnout is measured as the total votes cast divided by the number of eligible voters.

2.4. Additional data sources. To supplement data on voting outcomes, we collected information about the presence of ethnically-offensive graffiti on public buildings in the centers of all villages in the baseline sample. We classified graffiti as being ethnically offensive

¹⁴“*Velika Hrvatska*,” or Great Croatia, is the ideology of modern Croatian ultra-nationalists, according to which Croatia should be only for Croats and its territory should unite all the lands that belonged to Croatia before Ottoman invasions of the 15th, 16th and 17th century. These territories include parts of modern Serbia, Bosnia and Herzegovina, and Montenegro (Vienna Profit, August 3 1992 in FBIS Daily Report (Eastern Europe), August 3, 1992. pp, 26-7). In the 1990s, HSP created its own paramilitary unit that aimed to secure Croatian independence from Yugoslavia (UNCE 1994) and used the symbols resembling those of the fascist state during WWII.

¹⁵ Despite our focus is on relatively small parties, one should not underestimate their potential impact on policy. E.g., Folke (2011) shows that marginal political representation of small parties had a large effect on environmental and immigration policies of Swedish municipalities. Also, small extreme nationalistic parties might unexpectedly gain large popularity in times of economic crisis with potentially disastrous consequences (i.e. the case of Nazi Party in Weimar Republic).

¹⁶ The other political parties that got representation are as follows: two regionally-oriented parties (Istrian Democratic Assembly, IDS, and Croatian Democratic Alliance of Slavonija and Baranja, HDSSB); a party with liberal ideology (HNS-LD); a single-issue pensioners party (HSU) and an agrarian socialist party (HSS - HSLs).

according to the methodology used by local NGO Globalpact in Vukovar in 2008. Representative examples of these graffiti are slogans as “*Ubi Srbina*” (“Kill a Serb”) or “*Srbe na vrbe*” (“Hang a Serb on a willow”) (Online Appendix Figure 2 presents an illustration). We generate an indicator variable for villages with graffiti which are “somewhat” or “strongly offensive” towards Serbs. Of the 139 villages we visited, 36 had ethnically-offensive graffiti.

In the regression analysis, we use a number of control variables. Demographic controls come from the Croatian Census of 2001. We use the following village-level variables: logarithm of population, share of males, fractions of people between 21 and 40, between 41 and 60, and over 60 years of age. We also control for labor force participation, share of population disabled after the War of independence, the shares of Croats, and the share of people with higher education. These controls also come from the Census, but are available at the level of municipality (*općina*), which typically includes several villages.

We collected additional control variables during our visits to the villages in the baseline sample: (i) the language in which the street names are written – indicators for Cyrillic script and for Hungarian language and (ii) an indicator for signs that advertised Serbian beer outside village bars; (iii) an indicator for monuments in honor of Croats killed during the Serbo-Croatian war; (iv) an indicator for whether the village played an important role during the war, as coded by a former military official in charge of defending this region; (v) an indicator of whether there is a large forest near the village from the Serbian side as forests hamper the radio signals. We also control for geographic distance as well as time and distance of travel to Serbia. The sources for these variables are *Google Earth* and the *Geocode Stata* module. Finally, we control for county fixed effects. The baseline sample consists of two counties: *Vukovar-Sirmium* and *Osijek-Baranja*; the extended sample includes three additional counties: *Slavonski Brod*, *Virovitica-Podravina*, and *Požega-Slavonia*. Summary statistics for all variables used in the regression analysis are presented in Online Appendix Table 1.

3. Main Results

3.1. Do Croats listen to Serbian radio? The measures of radio availability provide us with variation in whether Croatian villagers are able to listen to Serbian radio. In order to study the impact of exposure to this radio, one needs to understand if the villagers where Serbian radio is available actually listen to the broadcast coming from across the border.

To answer this question, in December 2010 and January 2011 we conducted a face-to-face survey of 70 individuals in 9 villages in the baseline sample: 4 villages without Serbian radio access (according to our measures), and 5 villages with access to at least one Serbian radio. (Online Appendix Figure 1b shows that the 9 villages are contiguous.) We asked people on the central street of each village whether they could answer a few questions. The response rate was about 50%. The questionnaire and a more detailed description of the survey are given in the Online Appendix.

First, we asked respondents whether Serbian radio is available in their village. As Figure

2a shows, 87 percent of the respondents in villages that we categorize as having at least one Serbian radio respond affirmatively to the question, compared to 56 percent in villages that we categorize as having no reception.¹⁷ We also asked respondents how often they listen to Serbian radio. As Figure 2b shows, in the villages with at least one Serbian radio station (according to our hand-collected measure), only 26 percent of the respondents state that they never listen to Serbian radio; whereas 32 percent state that they listen to Serbian radio at least once a week. In contrast, in the villages that we code as not having Serbian radio, 62 percent state that they never listen to Serbian radio; and only 16 percent state that they do so at least once per week. A linear probability model indicates a statistically significant difference between the two types of villages in the likelihood of listening to Serbian radios at least some times according to survey responses (Table 1).

Figure 2c indicates a similar pattern using the signal strength variable. The dots representing the villages in the survey indicate a positive relationship between signal strength and the measure of listening to Serbian radio; the pattern is similar for the question on availability of Serbian radio (Online Appendix Figure 3a). Columns 3 and 4 of Table 1 indicate that the relationship is statistically significant. We also asked whether respondents thought that other villagers listen to Serbian radio and got a similar pattern (Online Appendix Figure 3b).

The survey also provides information on the availability of Bosnian and Croatian radios allowing estimation of the patterns of substitution between radios. We find no significant differences across villages with and without Serbian radio in either the self-reported reception or the pattern of listening to Bosnian radio (Online Appendix Figures 4a and 4b). In contrast, we find some substitution away from Croatian radio when Serbian radio is available. Namely, while there is no difference across the two types of villages in the share reporting reception of Croatian radio, as all respondents report reception (Online Appendix Figure 4c), in villages with Serbian radio, respondents are less likely to listen to Croatian radio frequently (Online Appendix Table 2 and Online Appendix Figure 4d and 4e). There is no variation in the likelihood of listening to the Croatian radio at least sometimes as nearly all respondents report doing so.

Overall, the survey findings indicate that a significant share of respondents listen to Serbian radio. In addition, the survey provides a reality check on our hand-collected radio availability measure and shows that our measure correlates well with survey measures of both the availability and listenership of Serbian radios.¹⁸

The survey also provides some suggestive evidence on why Croats listen to Serbian

¹⁷ There are several potential explanations for the stated availability of Serbia radio in villages that we classify as not having such availability. First, our measure is crude and radio receivers differ in their power. We used a portable receiver, whereas better quality receivers or amplifiers are fairly common. Second, people can listen in cars or when visiting their friends or relatives in neighboring villages. Third, there is weather-related variation in the quality of signal. Fourth, we measure the presence of the signal in the center of the village, but there might be within village variation. Finally, there are different Serbian radios, broadcasted from different places, and the absence of the availability of RTS radios does not mean there is no Serbian radio in the village. Unfortunately, people do not remember the names of radios, so we could not ask specifically about RTS radio.

¹⁸ This survey evidence could only be considered suggestive, as the sample of villages is very small and cannot be representative.

radio. Specifically, people who reported listening to Serbian radio were more likely to express preferences for Serbian music stating that they support the concerts of Serbian artists in Slavonia and are familiar with new songs of the Serbian artists etc. (see Online Appendix Table 3). While this is a simple correlation, it is interesting that we find no such correlation between reported listening to Croatian or Bosnian radio and preference for Serbian music. This evidence thus suggests that a preference for the entertainment content embedded in the RTS programming may be the main reason for the high exposure to Serbian radio, despite its nationalistic content.

3.2. Inflammatory radio content: experimental results. To provide evidence that certain types of Serbian radio have inflammatory content for Croats, we designed a laboratory experiment in which we exposed Croatian students from the region to different remixes of news and music from radio programs typically broadcast in the region.¹⁹

We randomized the students into three groups. Each group listened to a short radio remix consisting of three recordings of news broadcasts separated by two songs. The first two news broadcasts were common to all three groups and drawn from a Croatian radio station. In contrast, the two songs and the third news broadcast differed between group assignments: The first group listened to fragments from Croatian radio only and two popular Croatian songs. The second group listened to a fragment from the independent Serbian radio B92 and two popular Serbian songs. The third group listened to a fragment from the Serbian Public RTS radio (substantially more nationalistic than B92) and another two popular Serbian songs.²⁰ None of the news broadcasts mention the Serbo-Croatian conflict. More details about the experiment are available in the Online Appendix.

After the exposure to the radio broadcast, we asked the subjects a number of questions on attitudes toward different ethnic groups: Serbs, Bosnians, Hungarians, Rusini. Figure 3 displays the effect on a standardized measure, which aggregates the different attitudinal responses, with the disaggregated evidence presented in Online Appendix Figures 5a-e. The exposure to Serbian radio had a dramatic effect of inducing more negative attitudes towards Serbs. This effect is more pronounced for the exposure to the RTS Serbian public radio, which is the focus of our study, compared to the exposure to the less-nationalistic B92 Serbian private radio. There is no effect of either treatment on attitudes towards other ethnic groups, as expected.

The experimental findings suggest that even a short exposure to the type of content featured in the Serbian RTS radio (such as the song devoted to a Serbian alleged war criminal) affects attitudes towards Serbs in the direction of increased anti-Serbian sentiment. As subjects treated with Serbian public radio, openly hostile to Croatia, were substantially more affected

¹⁹ The experiment was held in the university of Vukovar, the main city in the region occupied by Serbs during the war.

²⁰ The songs were chosen to be representative of those typically played on Croatian radio, B92 radio, and RTS radio, respectively. The songs played in the two Serbian radio treatments are modern, but have direct references to Serbian national folklore, easily identifiable by Croats. In addition, one of the songs in the RTS treatment has a direct reference to the Serbo-Croatian conflict, as it is devoted to a former Serbian paramilitary commander accused of war crimes in Croatia.

compared to those treated with B92 Serbian radio, neutral towards Croats, the likely channel of the effect of Serbian radio exposure is through reminding Croats about current Serbian nationalism and anti-Croatian rhetoric rather than reminding just about the proximity to their former war enemy.

3.3. Determinants of radio availability. Turning to the analysis of the village-level data on Serbian radio reception and nationalism, we first document how the measures of availability of Serbian radio correlate with control variables, which may also be related to nationalistic sentiment.

In Panel A of Table 2, we estimate the OLS regression

$$Availability_of_RTS_radio_i = \beta_0 + \beta_1 \mathbf{X}_i + \phi_r + \varepsilon_i \quad (1)$$

where *Availability_of_RTS_radio_i* is a measure of availability of Serbian radio stations, \mathbf{X}_i is a vector of socioeconomic and demographic controls, and ϕ_r are county fixed effects. We first examine the predictability of hand-collected availability of Serbia radio. Column 1 shows that out of 15 non-geographic controls, only education has a statistically significant effect on the measured reception of Serbian radio in the villages in the baseline sample. Jointly, the non-geographic controls are not statistically significant predictors of Serbian radio availability (F-statistic of 0.99). We obtain similar results in Column 2 where we also control for signal strength, a strong predictor of radio signal. The joint lack of significance of the non-geographic controls is consistent with the availability of Serbian radio being idiosyncratic.

Columns 3 and 4 in Panel A of Table 2 focus on the predictors of the signal strength. The signal strength of Serbian radio is related significantly to several control variables, including the distance to Serbia, population, and the number of individuals disabled in the war of independence. Unlike in the case of measured availability, the non-geographic controls significantly predict radio availability measured by signal strength (F=3.1 and F=5.6). We address the identification concerns associated with such correlations below.

3.4. The effect of Serbian radio on Croatian nationalism. We test whether Serbian radio affects expressions of nationalistic feelings by Croats, such as voting behavior, and in particular, voting for Croatian extreme nationalist parties (HSP and its former factions, HCSP and HP-HPP) and ethnically-offensive graffiti. We estimate the OLS regression:

$$dep_var_i = \beta_0 + \beta_1 \cdot Availability_of_RTS_radio_i + \beta_2 \mathbf{X}_i + \phi_r + \varepsilon_i \quad (2)$$

in which *dep_var_i* denotes the a particular measure of nationalistic behavior in village *i*, *Availability_of_RTS_radio_i* is the measure of availability of Serbian radio stations, i.e., either an indicator variable for the measured availability or signal strength, \mathbf{X}_i is a vector of socioeconomic and demographic controls, and ϕ_r are county fixed effects. We weight the observations by the number of registered voters in 2007 and cluster the standard errors at the municipality (*općina*) level.

Table 3 presents the results of estimation of equation (2) for the vote share of extreme nationalistic parties in the baseline sample with only county fixed effects as controls (Column

1),²¹ with geographic and Census demographic controls (Column 2), and with all controls (Column 3). In the specification with most controls (Column 3), the availability of Serbian radio increases the vote share for the extreme nationalist parties by 2.6 percentage points relative to a baseline vote share of 7 percentage points, a statistically and economically significant effect. Online Appendix Table 4 reports the coefficient on all the control variables for this and other specifications.

A key concern is that the availability of Serbian radio could proxy for (unobservable) confounding variables that are positively correlated with nationalistic sentiment and hence bias upward the correlation between radio availability and nationalistic vote share. Above, we have shown that the observables are not significant determinants of the radio availability variable (Panel A of Table 2). A complementary test in the spirit of Altonji, Elder, and Taber (2005) is to examine how the introduction of control variables affects the results. If there is an upward bias in the estimates due to an omitted variable, adding controls should lower the point estimate, since they reduce the impact of the bias on the estimates. When we apply this test, we find no evidence that a bias drives the results upward. The point estimate of the effect of radio remains essentially identical with the addition of controls. While it is possible that our control variables are not positively correlated with the unobservables which bias the results, the controls include plausible correlates of nationalism (such as an indicator for importance during the war) and do a good job of predicting the nationalistic vote share, with an R-squared of 0.60 (Column 3).

One may worry that the estimated effect of exposure to Serbian radio reflects the impact of an outlier village, especially given the small sample of 139 villages in the baseline sample, of which 16 villages are identified as having reception of Serbian radios. To address this concern, Figure 4a provides a comparison of the c.d.f. of the vote share for the extreme nationalistic party in the villages with and without reception of Serbian radio, after taking control variables into account. (We regress the vote share on all the control variables in Column 3 except the radio reception, and plot the residuals evaluated at the mean; a similar plot, but without taking controls into account, is presented in Online Appendix Figure 6a). The vote share for the villages with Serbian radio nearly first order stochastically dominates the vote share for villages with no Serbian radio. A Kolmogorov-Smirnov test rejects the hypothesis of the equality of distributions with controls with a p-value of 0.006. Figure 4b provides evidence on the map of a positive correlation between the availability of Serbian radio and the residual vote share for the extreme nationalist parties (in deciles) after accounting for controls. Altogether, Figures 4a-4b show that the results are not due to a single outlier but rather to a pronounced pattern.

Returning to Table 3, the next specification (Column 4) decomposes the effect of availability of one Serbian radio versus multiple Serbian radios. In the 9 villages where multiple (RTS) Serbian radios are available, the audience is more likely to listen to Serbian content (intentionally or accidentally) and the reception of the Serbian channels is likely to be better. Indeed, these villages are associated with an (insignificantly) larger impact on nationalistic

²¹ There are two counties in our baseline sample, and five counties in our extended sample.

voting than the villages with one radio.

The estimates so far have made use of the hand-recorded measure of Serbian radio availability. In Columns 5-7 we present the parallel specifications using signal strength. In the most controlled specification, we again find a significant effect of signal strength on the nationalist vote share. Again, the addition of controls has a limited effect on the point estimates. In Figure 5 we plot for each village the residual signal strength and the residual vote share, after taking controls into account, and find a monotonic pattern.

One may argue that, while not jointly significant, the control variables associated with nationalism positively co-vary with radio availability. Panel B of Table 2 presents a test inspired by Altonji, Elder, and Taber (2005). We regress our outcome variable – nationalistic vote share – on an index of observables predicting the availability of RTS radio, i.e., fitted value from specification (1). This univariate regression allows for a higher-power test of how the observables that are correlated with radio availability are correlated with the outcome of interest. As reported in the Panel B of Table 2, we find no statistical evidence of a positive correlation, which could lead to an upward bias in the main specification (to the extent that the observables are positively correlated with the unobservable confounds). In Online Appendix Table 5, we implement the Altonji-Elder-Taber test separately by three groups of controls: geographic, census, and additional controls. Again, we find no evidence of a significant positive correlation. There is some evidence of a negative correlation between indices for some groups of controls and the nationalistic vote share. The fact that none of the three indices has positive correlation with nationalism irrespective of the Serbian radio measure used bolsters the view that the main estimates are unlikely to be biased upward.

Table 4 displays the results for other political outcomes, reproducing the baseline estimates from columns 3 and 7 of Table 3 in the first two columns, with the corresponding graphical evidence in Online Appendix Figures 6b-6d. The availability of Serbian radio has a negative effect on the vote share for the moderate nationalistic parties (Columns 3 and 4); the effect is especially pronounced in the specification with signal strength. There is some evidence that the exposure to Serbian radio increased the vote share for the Social Democratic party (Columns 5 and 6). An interpretation of this result is that exposure to Serbian radio made Croatian voters more nationalistic at the margin, shifting some voters from the moderate nationalist party to the extreme nationalist parties, while polarizing the electorate, which leads to higher vote share for the Social Democratic party. We find no evidence of an effect on turnout (Columns 7 and 8), though these results are more tentative, as the measure of listed voters is noisy.

So far, we presented evidence only on political outcomes. Anti-Serbian feelings among Croats can be expressed in various ways other than voting for extreme-nationalistic parties. As an alternative measure of nationalism, we use the presence of graffiti ethnically disparaging of Serbs in public spaces in the village (e.g. Online Appendix Figure 2). Using a probit specification with equal weighting (Table 5 and Online Appendix Figure 6e), we find that in

villages with Serbian radio the probability of ethnically offensive graffiti in the streets is 35 to 40 percentage points larger, that is, about double as compared to the villages with no Serbian radio, a statistically significant difference. The addition of controls has a small impact on the estimates. We find similar results using the continuous measure of signal strength, and the results are similar if we use a linear probability model (Online Appendix Table 6). These results provide evidence that Serbian public radio increases the expressions of Croatian nationalism beyond the voting booths.

To interpret the magnitudes of the impact of media availability on voting for extreme nationalist parties, we evaluate the results in terms of persuasion rate (DellaVigna and Kaplan, 2007). The persuasion rate is the fraction of the audience of a media outlet who are convinced to change their behavior (in this case, their vote) as a result of being exposed to this media outlet.

To compute the persuasion rates, one needs an estimate of the share of individuals listening to the media in question (Serbian radio) in the treatment group (villages with Serbian radio) and in the control groups (villages without Serbian radio). As not all residents in a village with reception of Serbian radio listen to it and some residents in villages with no reception of Serbian radio (according to our measure) do listen to it, we use survey responses to estimate the “first stage.” The estimates in Table 1 imply that the exposure to Serbian radio content is 31 percentage points higher in the villages with at least one Serbian radio available (Column 2 of Table 1). In addition, a unit increase in the signal strength of Serbian radio is associated with a 51-percentage point increase in exposure (Column 4 of Table 1).

To compute a persuasion rate based on the dichotomous measure of availability of Serbian radio, we use the following formula from DellaVigna and Kaplan (2007):

$$f = \frac{1}{1-v_0 t_0} \left(t \frac{dv}{de} + v \frac{dt}{de} \right) f = \frac{v_T - v_C}{e_T - e_C} \frac{t_T}{1 - v_C}. \quad v_T \text{ and } v_C \text{ are the votes for ultra-nationalists in}$$

villages with and without Serbian radio, respectively, e_T and e_C are the exposures to Serbian radio in villages with and without Serbian radio, respectively, and t_T is the turnout in villages with Serbian radio. Turnout is not affected by Serbian radio and is equal to $t_T = t = 56.2\%$. The difference in exposure is estimated from the survey data and equals to $\hat{e}_T - \hat{e}_C = 0.313$ (Column 2 of Table 1). The impact on voting equals $\hat{v}_T - \hat{v}_C = 0.0226$ (Column 3 of Table 3) and the predicted share of vote for ultra-nationalists in the absence of Serbian radio is $\hat{v}_C = 0.057$. Thus, the persuasion rate is $f = (0.0226 * 0.562) / (0.313 * 0.943) = 4.3\%$.²²

Alternatively, we can compute the persuasion rate based on the continuous measure of signal strength using the formula from Enikolopov et al. (2011):

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

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

Here $v_0 t_0$ is the number of people who would vote for ultra-nationalists in the absence of

²² Note that because the change in exposure is estimated based on data from a non-representative survey, some bias is possible, so these results should be interpreted with caution.

Serbian radio; v and t are the vote share of ultra-nationalists and the voter turnout in places with e exposure to the Serbian public radio; $\frac{dv}{da}$ is the effect of da change in the signal strength of Serbian radio on the vote share; $\frac{de}{da}$ is the effect of a da change in the signal strength on the exposure; and $\frac{dt}{da}$ is the effect of de change in exposure on turnout. Our results with signal strength yield that $v_0 t_0$ equals 4.3 percent. This implies that 95.7 percent of Croats could, in principle, be convinced by the radio's message. From column 7 of Table 3, we get that $\frac{dv}{da}$ is equal to 2.404. The estimated effect of signal strength on the exposure $\frac{de}{da}$ is 51.3 (Column 4 of Table 1). As there is no effect on turnout, t does not depend on e and hence the second term in parentheses in equation (3) is 0. The implied persuasion rate is $f = 0.957 * 0.562 * (2.404 / 51.3) = 2.7\%$. These results are slightly smaller than the results obtained using a binary measure of radio availability above and are on the lower end of estimates in the literature of persuasion effects (DellaVigna and Gentzkow 2010).

4. Robustness.

Table 6 documents the results of various robustness checks, both for the manual measure of reception and for the signal strength measure.

First, we show that the results are unlikely due to the fact that towns with overall better radio reception may have unobservable features that are associated with nationalism. We examine the impact of reception of Hungarian radio on the nationalistic vote share. Given the lack of hostilities with Hungary and the fact that very few Croats speak or understand Hungarian, we expect no casual impact on nationalism. Indeed, we find no impact of this radio, and controlling for their availability does not affect the main estimates.

We also consider the impact of the signal strength of two major Croatian radios, the Radio HRT group and the Croatian Catholic Radio. One may worry that villages with reception of Serbian radio differ also in reception of Croatian radios (despite survey evidence suggesting that all villages have reception of Croatian radio). We find that controlling for the signal strength of these radios has no impact on the estimated effect of Serbian radio.²³

We then consider the impact of spatial correlation on our estimates. The level of clustering in our baseline estimation allows for arbitrary correlation of error terms among villages in the same municipality, but not across these geographical units. In order to account for spatial correlation, in Columns (5) and (6) we present the main results with standard errors corrected with the Conley (1999) procedure.²⁴ The corrected standard errors are if anything slightly lower once adjusted for spatial correlation and, thus, our results are robust.

We can also decompose the radio reception measure into the part that is driven by signal decay due to distance from the transmitter and the part that is driven by topography. After controlling for free-space signal strength (i.e., the signal strength that would have been obtained

²³ We find some evidence that stronger signal strength for the HR radio lowers the nationalistic vote share, with no such effect for the Catholic Croatian radio.

²⁴ The original method in Conley (1999) was extended to allow for weighting.

if there was a direct line of sight between the transmitter and the receiver), the manually-measured radio availability is no more significant (Column 7), but the signal strength remains significant (Column 8), though less precisely estimated.

In Online Appendix Table 7, we present an additional series of robustness checks. The results are essentially identical if we: (i) consider only the vote for the main nationalistic party HSP (without vote for HP-HPP and HCSP) as dependent variable (Columns 1 and 2); (ii) control for the intensity of past conflict by introducing a control for the location of the Serbian *Krajina* (Columns 3 and 4); (iii) control for the distance to the transmitters and for elevation (Columns 5 and 6); (iv) control for the vulnerability to potential Serbian attacks using driving time to Serbia and the number of conflict events within 3 km of each village according to *Armed Conflict Location and Event Dataset* (Columns 7 and 8); (v) estimate the results with a nearest-neighbor matching estimator, where we compute the average treatment on the treated by finding the 5 control villages which are the closest to each of the treated villages (that is, each village with radio reception) (Column 9); (vi) include all villages within a 35 km. range from the border (Column 10).

The analysis so far focused on the sub-sample of villages that we visited (baseline sample). We also analyze the extended sample of 417 villages within 75 kilometers of the Croatian-Serbian border. In this larger sample, we do not have a direct measure of radio availability and hence focus on the specification with signal strength. The results are largely robust to extending the sample as reported in Table 7. The signal strength of Serbian radio is associated with significantly higher vote share for the extreme nationalist parties (Column 2), a decrease in the vote share for moderate nationalist parties once controls are included (Column 4), an increase of the vote share for the social-democratic party (Column 6), and a decrease in turnout (Column 8). Regarding the main result on the vote share of extreme nationalist parties (Column 2), the estimate is somewhat smaller than the comparable estimate for the baseline sample (column 6 in Table 3), though not significantly so. Online Appendix Table 8 shows that the results are very similar if we restrict the sample to villages within 50 kilometers of the border.

To understand whether the results are consistent across elections, we examine the impact of exposure to Serbian radio (as measured in 2009 and 2010) on the 2011 and 2003 Parliamentary elections (Table 8). The results for the 2011 elections are consistent with the 2007 results: exposure to Serbian radio is associated with an increase in voting for the extremely nationalistic party, a results which is statistically significant in the baseline sample using both radio measures. The pattern of results on voting for other parties is similar too (Online Appendix Tables 9 and 10).

In contrast to the results for 2007 and 2011, there is no evidence of an effect of Serbian radio exposure measured in 2009 on the election results in 2003 in the baseline sample, with some evidence in the extended sample (see also Online Appendix Tables 11 and 12). The different results for the 2003 elections could be explained by the different degree of

measurement error. In 2003 the transmitters were still in the process of being repaired and, in addition, many people still lived and voted in refugee camps.

We also examine the heterogeneity of the impact of exposure to Serbian radio on voting by adding to specification (2) an interaction of the availability and signal strength variables with a particular control variable. As our sample is small, we include interactions with one variable at a time. Online Appendix Table 13, Panels A and B show that the only consistent pattern is that the effect tends to be smaller in villages with more disabled during the war of independence and more important role in the war. In these villages, nationalism is higher most probably because of the vivid memories of the war experience, and, therefore, the media message is likely to be infra-marginal.

Overall, we find the cross-border media effects to be robust.

5. Conclusion

This paper documents the effect of Serbian public radio on the voting behavior and nationalistic anti-Serbian sentiment of Croats in *Eastern Slavonia, Baranja and Western Srijem*, a post-conflict region of modern Croatia on the border with Serbia. We find that the exposure to the Serbian public radio convinces some Croats to switch to voting for ultra-nationalist parties from voting to moderate nationalist party. In addition, exposure to Serbian public radio increases the incidence of ethnically-offensive graffiti on public buildings in the center of their villages. The results of a laboratory experiment confirm that Serbian public radio causes an increase in anti-Serbian sentiment among Croats.

Our results indicate that media can have substantial cross-group effects in areas characterized by ethnic tensions with overlapping media markets and groups sharing similar languages. This suggests that peaceful relations between neighboring ethnic and religious groups depend in part on the content of media programming, and the extent of media overlap. Hence, nation-building efforts implicit in the nationalistic content of the group-specific media (in our case, the Serbian radio) can have important negative spillovers on the persistence of peace.

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Figure 1a. Map of the area with the baseline and extended samples of villages



Figure 1b. Map of the area with the baseline sample of villages showing both the measured and the predicted reception of Serbian radio.

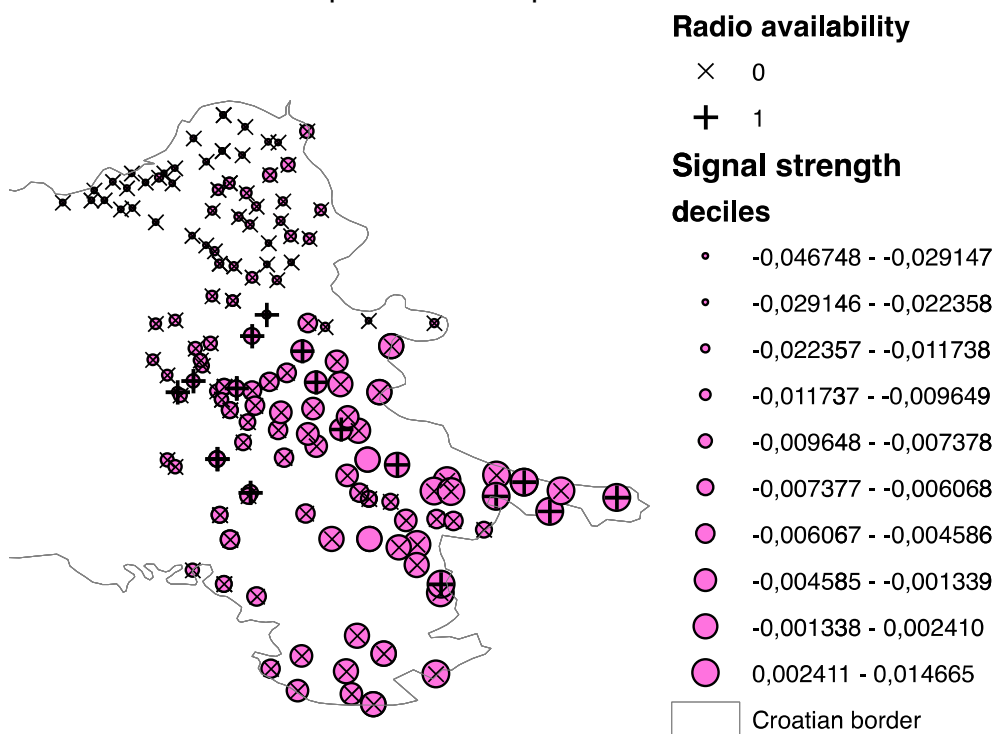


Figure 2a. Reported reception of Serbian radio (survey response), as function of availability of Serbian radio in village.

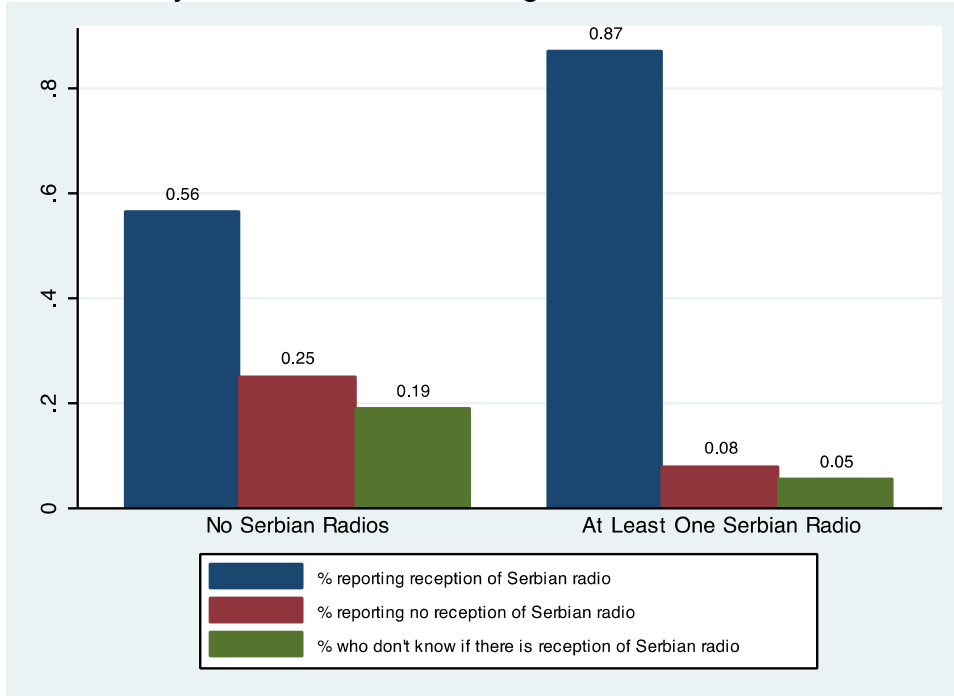
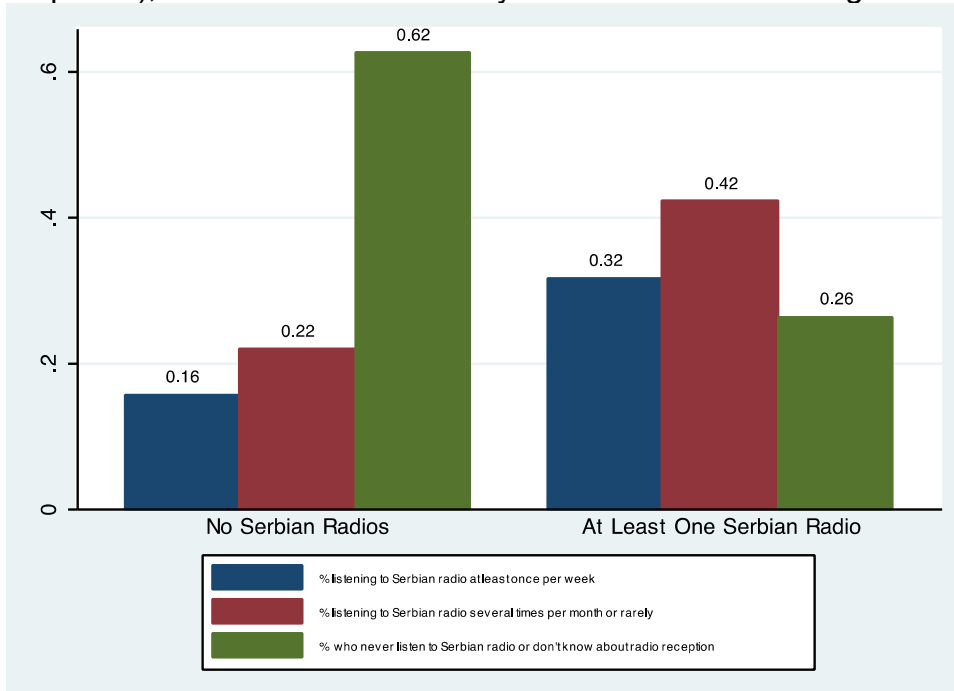
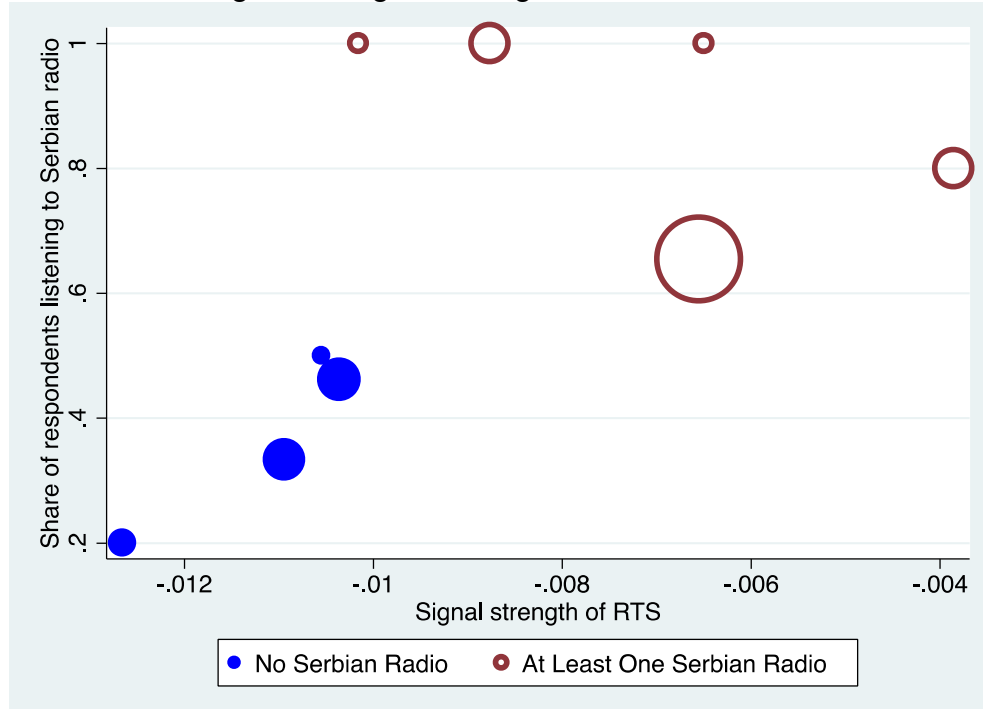


Figure 2b. Reported frequency of listening to Serbian radio (survey response), as function of availability of Serbian radio in village



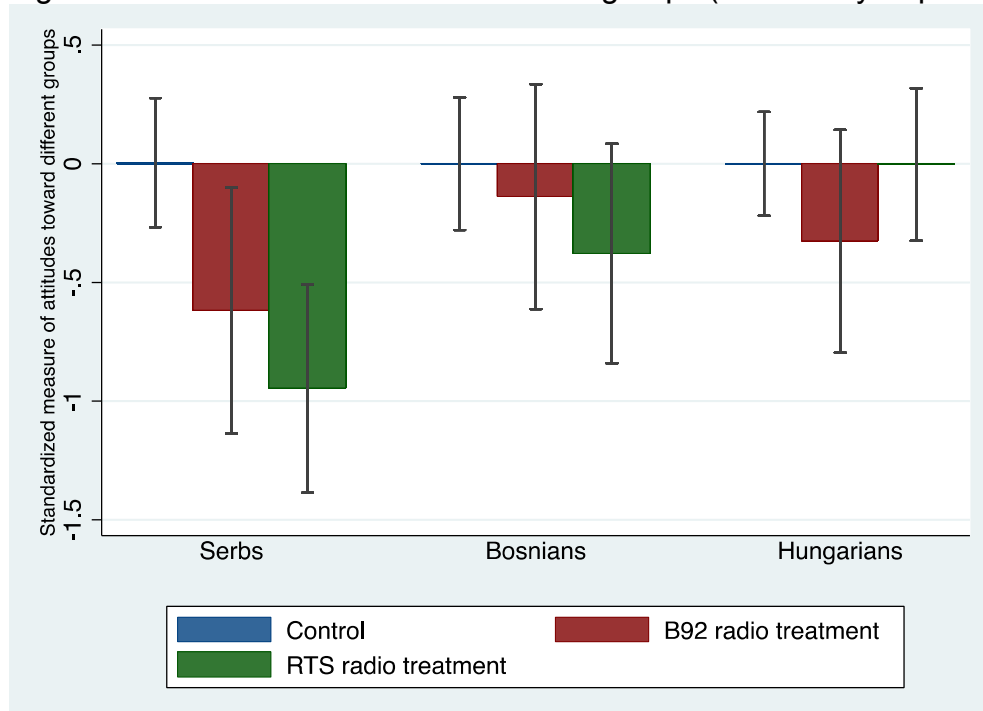
Notes: Figures 2a and 2b tabulate the responses to two questions of an in-person survey undertaken in Dec. 2010 and Jan. 2011 in 9 of the Croatian villages in the baseline sample. We report the average responses separately for the 32 respondents in villages which we code as not having reception of Serbian radio, and for the 38 respondents in villages which we code as having reception of at least one Serbian radio.

Figure 2c. Reported incidence of listening to Serbian radio (survey response), as function of signal strength in village.



Notes: Figure 2c shows responses to a question on frequency of listening to Serbian radio in an in-person survey undertaken in Dec. 2010 and Jan. 2011 in 9 of the Croatian villages in the baseline sample. We report in solid circles the average responses for the 32 respondents in villages which we code as not having reception of Serbian radio, and with hollow circle for the 38 respondents in villages which we code as having reception of at least one Serbian radio. Size of the markers is proportional to the number of respondents in each village.

Figure 3. Attitudes toward different ethnic groups (Laboratory Experiment)



Notes: Difference for feeling towards Serbs between control and RTS treatment significant at 1% level, between control and B92 treatment at 5%. All other differences are not significant.

Figure 4a. Vote share for extreme nationalistic parties in villages with, and without, reception of Serbian radio (controls).

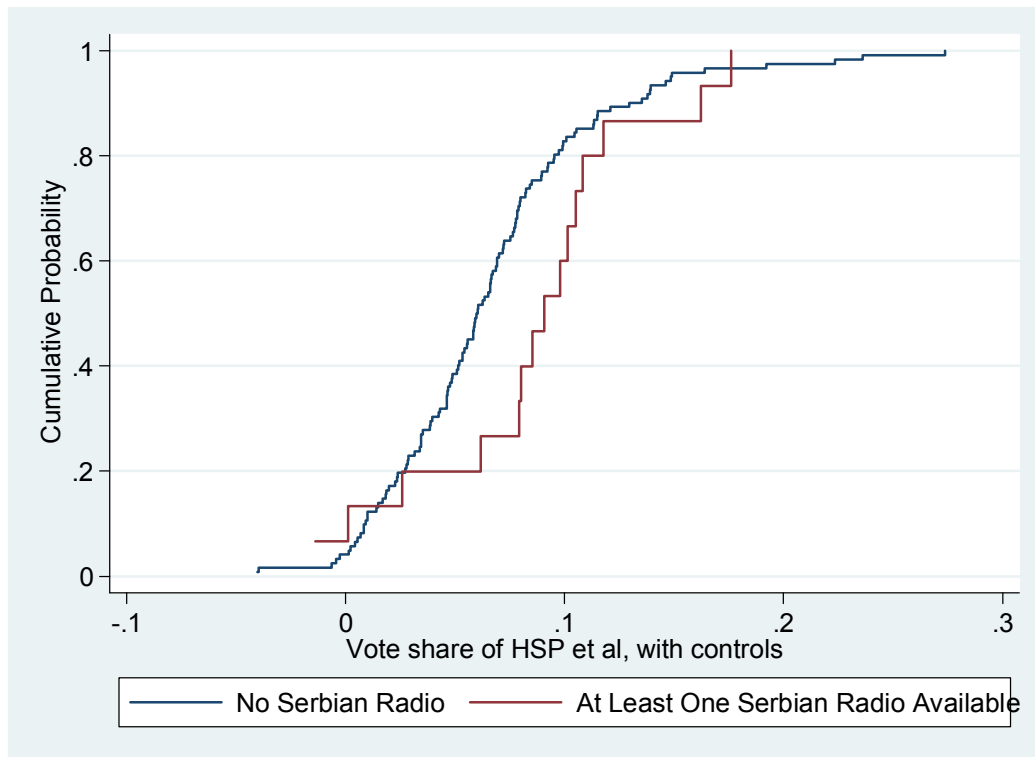


Figure 4b. Map of the vote share for extremely nationalistic parties (with controls) and the measured reception of Serbian radio.

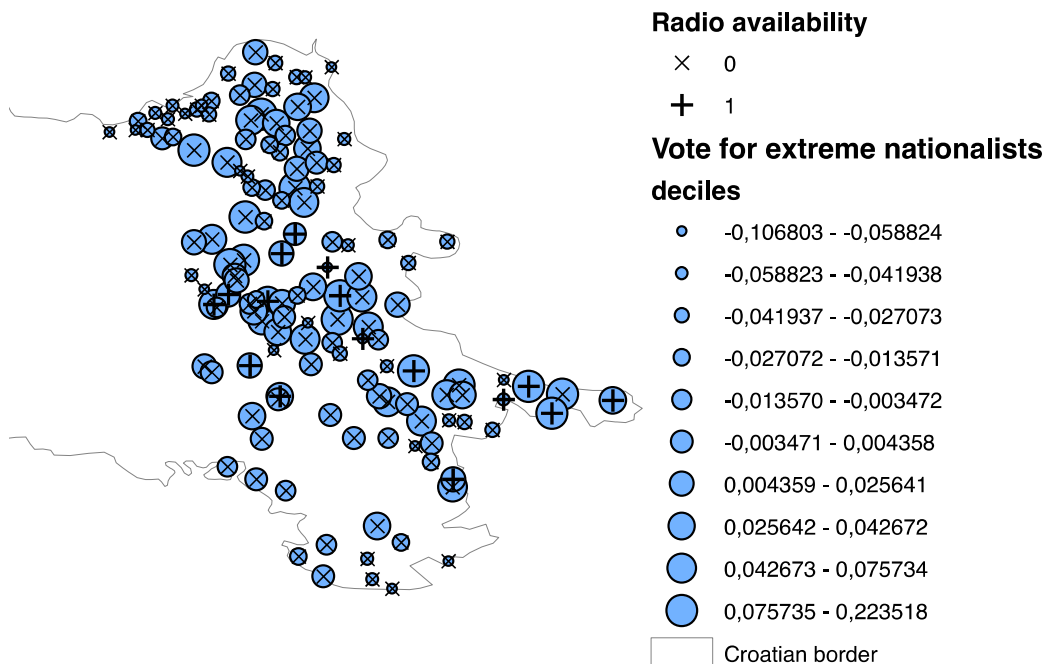
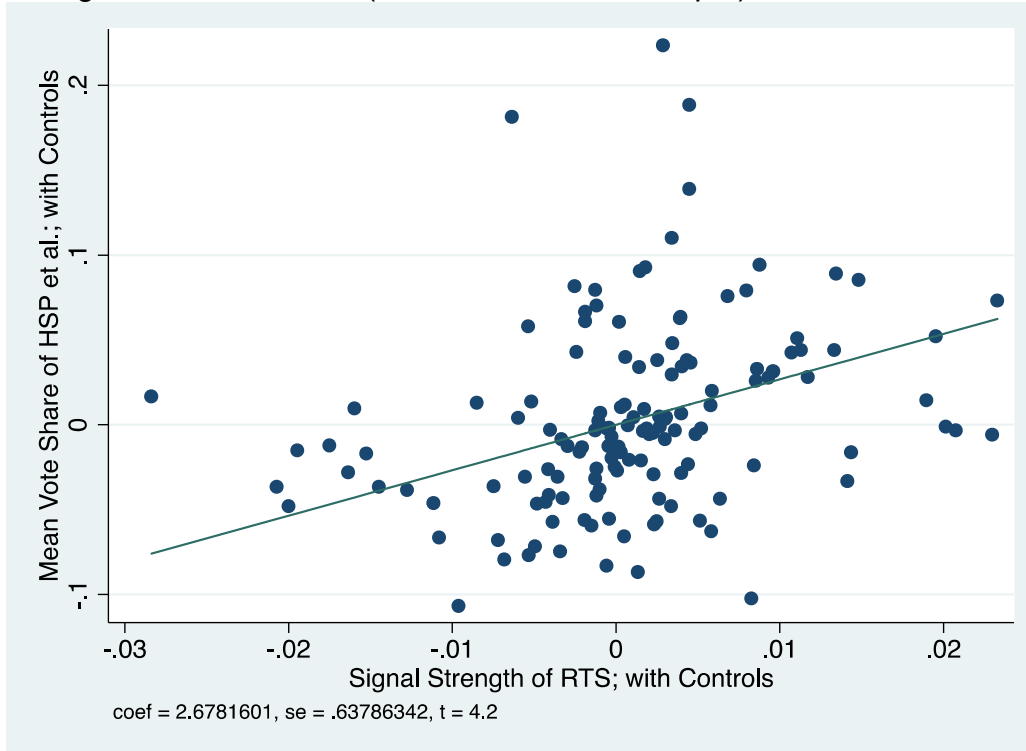


Figure 5. Vote share of extremely nationalistic parties as function of signal strength of Serbian radio (controls, baseline sample).



Notes: The picture shows share of votes for HSP et al. and predicted signal strength of Serbian radio after taking controls into account. Residuals are taken from the specification presented in column (3) of Table 3.

Table 1. Effect of Serbian radio availability on radio listenership: Survey Evidence

Dep. Var. in OLS Regression:	Indicator for Survey Respondent Who Reports Listening to Serbian Radio At Least Sometimes			
Panel A. Listening at all	(1)	(2)	(3)	(4)
At least 1 Serbian radio available	0.362*** [0.113]	0.313** [0.120]		
Signal strength of Serbian Radio			55.206** [23.820]	51.325** [22.673]
Constant	0.375*** [0.051]	0.405 [0.412]	1.098** [0.449]	1.098** [0.449]
Controls	No	Yes	No	Yes
Observations	70	70	70	70
R-squared	0.13	0.45	0.11	0.42
Effect of 1 st. dev. change			0.14	0.13
Dep. Var. in OLS Regression:	Indicator for Survey Respondent Who Reports Listening to Serbian Radio Often			
Panel B. Listening often	(1)	(2)	(3)	(4)
At least 1 Serbian radio available	0.160 [0.100]	0.144 [0.107]		
Signal strength of Serbian Radio			26.564 [22.532]	27.588 [19.415]
Constant	0.156* [0.077]	-0.266 [0.260]	0.076 [0.216]	0.076 [0.216]
Controls	No	Yes	No	Yes
Observations	70	70	70	70
R-squared	0.03	0.28	0.06	0.27
Effect of 1 st. dev. change			0.07	0.07

Notes: Data from a survey of 70 individuals in 9 villages. Respondents are asked how often, if at all, they listen to Serbian radio. They are considered to listen to Serbian radio often if they listen to it at least several times per week. Control variables include age, gender, occupation, education, and whether village was surveyed in 2011. Robust standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

Table 2. Determinants of the availability of Serbian radio and Altonji-Elder-Taber test

Panel A. Determinants of Serbian radio availability				
Dep. Var. in OLS Regression	Indicator for measured Availability of at least 1 Serbian (RTS) radio		Signal Strength for Serbian (RTS) radio	
	(1)	(2)	(3)	(4)
Signal strength of all Serbian RTS radios		9.183** [3.637]		
Distance to Serbia, logged	-0.056 [0.034]	-0.021 [0.032]	-0.0038*** [0.001]	-0.004*** [0.001]
Population (logged)	-0.026 [0.026]	-0.034 [0.029]	0.0009 [0.001]	0.001** [0.001]
% of male population	-1.312 [1.084]	-1.585 [1.142]	0.0298 [0.023]	-0.011 [0.012]
% of aged 21-40	-2.187 [1.732]	-2.273 [1.936]	0.0094 [0.061]	0.001 [0.016]
% of aged 41-60	-1.551 [1.118]	-0.916 [1.091]	-0.0692** [0.031]	-0.041*** [0.013]
% of aged 61+	-1.405* [0.835]	-1.138 [0.886]	-0.0291 [0.027]	-0.006 [0.010]
% of Croats	-0.189 [0.219]	-0.053 [0.184]	-0.0148* [0.008]	-0.003 [0.005]
% of people with higher education	4.544*** [1.663]	3.543** [1.424]	0.1091* [0.059]	-0.012 [0.050]
Economically active population (%)	-0.239 [0.927]	-0.209 [0.959]	-0.0032 [0.048]	0.047** [0.019]
Disabled after the war of independence (%)	-0.781 [2.327]	-3.714 [2.877]	0.3194*** [0.106]	0.255*** [0.085]
Large forest nearby	-0.120* [0.069]	-0.123* [0.065]	0.0004 [0.002]	
Was important during the war	0.057 [0.142]	0.100 [0.121]	-0.0047 [0.004]	
Monument in the honor of died defendants of the town	0.077 [0.075]	0.079 [0.076]	-0.0002 [0.002]	
Names of the streets in Cyrillic script	-0.162 [0.150]	-0.152 [0.134]	-0.001 [0.004]	
Names of the streets in Hungarian	0.058 [0.065]	0.051 [0.059]	0.0007 [0.003]	
Serbian beer in bars	-0.006 [0.124]	-0.024 [0.120]	0.002 [0.002]	
County fixed effects		Yes	Yes	Yes
R-squared	0.17	0.21	0.643	0.636
F-stat for joint significance of non-geographic controls	0.99	0.89	3.094***	5.655***
F-stat for all the controls	2.23**	3.12***	13.35***	122.81***
Sample	Baseline	Baseline	Baseline	Extended
Observations	139	139	139	417
Panel B. Altonji-Elder-Taber test of selection on observables				
Dep. Var. in OLS Regression:	Vote share for Extremely nationalistic parties			
	(1)	(2)	(3)	
Prediction (based on all controls) of availability of dummy for 1 Serbian radio	0.031 [0.062]			
Prediction (based on all controls) of signal strength of Serbian radio		-1.858 [1.279]	-0.001 [0.459]	
Controls	No controls	No controls	No controls	
Sample	Baseline	Baseline	Extended	
Observations	139	139	417	

Notes: Panel A reports the coefficient of OLS regressions of radio reception on all the control variables for the baseline sample (Columns 1-3) and for the extended sample (Column 4). The dependent variable is measured radio reception in Columns 1-2 and radio signal strength in Columns 3-4. Panel B regresses the dependent variable of Table 3 (vote share for extremely nationalistic parties) on the predicted radio reception based on all variables in Panel A. The univariate regression in Panel B provides information on the correlation between the predictors for the media variable and the political variable, indicating the potential for bias in the regressions in Tables 3. Observations in panel B are weighted by the number of eligible voters. In both panels, the standard errors in brackets are clustered by municipality, allowing for correlation between villages in the same municipality. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3. Serbian radio and vote for extreme nationalists. Baseline sample.

Dep. Var. in OLS regression:	Vote share for extremely nationalistic parties						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
At least 1 Serbian (RTS) radio available	0.028** [0.011]	0.025*** [0.008]	0.026*** [0.008]	0.018* [0.009]			
At least 2 Serbian (RTS) radios available				0.025 [0.019]			
Signal Strength of Serbian (RTS) radio					3.671*** [0.975]	2.464*** [0.622]	2.678*** [0.617]
Distance to Serbia, logged	-0.006 [0.008]	-0.015* [0.008]	-0.016 [0.010]	-0.014 [0.010]	0.005 [0.007]	-0.006 [0.007]	-0.006 [0.008]
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census controls	No	Yes	Yes	Yes	No	Yes	Yes
Additional controls	No	No	Yes	Yes	No	No	Yes
Mean of Dependent Variable	0.070	0.070	0.070	0.070	0.070	0.070	0.070
R-squared	0.36	0.60	0.60	0.60	0.48	0.63	0.64
Observations	139	139	139	139	139	139	139
Implied Persuasion Rates	0.05	0.05	0.05	0.03	0.043	0.03	0.03
Implied ATT	0.09	0.08	0.08	0.06	0.07	0.05	0.05

Notes: The specification reports the results of OLS specifications, with the observations weighed by the number of eligible voters. The baseline sample includes villages directly visited by the authors in 2009 and 2010 to measure the radio availability in the main street. Columns (1)-(4) use the measure of reception of RTS Serbian radio recorded on an in-person visit, while columns (5)-(7) use the signal strength computed using the transmitter location. The full set of control variables is listed in Table 2. Persuasion rates (DellaVigna and Kaplan, 2007) are computed according to the formula in the text. Implied Average Treatment on Treated effect (ATT) is computed as the ratio of the coefficient for the effect of radio on vote to the coefficient of the effect of radio on listenership from Table 1. The standard errors in brackets are clustered by municipality, allowing for correlation between villages in the same municipality. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4. Serbian radio, vote for other parties and turnout. Baseline sample.

Dep. Var. in OLS regression:	Vote Share of Extreme Nationalists		Vote Share of Moderate Nationalists		Vote Share of Social-Democrats		Turnout	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
At least 1 Serbian (RTS) radio available	0.026*** [0.008]		-0.041* [0.024]		0.009 [0.015]		-0.009 [0.017]	
Signal Strength of Serbian (RTS) radio		2.678*** [0.617]		-4.099*** [0.838]		1.884** [0.846]		-0.981 [1.067]
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census and geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Manually collected controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of Dependent Variable	0.070	0.070	0.362	0.362	0.251	0.251	0.550	0.550
R-squared	0.60	0.64	0.74	0.76	0.69	0.71	0.62	0.62
Observations	139	139	139	139	139	139	139	139
Implied Persuasion rates	0.05	0.03	-0.13	-0.06	0.02	0.02	-0.04	-0.02
Implied ATT	0.08	0.05	-0.13	-0.08	0.03	0.04	-0.03	-0.02

Notes: The specification reports the results of OLS specifications, with the observations weighed by the number of eligible voters. The baseline sample includes villages directly visited by the authors in 2009 and 2010 to measure the radio availability in the main street. The full set of control variables is listed in Table 2. First two columns reproduce columns (3) and (7) from Table 3. The standard errors in brackets are clustered by municipality, allowing for correlation between villages in the same municipality. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Serbian radio and ethnically offensive graffiti.

Dap. Var. in Probit Regression	Indicator for ethnically offensive graffiti in a village						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
At least 1 Serbian (RTS) radio available	0.364*** [0.139]	0.355** [0.171]	0.361** [0.161]	0.311 [0.245]			
At least 2 Serbian (RTS) radios available				0.076 [0.294]			
Signal Strength of Serbian (RTS) radio					10.883** [4.975]	8.559* [4.589]	10.288** [5.109]
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to Serbia, logged	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census and geographic controls	No	Yes	Yes	Yes	No	Yes	Yes
Additional controls	No	No	Yes	Yes	No	No	Yes
Mean of Dependent Variable	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Observations	139	139	139	139	139	139	139

Notes: All estimations use probit model. All observations are equally weighted. The baseline sample includes villages directly visited by the authors in 2009 and 2010 to measure the radio availability in the main street. The dependent variable is an indicator for the presence of a graffiti offensive towards Serbs in the village streets, as measured on an in-person visit in 2009 and 2010. The full set of control variables is listed in Table 2. Marginal effects are reported. The standard errors in brackets are clustered by municipality, allowing for correlation between villages in the same municipality. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. Serbian radio and vote for extreme nationalists, Robustness Checks. Baseline sample.

Dep. Var.:	Vote share for extremely nationalistic parties							
Sample	Baseline							
Specification	Control for exposure to Hungarian radio		Control for exposure to Croatian radio		Standard errors corrected for spatial autocorrelation		Control for free-space signal strength	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
At least 1 Serbian (RTS) radio available	0.026** [0.010]		0.030*** [0.010]		0.026*** [0.008]		0.008 [0.010]	
Signal Strength of Serbian (RTS) radio		2.699*** [0.602]		2.446*** [0.675]		2.678*** [0.382]		1.7111** [0.818]
At least 1 Hungarian radio available	0.001 [0.023]							
Signal Strength of Hungarian radio		0.223 [0.941]						
Signal Strength of Croatian Catholic radio			0.16 [0.742]	0.216 [0.751]				
Signal Strength of Croatian HR radios			-1.221*** [0.341]	-0.810** [0.321]				
Free-Space Signal Strength of Serbian (RTS) radio	No	No	No	No	No	No	Yes	Yes
Standard errors corrected for spatial autocorrelation	No	No	No	No	Yes	Yes	No	No
Observations	139	139	139	139	139	139	139	139
R-squared	0.60	0.64	0.63	0.65	0.60	0.64	0.64	0.65
Implied Persuasion Rates	0.05	0.03	0.06	0.03	0.05	0.03	0.02	0.02
Implied ATT	0.08	0.05	0.10	0.05	0.08	0.05	0.03	0.03

Notes: The specification reports the results of OLS with the observations weighed by the number of eligible voters. The baseline sample includes villages directly visited by the authors in 2009 and 2010 to measure the radio availability in the main street. All specifications control for the full set of control variables listed in Table 2. The standard errors in brackets for OLS regressions are clustered by municipality, allowing for correlation between villages in the same municipality. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Extended sample results (Villages within 75km of Croatian-Serbian Border).

Dep. Var. in OLS regression:	Vote share of extreme nationalists		Vote share of moderate nationalists		Vote share of social- democrats		Turnout	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Signal Strength of Serbian (RTS) radio	2.058** [0.880]	1.552** [0.623]	-0.931 [0.987]	-1.934** [0.934]	0.993 [1.404]	1.235 [0.908]	-1.504** [0.717]	-3.080*** [0.767]
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to Serbia, logged	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census and geographic controls	No	Yes	No	Yes	No	Yes	No	Yes
Mean of Dependent Variable	0.061	0.061	0.349	0.349	0.215	0.215	0.215	0.215
R-squared	0.27	0.40	0.53	0.61	0.030	0.50	0.11	0.33
Observations	417	417	417	417	417	417	417	417
Implied Persuasion Rates	0.026	0.019	-0.017	-0.028	0.015	0.017	-0.040	-0.052
Implied ATT	0.040	0.030	-0.018	-0.038	0.019	0.024	-0.029	-0.060

Notes: The specification reports the results of OLS specifications, with the observations weighed by the number of eligible voters. This extended sample includes villages in the broader Croatian region up to a 75 km. distance from the Croatian-Serbian border. The full set of control variables is listed in Table 2. The standard errors in brackets are clustered by municipality, allowing for correlation between villages in the same municipality.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8. Serbian radio, vote for extreme nationalistic parties in 2003 and 2011.

Dep. Var. in OLS regression:		Vote Share of Extreme Nationalistic Parties					
Elections:		2003 Election			2011 Election		
Sample		Baseline Sample	Ext. Sample		Baseline Sample	Ext. Sample	
		(1)	(2)	(3)	(4)	(5)	(6)
At least 1 Serbian (RTS) radio available		-0.006 [0.008]			0.024*** [0.008]		
Signal Strength of Serbian (RTS) radio			-0.115 [0.505]	0.748* [0.384]		1.266*** [0.446]	0.484 [0.500]
County fixed effects	Yes	Yes	Yes		Yes	Yes	Yes
Census and geographic controls	Yes	Yes	Yes		Yes	Yes	Yes
Manually collected controls	Yes	Yes	No		Yes	Yes	No
Mean of Dependent Variable		0.072	0.072	0.076	0.052	0.052	0.052
R-squared		0.44	0.44	0.19	0.40	0.39	0.36
Observations		121	121	369	123	123	375
Implied Persuasion rates		-0.01	0.00	0.01	0.05	0.01	0.01
Implied ATT		-0.02	0.00	0.01	0.08	0.02	0.01

Notes: The specification reports the results of OLS specifications, with the observations weighed by the number of eligible voters. The number of observations for the 2003 and 2011 elections differs somewhat from the one in the baseline sample because the electoral committee does not provide village-level data for polling places comprising more than one village in these other years. The sample in Columns 1-2 and 4-5 includes villages directly visited by the authors in 2009 and 2010 to measure the radio availability in the main street for which the voting data for the respective year is available. The sample in Columns 3 and 6 includes the extended sample used in Table 7. The full set of control variables is listed in Table 2. The standard errors in brackets are clustered by municipality, allowing for correlation between villages in the same municipality. * significant at 10%; ** significant at 5%; *** significant at 1%