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Unintended Media Effects in a Conflict Environment: Serbian Radio and Croatian Nationalism
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ABSTRACT

Do media broadcasts matter when they reach audiences that are not their target? In a conflict, the media may have an unintended effect of increasing ethnic animosity. We consider radio signals travelling across country borders in the region that witnessed one of Europe's deadliest conflicts since WWII: the Serbo-Croatian conflict in the Yugoslavian wars. Using survey data, we find that a large fraction of Croats listen to Serbian radio (intended for Serbian listeners across the border) whenever signal is available. Then, using official election results, we document that residents of Croatian villages with good-quality signal of Serbian public radio were more likely to vote for extreme nationalist parties, even after several years of peace time. Finally, ethnically-offensive graffiti are more likely to be exposed openly in the center of villages with Serbian radio reception. The effect is identified from the variation in the availability of the signal mostly due to topography and forestation. The results of a laboratory experiment confirm that Serbian radio exposure causes an increase in anti-Serbian sentiment among Croats.

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1. Introduction

A number of recent papers suggest that media outlets have substantial persuasion power over their audiences. They affect political views and behavior both in times of peace (e.g., Strömberg 2004; Gentzkow 2006; DellaVigna and Kaplan 2007; Gerber, Karlan, and Bergan 2009; Knight and Chiang forthcoming; Eisensee and Strömberg 2007; Snyder and Strömberg 2010; Enikolopov, Petrova, and Zhuravskaya forthcoming; Oberholzer-Gee and Waldfogel forthcoming) and in times of conflict (e.g., Lasswell 1971; Childs 1972; Wolfsfeld 1997; Snyder 2000; Yanagizawa 2009). In these cases, persuasion occurs as media broadcasts reach their intended audience.

Do media broadcasts have a similar effect when they reach an audience they did not aim to reach? An important instance of unintended media audiences occurs in towns near a country border, as the audience on one side of the border receives the media intended for the other side.

The unintended cross-border media effect may be particularly important between countries recently involved in conflict. The exposure to media content of a former enemy may trigger nationalistic sentiment, making future conflict more likely. It is also possible, however, that the cross-border impact of media is negligible, particularly if people mostly listen to media outlets that support their own views (Sunstein, 2001; Gentzkow and Shapiro, 2011; Durante and Knight, forthcoming). Clarifying the extent to which such cross-border media effects trigger nationalism is relevant for our understanding of conflict and of the impact of the media.

This paper examines the impact of cross-border media exposure on nationalistic behavior in the context 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 (officially called *Eastern Slavonia, Baranja and Western Srijem*) was place 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, the public media in Serbia continues to promote Serbian nationalism. In particular, public radio stations[1] (i.e., radios of

[1] Qian and Yanagizawa (2010) show that even private media outlets might choose their coverage according to strategic incentives of the government.

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).

The Serb-Croat case is a nearly ideal setting to study cross-border effects of media. The signal of Serbian public radio intended for internal consumption of Serbs 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 Serbian radio.[2] We are able to narrow down the analysis of cross-border effects of media to radio content for two reasons. First, radio is the primary media source in this area. Second, due to different alphabets, the press and even television, which often broadcasts foreign programs with subtitles, do not travel as easily across border.

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 their 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 without any special amplifiers, 87% of respondents are aware of getting the signal; whereas in areas where a special amplifier is needed to get reception, 56% of respondents report having access to Serbian radio. Among those who responded positively to the question whether they get Serbian radio, 78% of respondents acknowledge that they listen to Serbian radio occasionally, and one half admits to listening to Serbian radio at least several times a month. The high percentage of listeners of Serbian radio among Croats may seem puzzling in light of the general view that consumers sort into media outlets that conform to their political beliefs. Anecdotal evidence from the authors' interviews with Croatian media experts suggests two main reasons for cross-border listening. Some Croats tune in to Serbian radio to listen to Serbian singers from the times of Socialist Yugoslavia which are still popular among Croats, and in doing so encounter also political content. Others are interested in getting information about the scale of anti-Croatian sentiment in Serbia or are interested in hearing a different point of view.

Does Serbian radio then affect the political views of Croats? We estimate the effect of Serbian radio on the propensity to vote for extremist nationalist parties and other political parties, voter turnout, and expressions of ethnic hatred and nationalism in Croatia. Our

[2] According to Greenberg (2004), the difference between Serbian and Croatian spoken language is similar in magnitude to the difference between British and American English.

identification strategy relies on variation in the availability of Serbian radio among different villages in the border region. The main drivers of this variation are topography and the presence of forests in near proximity of the village. We use data on actual availability of Serbian (RTS) radios in 138 villages in the region adjacent to Serbian border, measured using an ordinary receiver without an amplifier. We also compute signal strength of Serbian radios using information on transmitters and the topography of the region for all 948 villages in an extended area of Croatia. Combining data on the actual reception and signal strength, we predict the availability of Serbian radio for the extended set of villages.

In both the baseline and extended sample, we find that availability of Serbian (RTS) radio significantly increased vote for extremist nationalist political parties during the last 2007 Parliamentary election. The effect is larger where the reception of the radio signal is stronger. The magnitude of the estimates suggests that a substantial part of the total vote for ultra-nationalist parties in the border region of Croatia is explained by the reception of Serbian public radio.

A key potential confound is that the results could be due to an omitted variable which is correlated with both nationalistic sentiment and the reception of Serbian radio. We find, however, that adding extra geographic and demographic controls generally makes the estimated results *larger*. The Altonji, Elder, Taber (2005) test, therefore, suggests that unobservables are likely to bias the estimates downward, rather than upward.

To quantify the effect, we 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 to it (DellaVigna and Kaplan 2007; DellaVigna and Gentzkow 2010). To compute the exposure rate we use the street survey of residents outlined above. The implied persuasion rate of 4% to 5% is on the lower end of the estimates in the literature of persuasion rates of media on their intended recipients.

We also consider a direct measure of nationalistic behavior, the presence of graffiti offensive to Serbs in the open spaces in the village. We find some evidence that the likelihood of having ethnically-offensive graffiti in the village center is higher in places where Serbian radio is available.

To provide further evidence on the impact of radio exposure, we conducted a laboratory experiment. Eighty ethnic Croatian students of Vukovar University listened to different remixes of radio broadcasts and were then questioned on their attitudes towards different ethnic groups and political parties. Students were randomly allocated into three groups: the control group listened to a remix of Croatian radios; the first treatment listened to

a remix of Croatian radios and Serbian public (RTS) radios; and the second treatment listened to a remix of Croatian and Serbian private radio (B92), which is known for its more neutral attitude towards Croats. Compared to the control group, the two groups exposed to Serbian radio display significantly heightened animosity towards Serbs in attitude questions, and the increase is larger for the group exposed to RTS radio. There is also weaker evidence that exposure to Serbian radio increased the self-reported preference for nationalistic parties. As predicted, neither of the treatments changed subjects' attitude towards other ethnic groups, i.e., Bosnians or Hungarians. Since subjects treated with Serbian nationalistic public radio, openly hostile to Croats, were more affected by the experiment than those treated with Serbian radio, neutral towards Croats, we conclude that most of the estimated effect of Serbian public radio comes from reminding Croats specifically about *concurrent* Serbian nationalism and anti-Croatian rhetoric rather than reminding them that their *former* enemy is just across the border.

Overall, our results suggest that Serbian public radio hostile to Croats appears to have an important effect working across the border which results in a substantial increase in extremist nationalistic sentiment among Croatian population.

Our paper is related to the burgeoning literature on the effect of media on voting, cited above. Much of this literature focuses on developed countries. We contribute to the more limited evidence on the effects of media on voting outside the developed world (e.g., Lawson and McCann 2005; Olken 2009; and Enikolopov, Petrova, and Zhuravskaya forthcoming), focusing in particular on cross-border media effects.

Within the media literature, the paper is more closely related to Yanagizawa (2009), Gentzkow and Shapiro (2004), and Hainmueller and Kern (2009). Yanagizawa (2009) uses variation in radio coverage generated by hills in the line-of-sight between radio transmitters and villages to investigate the effect of "hate speech" of RTLM radio on casualties from the genocide in Rwanda in 1994. Gentzkow and Shapiro (2004) argue that media in Arabic countries biased against the US reinforces anti-American sentiment in the population. While these papers measure the effects of propaganda in fueling ethnic animosity on the intended audiences, we examine the unintended media effect as a catalyst of ethnic hatred. In contrast to these papers, our analysis also combines evidence from a survey of individuals and a laboratory experiment to complement the field village-level evidence. Hainmueller and Kern (2009) examine one form of unintended cross-border effects by showing that the availability of free West German TV increased the support of the communist regime in German Democratic Republic by providing otherwise-missing entertainment to East Germans. The

cross-border effect which we consider is, arguably, more widely applicable as one can expect such an effect to be present in many other conflict environments.

Our findings are also related to the literature on the determinants of voting for fascist and ultra-nationalist parties. So far, research on this subject has focused mainly on two determinants of ultra-nationalist voting: protest against policies offered by moderate parties (Voerman and Lucardie 1992: 48-49; Westle and Niedermayer 1992: 95-97; Mayer and Pemneau 1992: 133-134; Childers 1983; Falter and Zintl 1988) and the priority of economic over nationalistic issues for voters on parties' agenda (Lipset 1960; Himmelweit et al. 1981; King et al. 2008).

The rest of the paper is organized as follows. Section 2 provides background information on the conflict and the mass media in the former Yugoslavia and elections in Croatia. Section 3 presents our hypotheses and describes the data on outcomes. Section 4 explains the variation in Serbian radio signal in Croatia. Section 5 presents the empirical results. Section 6 presents the results of the laboratory experiment and Section 7 concludes.

2. Background

Conflict. The Croatian-Serbian conflict (1991-1995) was one of several major open-armed conflicts in the former Socialist Yugoslavia, known as Yugoslavian wars. Croatians are predominantly Catholic Christians, whereas Serbians are predominantly Orthodox Christians. Ethnic animosity between the two groups has deep historic roots and had been escalating at least 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. Croatia became an independent country recognized by the international community. Estimates of the number of victims for the Croatian-Serbian conflict alone amount to roughly 500,000 displaced civilians and 20,000 casualties (the vast majority of which were civilians). The Yugoslavian wars were formally characterized as genocide. To investigate and prosecute Yugoslavian war crimes, the UN established the International Criminal Tribunal.

A multitude of sources agrees that mass media played a crucial role in fueling ethnic animosity and escalating the conflict before and during disintegration of Socialist Yugoslavia

(see, for instance, Thompson 1994; Kurspahić 2003, MacDonald and Bruce 2002; Kolar-Panov 1997; Skiljan, 2000, and Hockenos 2003). In particular, Smajlović (1997), Kurspahić (2003) and MacDonald and Bruce (2002) present evidence that media outlets that belonged to the RTS media group, including Serbian public radio, were engaged in active pro-Serbian and anti-Croatian propaganda during the conflict. They actively supported the Milošević regime, denied Serbian aggression, and selectively covered information on victims of war from the the Serbian side. Smajlović (1997) reports results of surveys which show that most of the Serbian population trusted RTS news.

Media. There are four major types of media in the region of our study: Croatian television, Croatian print media, Croatian radio, and Serbian radio. Croats in this region do not typically consume either Serbian print media or Serbian television. While it is easy for them to listen to Serbian radio, as they speak the same Serbo-Croatian language, it is more difficult for them to read Serbian newspapers, as Serbs use Cyrillics, whereas Croats use Latin alphabet. Watching Serbian television is similarly difficult as it often includes foreign programs that use Cyrillic subtitles.

Of the four prominent media, Croatian television and print media play smaller roles relative to the radio in our region. In many areas, people do not possess television sets, but do own radio receivers. While we do not have data on TV and radio set ownership specifically for our region, in the whole country the number of TV sets was 281 per 1000 inhabitants and the number of radios was 336 per 1000 inhabitants in 2003. In the rural areas, which are the focus of the study, the imbalance in favor of radio receivers is likely to be larger. In addition, Croatian law requires that all legally-owned television sets be registered with a paid subscription to Croatian television channels. The price of monthly subscription is high by local standards (starting at 10€ per month), so typically residents in rural areas do not register their TV sets; without paid subscription, the quality of the TV signal is poor.[3] Regarding newspapers, poverty prevents many people in rural areas from buying print media; and in some villages there is no place to buy a newspaper.

Given the constraints outlined above, 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.

The radio market in Croatia is localized, with 3 national public channels having a

[3] Source: authors' interview with Ivana Cosic, the adviser of Croatian Ministry of Education, Science and Sport.

joint share of just 10% of radio audiences. (Peruško and Jurlin 2006). This stands in contrast to the high concentration and state ownership in television and newspaper markets. Local radio stations in Croatia are controlled by local governments that own 70% of the local media and indirectly control the remaining stations. Nearly half of the local radio stations do not make a profit and are financially dependent on support from local authorities (Peruško and Jurlin 2006).

Parliamentary elections and parties in Croatia. The Croatian Parliament (Sabor) has one chamber, whose members are elected every four years. There are 10 multi-member electoral districts in mainland Croatia and an additional electoral district giving representation to Croatian diaspora living abroad. The electoral rule in each of these districts is proportional representation with closed party lists and the minimum of 5% of total vote cutoff necessary to get representation. In addition, 8 seats are reserved for ethnic minority representation. The last parliamentary election took place in November 2007. In total, 145 representatives were elected from 11 districts representing 8 political parties (and party alliances).

The two main political parties in Croatia (HDZ and SDP) have very different views on the issue of nationalism. The political party which got the largest share of the total vote (36.6%) and most seats (66) in 2007 is the Croatian Democratic Union (HDZ, *Hrvatska demokratska zajednica*). It is the main center-right political party with a moderate nationalist pro-Croatian ideology. It was founded by nationalist dissidents in 1989 and led by Franjo Tuđman, the first president of Croatia. The party entered parliament in 1990 and positioned itself as anti-Communist and anti-Serbian-nationalism of Slobodan Milošević. During the war of independence, HDZ was in power and many members of the military were also members of the party. One of the new proclaimed goals of HDZ in the 2000s was the accession of Croatia into the EU, which moved the party substantially towards the center.

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*). It is the main center-left opposition party which 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 political parties, which have a substantially smaller political base in the entire country, but a few of them have significant political support in specific parts of the country. In particular, as nationalistic

sentiment is stronger in the border region with Serbia than in the rest of the country, the ultra-nationalist political party, the Croatian Party of Rights (HSP, *Hrvatska stranka prava*), is fairly popular in this region. This party got 8% of the total vote in the northern part of the border region and 5.2% in the southern part and as a result gained 1 seat in the Croatian parliament of 2007. This party is the main extreme nationalist party in Croatia (Laqueur 1997, Hislope 1997) with the ideology of supporting "the Great Croatia."[4] 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 the WWII.[5] After the war, two wings of HSP seceded because of internal conflicts among party leadership and formed independent political parties (HP-HPP and HCSP). These parties are very small, but they share the same ultra-nationalist ideology and find some (insignificant) support in the border region.

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).

For the purposes of our study, 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.[6]

Region. Our main focus is on the border region of Croatia, called *Eastern Slavonia, Baranja and Western Srijem*. The region consists of two counties which differ in terms of local politics and electoral preferences. The first county is called *Vukovar-Sirmium.* It suffered the most during the war in terms of the number of causalities and physical damage. For a substantial period of time during the conflict—at the time of the *Republic of Serbian*

[4] "*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).

[5] For example, HSP uses the symbols of the former *Ustaše* movement such as the letter "*U*" on the uniforms of its military wing. *Ustaše* was the Croatian Nazi movement in power during WWII. The war-time leader Dobroslav Paraga used to end his speeches with a Nazi salute (Hislope 1996). According to the Ignazi (1992) classification, HSP is an extreme right-wing party with roots in fascism.

[6] One of the regional political party, Croatian Democratic Alliance of Slavonija and Baranja (HDSSB, *Hrvatski demokratski savez Slavonije i Baranje*) may also be considered as moderately nationalistic as its leader, Branimir Glavaš, was one of the main defenders of the city of *Osijek* during the war. However, its main goals are in development of *Osijek* region and securing central budget transfers for it. The results are robust to characterising HDSSB as moderately nationalistic in addition to HDZ, the main party of power.

Krajina, a Serbian entity self-proclaimed inside Croatia—all Croats in this part of the region were displaced. As a result, Croats living in this area are substantially more nationalistic than the national average. The second county is called *Osijek-Baranja*. It includes two subregions: *Osijek* and *Baranja*. Nationalistic sentiments are also important in *Osijek*, but are less wide-spread than in *Western Srijem and Eastern Slavonia*. This subregion is the stronghold of HDSSB (Croatian Democratic Alliance of *Slavonija* and *Baranja* regional party). Unlike the rest of the border region, *Baranja* has a relatively large Hungarian minority (close to 30%) and, as a consequence, the population of *Baranja* shows relatively low support for Croatian nationalistic ideas. During the war, *Baranja* became occupied by Serbs almost without resistance. In the empirical analysis, we include county fixed effects and thus focus on the within-county variation.

3. Hypotheses and the data

Hypotheses. Our main hypothesis is that the exposure to Serbian public radio triggers nationalistic anti-Serbian feelings among Croats. There could be several potential belief-based mechanisms underlying this hypothesis. First, Serbian radio may increase Croats' awareness of Serbian nationalism in the past and remind them about the war (Zaller 1992). Second, listening to Serbian radio might increase the perceived probability among Croats of new war with Serbia in the future. Finally, Croats may believe that Serbian radio affects Serbs still living in Croatia, which, in turn, may increase the probability of a new civil war in Croatia.

The main testable implication is that Croats exposed to Serbian radio are more likely to vote for Croatian extreme nationalist parties (i.e., HSP and its former factions, HCSP and HP-HPP). The literature on ultra-right party voting shows that fear is an important determinant of such behavior (Jackman and Volpert 1996, Voerman and Lucardie 1992, pp. 48-49, and Westle and Niedermayer 1992, pp. 95-97).

Which groups of voters are expected to move to the extreme nationalistic right as a result of Serbian radio exposure? There are two possibilities: those who abstain in the absence of Serbian radio and those who vote for less extreme parties. As it is easier to move to the ultra right from the moderate right rather than from any left-wing position on the scale of nationalistic political preference, we expect to see fewer people voting for the moderate nationalist party (HDZ) than for the neutral-toward-Serbs Social Democratic Party (SDP) as a result of Serbian radio exposure. The prediction about the effect of Serbian radio on Croatian

turnout is ambiguous. On the one hand, it could increase due to a mobilization effect (as in DellaVigna and Kaplan 2007). On the other hand, it could decrease as people can get distracted from local policy issues (as in Snyder and Strömberg 2010).

Furthermore, anti-Serbian feelings among Croats can be expressed in various ways other than voting for extreme-nationalistic parties. We test whether the likelihood of ethnically-offensive graffiti displayed on the walls of public buildings on the central streets of Croatian villages is higher in areas where Serbian public radio is available.

Electoral measures. We use data from the 2007, the most recent election to the Croatian parliament. The Central Election Commission of Croatia published results at the level of polling stations. We match and aggregate these data to the village-level. The vast majority of villages include 1 to 4 polling stations, though some villages have more polling stations and some polling places cover several (typically small) villages.

As we describe in the background section, we construct vote share measures for extreme nationalist parties (HSP, HP-HPP and HCSP), for moderate nationalist parties (HDZ) . and for parties without nationalistic ideology (SDP). Turnout is measured as the total votes cast divided by the number eligible voters.

Ethnically-offensive graffiti. We visited all the villages in the main sample (described below) and collected information about the presence of ethnically-offensive graffiti on public buildings in the centers of villages. We classified graffiti as being ethnically offensive 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") (Appendix Figure A1 presents an example). We generate an indicator variable for villages with graffiti which are "somewhat" or "strongly offensive" towards Serbs. Of the 138 villages we visited, 36 had ethnically-offensive graffiti.

Control variables. Demographic control variables come from the most recent Croatian Census of 2001. We use the 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 include controls at the level of municipality (*općina*), which typically includes several villages: labor force participation, share of population disabled after the War of independence, the shares of Croats and Serbs, and the share of people with higher education.

In addition, we collected additional variables during our visits to the villages in 2009 and 2010. Since the Census data on ethnic composition is noisy, as additional proxies we coded: (i) the language in which the street names are written – we use indicators for Cyrillic

script and for Hungarian language and (ii) the type of beer predominantly sold in local bars, since people of Serbian, but not Croatian, origin prefer beer produced in Serbia (e.g., *Jelen pivo*) and vice versa - we constructed indicator variables for signs that advertised Serbian and Croatian beers outside village bars; (iii) an indicator for presence of official monuments in the honor of the Croatian defenders 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.

To control for geographic location, we use the village elevation over the sea level and distance to Serbia; both variables are logged. The source for these variables is *Google Earth*. We also use hand-collected data on whether there is a large forest near the village from the Serbian side, since the existence of the forest hampers the signal of Serbian radio. Finally, we control for county fixed effects. This is only a rough geographic control, since the baseline sample consists of only two counties, *Vukovar-Sirmium* and *Osijek-Baranja*, with three additional counties, *Slavonski Brod*, *Virovitica-Podravina*, and *Požega-Slavonia* in the extended sample.

Sample. The region under study is located in the North-East of Croatia, bordering with Serbia to the East, Bosnia to the South, and Hungary to the North, as shown in Figure 1a. The baseline sample includes 138 villages. In Figure 1a these villages are indicated by lighter dots. Figure 1b zooms into the region of the baseline sample and shows all the villages, as well as the radio reception measure (described below). The villages in the baseline sample are the ones which we were able to visit in person and, hence, in which we hand-collected radio reception data.

The extended sample includes the baseline sample, but also adds villages in *Eastern Slavonia, Baranja and Western Srijem* which we were not able to visit, but for which we could compute the predicted radio reception (described below). These are all villages portrayed in Figure 1a. Figure 1c zooms in. This larger sample of 948 villages includes all the villages from counties of *Osijek-Baranja* and *Vukovar-Sirmium* which do not belong in the original sample, as well as all the villages from the counties of *Slavonski Brod*, *Virovitica-Podravina*, and *Požega-Slavonia*. We exclude villages with no data on population or zero population. The summary statistics for all village-level variables are presented in Table A1.

4. The Serbian radio in Croatia

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

In Serbia, there are four public radio stations--RTS Radio 1, RTS Radio 2, RTS Radio 3, and Radio Belgrade 202—as well as numerous private radio stations, like Radio Pink, Radio HIT, Radio S and the independent internationally sponsored Radio B92. RTS 1 broadcasts mostly news and current affairs programs, RTS 2 is oriented to culture, and Radio Belgrade 202 is more youth-oriented and broadcasts music programs.

With the exception of Radio B92, which was founded in 1989 with help of Soros foundation and USAID, all Serbian radio stations are pro Serbian government, in part because of a centralized license allocation process. In particular, Serbian public radios aim at reinforcing the Serbian national identity (IREX 2010). As part of its coverage, the public radio service broadcaster in Serbia has 9% of items covering neighboring countries (Nedeljkovic, Dubravka, and Bacanovic 2007, p. 214). Among the neighboring countries, Croatia is the most frequently covered; and the most covered topics are those related to war and war crimes (Nedeljkovic, Dubravka and Bacanovic 2007, 214).

Given the political orientation and the nature of the coverage, it is not surprising that Croatian listeners can display a strong reaction to Serbian radio broadcast. The coverage of these topics is deemed controversial by Croatians listeners, bringing back recent memories of the war (Nedeljkovic, Dubravka, and Bacanovic 2007, p. 219 and Udovicic 2005, p. 21). In addition, even non-political broadcast can trigger ethnic animosity. For example, the most popular Serbian music style is the so-called *turbo-folk*, which was invented to support Milosevic rule, and is considered offensive by Croats and Bosnians as it is associated with glorifying the war by Serbs (Kronja 2004).

Radio signal availability. Our identification strategy is based on comparing villages near the border in Croatia which receive Serbian radio to those which do not. To construct our measure of radio reception in the baseline sample of 138 villages, we traveled with a radio receiver throughout this 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 who made a judgment about whether the signal is good enough to hear well and understand what is being

said). In our analysis, we use two measures of availability of Serbian radios: (1) a dummy for at least one RTS radio station available, and (2) a dummy for at least two RTS radio stations available. Figure 1b displays with a "+" sign the villages with reception of at least one Serbia radio according to this measure.

An important caveat is that the radio signal measures were taken in 2009 and 2010, whereas the election data are from 2007. Thus, 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. The transmitter system of Serbian and Croatian radios was built during the times of Socialist Yugoslavia. Transmitters used by Serbian RTS radio stations are located in Serbia. During the war some of these transmitters 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 2007-2010.

The measurement of radio signal above defines our baseline sample of 138 villages. To extend the analysis to an extended sample of 948 villages, we also collected data on the location of RTS transmitters from the RTS website supplemented with data on the technical characteristics of these transmitters from fmscan.org. We used this data to construct the predicted availability of RTS Serbian radios.

To do so, we first determine the power of the RTS signal for each of the Serbian villages. Similarly to Olken (2009) and Enikolopov et al. (forthcoming), we apply the Irregular Terrain Model (Hufford 2002) to calculate the signal loss caused by physical distance and topography between transmitting and receiving locations. The model allows us to calculate the signal power for each village-transmitter pair using the geographical center of each village as the receiving location. Our measure of the signal strength for each village and each radio is the maximum of the signal powers across all transmitters.

Second, we estimate the relationship between the probability that a village in fact had radio reception of at least one RTS radio according to our hand-collected measure and radio signal strength with a probit regression. We estimate a probit with the maximum signal strength of all RTS radios as an independent variable, together with *Osijek-Baranja*$_i$ a dummy for village *i* being a part of *Osijek-Baranja* county:

$$Prob\{1\_RTS\_available_i = 1\} = \Phi\left(\underset{[0.029]}{0.085} Signal\_strength_i - \underset{[0.198]}{0.968} + \underset{[0.429]}{0.593} Osijek - Baranja_i\right)$$

Using these equations, we predict the probability that RTS radio(s) are available in and out of sample. Figure 1b displays the predicted probability of reception in the baseline villages; the predicted measure and the actual measure line up quite nicely, though the

overlap is far from complete. Figure 1c shows the predicted availability in the extended sample; clearly the availability declines with the distance from the Serbian border, though it does so in a jagged way.

In the analysis of the effect of RTS on voting outcomes we use both the actual measure of radio reception, as well as the predicted measure. In particular, we use the predicted probability as the measure of RTS availability rather than using a nonlinear function of the signal strength to allow for meaningful interpretation of the size of the estimated coefficients.

Survey. These measures of radio availability provide us with variation in whether Croatian villagers are able to listen to Serbian radio. These measures, however, do not address the key question whether the villagers where Serbian radio is indeed available actually listen to the cross-border radio. If they do not, comparing towns with and without radio availability is a pointless exercise.

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), 2 villages with access to one Serbian radio, and 3 villages with access to two Serbian radios. 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 Appendix.

A first question we asked respondents is whether Serbian radio is available in their village. As Figure 2a shows, 87 percent of the respondents in villages which we categorize as having at least one Serbian radio respond affirmatively to the question, compared to 56 percent in villages which we categorize as having no reception. 7

The second question was how often they listen to Serbian radio. In the villages with at least one Serbian radio station (according to our classification), 74 percent of the respondents state that they listen to Serbian radio at least rarely, and 32 percent state that they listen to Serbian radio at least once per week. By comparison, in the villages which we code as not having Serbian radio, 38 percent of respondents state that they listen to Serbian radio at least rarely, and 16 percent state that they do so at least once per week. As shown in Table 1,

[7] There are several potential explanations for the stated availability of Serbia radio in villages which we classify as not having such availability. First, our measure is crude and radio receivers differ in their power. We used a portable receiver without an amplifier, whereas amplifiers are fairly common. Second, there might be within village variation in the availability of weak signal. Third, 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.

estimation of a linear probability model indicates that there is a statistically significant difference between the likelihood of listening to Serbian radios at least rarely according to survey responses between villages with at least one Serbian radio available and villages without Serbian radio (according to our measure). We obtain a similar, but not statistically significant, result on an indicator for listening to Serbian radio often.

The findings go in the same direction when we use the answer to the question whether respondents know the songs of a popular Serbian group whose music is only played on Serbian radios. Importantly, in contrast to the results about Serbian radios, there is no difference between responses about the likelihood of listening to Bosnian and Hungarian radios between villages which we coded as those with and without Serbian radio signal. Thus, although Bosnian and Hungarian radios are also available in some areas in our region, their availability is presumably orthogonal to the availability of Serbian radios. Since we do not have information about the location of the Bosnian and Hungarian transmitters, we cannot control for the signal of Bosnian and Hungarian radios directly.

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.

5. Empirical results on nationalism

Determinants of radio availability. Our main empirical specifications relates the reception of Serbian radios, both measured and predicted, to voting for nationalist parties and to the presence of ethnically offensive graffiti. Before we proceed to these specifications, we first document the extent to which the availability of Serbian radios in the different villages correlates with control variables which may also be related to nationalistic sentiment.

Column 1 in Table 2 shows that only the share of people with higher education and the share of people above 60 have a statistically significant effect on the measured reception of Serbian radio in the villages in the baseline sample. The relationship is not strong and, as reported at the bottom of the Table, the controls are not jointly significant. The availability of Serbian radio, hence, is not strongly related to the demographic variables.

In contrast, as shown in Column 2, the hand-collected measure of Serbian radio availability is, as expected, strongly correlated with the signal strength of the Serbian radio, constructed using transmitter information. This correlation replicates the pattern in Figure 1b

showing a clear correlation between the measured availability in the village (indicated with a "+" sign) and the predicted signal strength in deciles (indicated by the size of the circles).

Columns 3 and 4 show the determinants of predicted reception of Serbian radio which, as we discussed in the previous Section, reflects the strength of the radio signal. This measure is related (negatively) to the distance to Serbia, to the share of people between 41 and 60 years of age (also negatively), and to the number of individuals disabled in the war of independence. In the specifications below we examine how the estimates change after controlling for these variables.

Effect on voting for the extreme nationalist parties. To test whether Serbian radio affects voting behavior, we estimate the following OLS regression:

$$dep\_var_i = \beta_0 + \beta_1 \cdot Availability\_of\_RTS\_radio_i + \beta_2 \mathbf{X_i} + \varphi_r + \varepsilon_i \quad (1)$$

where dep_var_i is the relevant political variable (vote share or turnout) in village *i* for the 2007 Parliamentary (*Sabor)* elections, $Availability\_of\_RTS\_radio_i$ is the measure of availability of Serbian radio stations, i.e., either an indicator variable for the measured availability or predicted availability based on 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 population of the village and cluster the standard errors at the municipality (*Opstina*) level.

Table 3 presents the results of estimation of equation (1) for the vote share of extremely nationalistic parties (HSP, HCSP, and HP-HPP) in the baseline sample of villages. The first four columns show the results with no controls (Column 1), geographic controls only (Column 2), geographic and Census demographic controls (Column 3), and all controls (Column 4). In the specification with most controls (Column 4), we estimate that the availability of Serbian radio increases the vote share for the extreme nationalist parties by 2.3 percentage points relative to a baseline vote share of 7 percentage points, a statistically and economically significant effect.

A key potential problem with this specification is that the availability of Serbian radio could proxy for (unobservable) confounding variables which are positively correlated with nationalistic sentiment and hence bias upward the correlation between radio availability and nationalistic vote share. While we have shown above that there is no significant correlation with observables of the radio availability variable (Table 3), a second way to address this concern is to examine how the introduction of control variables affects the results. To the extent that the observable controls are positively correlated with the unobservable confounds,

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 of the key variable. This is the test which Altonji, Elder, and Taber (2005) propose to examine the impact of potentially biasing unobservables. When we apply this test to our results, we find no evidence that a bias drives the results upward. The point estimate of the effect of radio increases monotonically with the addition of controls (except in the last Column where it remains essentially constant), indicating that the estimates of the impact of radio, if anything, are likely to be biased downward, that is, against finding a positive effect of radio on nationalistic voting. While of course it is possible that our control variables are not positively correlated with the unobservables which bias the results, the controls do a good job of predicting the nationalistic vote share, with an R-squared of 0.53 (Column 4). The Altonji-Elder-Taber test is particularly stringent when the controls capture a sizeable amount of the variation in the dependent variable, as in this case. Another interesting pattern in the OLS results reported in Columns 1-4 in Table 3 is that, as the controls are added, the standard error for the estimated effect of radio decreases. The extra controls lower the residual error in voting more than they take away predictive power in the radio availability variable.

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 138 villages in the baseline sample, of which 15 villages are identified as having reception of Serbian radios. To address this concern, we compare the c.d.f. of the vote share for the extreme nationalistic party in the villages with and without reception of Serbian radio. Figure 3a provides the simple comparison of the c.d.f,s for the two groups of villages, and Figure 3b provides a comparison of the c.d.f. after taking control variables into account. (We regress the vote share on all the control variables in Column 4 except the radio reception, and plot the residuals evaluated at the mean). In both figures, the vote share for the villages with Serbian radio essentially first order stochastically dominates the vote share for villages with no Serbian radio. The pattern is particularly clear with control variables. A Kolmogorov-Smirnov test, indeed, rejects the hypothesis of the equality of distributions with controls (Figure 3b, p-value of 0.009), though it does not reject the equality of distributions without controls (Figure 3a, p-value of 0.364).

Figure 3c provides a similar graphical comparison showing on the map the residual vote share for the extreme nationalist parties (in deciles) after accounting for controls and the availability of Serbian radio. The towns with Serbian radios are indeed some of the towns with larger nationalistic vote share, though the correspondence is not perfect. Both the c.d.f. comparison and the map evidence 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 5) 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. We find that indeed the villages with two radios are associated with a larger impact on nationalistic voting than the villages with one radio, a difference which is marginally statistically significant.

The estimates so far have made use of the measure of Serbian radio availability which we recorded ourselves on a field trip to each village. This measure is likely to display significant measurement error since radio availability may vary with different times of day or different weather. To obviate this problem, we present two alternative specifications. In Column 6, we instrument the indicator for measured radio availability with the signal strength variable of Serbian radios described in the previous Section. The first stage is relatively strong, with an F-stat of 8.02. The instrumented radio availability is associated with a larger and statistically significant effect on the nationalistic vote share. We obtain a similar result in Column 7 where we use the predicted availability measure.

In Figure 4 we provide a graphical display of the findings using predicted availability. We plot the average vote share for extreme nationalist parties plotted for each decile of the distribution of predicted reception of RTS radio. The vote share variable is the residual of a regression on the standard controls. The figure suggests a clearly monotonic pattern between the vote share and predicted availability, consistent with the findings in the Table.

Overall, our results suggest that the cross-border media effects are quite large. We interpret the magnitudes below in a subsection on persuasion rates. This subsection also discusses the potential concern that the estimated IV effects might be too large.

Other voting outcomes. In Table 4 we provide evidence on other political outcomes using two key specifications: an OLS specification using measured radio availability with all controls, as in Column 4 of Table 3, and an OLS specification with predicted radio availability, as in Column 7 of Table 3. The Table also reproduces in Column 1 and 2 the estimates from Table 3 on the vote share of extreme nationalist parties.

The availability of Serbian radio appears to have had a negative effect on the vote share for the moderate nationalistic parties (Columns 3 and 4), especially in the specification with predicted availability. There is no significant effect on 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 political support of the moderate nationalist party to the support for the extreme nationalist parties. In contrast, voters that were on a different side of the spectrum, i.e., the voters for the Social Democratic party, were not affected.

Columns 7 and 8 present some weak evidence, in the specification with predicted availability, that exposure to Serbian radio may have increased turnout, although the effect is not significant. Unfortunately, the analysis of turnout is tentative, as the measure of voters listed used as denominator is quite noisy.

Extended sample analysis. The analysis so far focused on the sub-sample of villages closest to the border which we visited (baseline sample). In the next set of results, we analyze the extended sample of 948 villages. In this larger sample, we do not have a direct measure of radio availability and hence we focus on the specification with predicted availability for comparability with specification in Column 7 in the baseline sample. We report the results both with and without controls to document the importance of selection on observables.

The results are largely robust to extending the sample as reported in Table 5. The predicted availability of a Serbian radio is associated with significantly higher vote share for the extreme nationalist parties (Columns 1 and 2), a decrease in the vote share for moderate nationalist parties once controls are in place (Columns 3 and 4), no impact on the vote share for the social-democratic party (Columns 5 and 6), and no effect on turnout (Column 7 and 8). Regarding the main result on the vote share of extreme nationalist parties, again the estimate with controls is (somewhat) larger than the estimate without controls, suggesting that potential omitted variables are not likely to bias the estimates in our favor.

Effect on graffiti. We focused so far on the expressions of nationalism via election outcomes. Nationalism may however express itself in several other forms, one of which we set out to measure with the presence of graffiti, which are ethnically disparaging of Serbs, in public spaces in the village. Table 6 reports the results of estimate of a linear probability model for the probability of having ethnically-offensive graffiti. We find that in villages with Serbian radio, the probability of finding ethnically offensive graffiti in the streets is 25 percentage points larger, that is, it nearly doubles, as compared to the villages with no Serbian radio. This effect is marginally significant in the specification with all controls (Column 4), and not significant in the instrumented specification (Column 6) and in the specification with predicted availability (Column 7). Unlike in the evidence on voting, adding additional controls lowers the effect (Columns 1 through 4), suggesting the potential biasing role of unobservables. Overall, the results provide suggestive evidence that Serbian public

radio increases the expressions of Croatian nationalism beyond the voting booths.

Persuasion rates. To interpret the magnitudes of the impact of media availability on voting for extreme nationalist parties, we evaluate the results in terms of a measure proposed by DellaVigna and Kaplan (2007), the persuasion rate, which provides an intuitive quantitative interpretation of the results. 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 our case) 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 not all residents in villages with no reception of Serbian radio (according to our measure) do not listen to it, we use survey responses to provide information on the "first stage." The estimates in Table 1 imply that the exposure to Serbia 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 10% increase in the predicted availability of Serbian radio is associated with a 25-percentage point increase in exposure (Column 3 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): $f = \frac{\nu_T - \nu_C}{e_T - e_C} \frac{t_T}{1-\nu_C}$. ν_T and ν_C 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 $t_T = t = 55\%$. 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 $\hat{\nu}_T - \hat{\nu}_C = 0.0226$ (Column 4 of Table 3) and the predicted share of vote for ultra-nationalists in the absence of Serbian radio is $\hat{\nu}_C = 0.057$. Thus, the persuasion rate is $f = (0.0226 * 0.562)/(0.313 * 0.943) = 4.3\%$.

Alternatively, we can compute a persuasion rate based on the continuous measure of predicted availability using the formula from Enikolopov et al. (forthcoming):

$$f = \frac{1}{1-\nu_0 t_0}\left(t\frac{d\nu}{de}+\nu\frac{dt}{de}\right) = \frac{1}{1-\nu_0 t_0}\left(t\,\frac{\frac{d\nu}{da}}{\frac{de}{da}}+\nu\frac{dt}{de}\right) \qquad (2)$$

Here $\nu_0 t_0$ is the number of people who would vote for ultra-nationalists in the absence of Serbian radio; ν and t are the vote share of ultra-nationalists and the voter turnout in Opštinas with e exposure to the Serbian public radio; $\frac{d\nu}{da}$ is the effect of *da* change in predicted availability on the vote share; $\frac{de}{da}$ is the effect of a *da* change in predicted availability on the exposure; and $\frac{dt}{de}$ is the effect of *de* change in exposure on the turnout. Our results with the predicted radio availability yield that $\nu_0 t_0$ equals 3.9 percent. This implies that 97.8 percent of Croats could, in principle, be convinced by the radio's message. From column 7 of Table 3, we get that $\frac{d\nu}{da}$ is equal to 0.183. The estimate of the effect of predicted radio availability on the exposure $\frac{de}{da}$ is 2.534 (Column 3 of Table 1). As there is no effect on turnout, the second term in the parentheses in equation (3) is 0, as *t* does not depend on *e*. Thus, the persuasion rate implied by these calculations is *f* =4.2%. These results are very similar to the results obtained using a binary measure of radio availability above and comparable with the other results in the literature (DellaVigna and Gentzkow 2010).

6. Laboratory Experiment

To provide additional evidence on the causal effect of Serbian radio on the nationalistic sentiment of 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 broadcasted in the region. The experiment took place in December 2011 with 80 undergraduate Croatian students from the University of Vukovar as subjects.

We randomized the students into three groups and put them in three different classrooms. Each group listened to a 17 minute remix of radio recordings with some common parts drawn from a Croatian radio station and other parts depending on group assignment. The first group listened to fragments from Croatian radio; the second group listened to fragments from the RTS Serbian public radio; and the third group listened fragments from the

independent Serbian radio B92 (which is substantially less nationalistic compared to RTS). The recording also included two songs (each about two minutes long each), which were chosen to be representative of the songs that could be heard on Croatian radio stations, RTS radio, and B92 radio, respectively (see Appendix Table A2 for further details).

After listening to the remixes, subjects were given five minutes to complete a questionnaire which asked about basic socio-demographic information of the respondent, content of the remix they were subjected to, and, most importantly, a number of questions that elicit attitudes toward different ethnic groups. Overall, the experiment took about 30 minutes. For participating in the experiment each subject received 20 kunas (slightly less than $4, equal to approximately an hourly wage of the subjects).

This design is modeled upon the work of, among others, Iyengar (1995), who used it to study the impact of political advertising on political attitudes. The downside of this design is that the outcomes are survey responses which can be subject to a demand effect, with the subject confirming to expectations about the desired findings of the study. The advantage, compared to the field evidence, is that we can guarantee random assignment of information and examine the consistency of experimental results with the field evidence.

We elicited attitudes towards other ethnic groups, i.e., Serbs, Bosnians, Hungarians, and Rusini. The first question was a "feeling thermometer" which asks to express the subject's attitude towards each ethnic group, on a scale from 0 to 100. The second question asked whether respondents would agree to work with someone of each ethnic group. As Figures 5a and 5b show, exposure to Serbian radio had a dramatic effect of inducing less positive attitudes towards Serbs, and reducing substantially the likelihood to work with a Serbian person. This effect is more pronounced for the exposure to the RTS radio, which is the focus of our paper, compared to the exposure to the less-nationalistic B92 radio. There is no effect on attitudes towards other ethnic groups, as expected.

This finding suggests that even short exposure to the type of content featured in the Serbian RTS radio affects significantly attitudes towards Serbs in the direction of increased nationalism and anti-Serbian sentiment (for example, lowering the willingness to work together with them). We find similar patterns in the other questions designed to measure ethnic preferences. These findings strongly support the results from the field.

We also asked subjects to rank political parties with lower rank indicating higher preference. As Figure 5c shows, we find a modest (not statistically significant) reduction in the rank for the extreme nationalist party, a significant reduction in the rank for the moderate nationalist parties, and an increase in the rank of the Social Democratic party. These results

also indicate that the general nationalistic sentiment goes up with the exposure to Serbian radio which is consistent with our other findings. The larger effect on moderate nationalist parties, however, differs from the results based on election data.

Overall, subjects treated with Serbian nationalistic public radio, RTS, which is openly hostile to Croatia, were substantially more affected by the treatment compared to those treated with B92, Serbian radio neutral towards Croats. This evidence sheds some light on the mechanism behind the effect. It is more likely that Serbian public radio catalyses ethnic animosity towards Serbs among Croats because it reminds Croats specifically about current Serbian nationalism and anti-Croatian rhetoric rather than because it reminds them that their former war enemy is located nearby (on the other side of the border).

7. 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, there is some evidence that 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 suggest that foreign media can have substantial cross-border effects in countries characterized by post-conflict ethnic tensions such as Croatia. Further research is needed to estimate the magnitudes of such effects in other conflict and post-conflict environments.

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Figure 1a. Map of the area with the baseline sample 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.

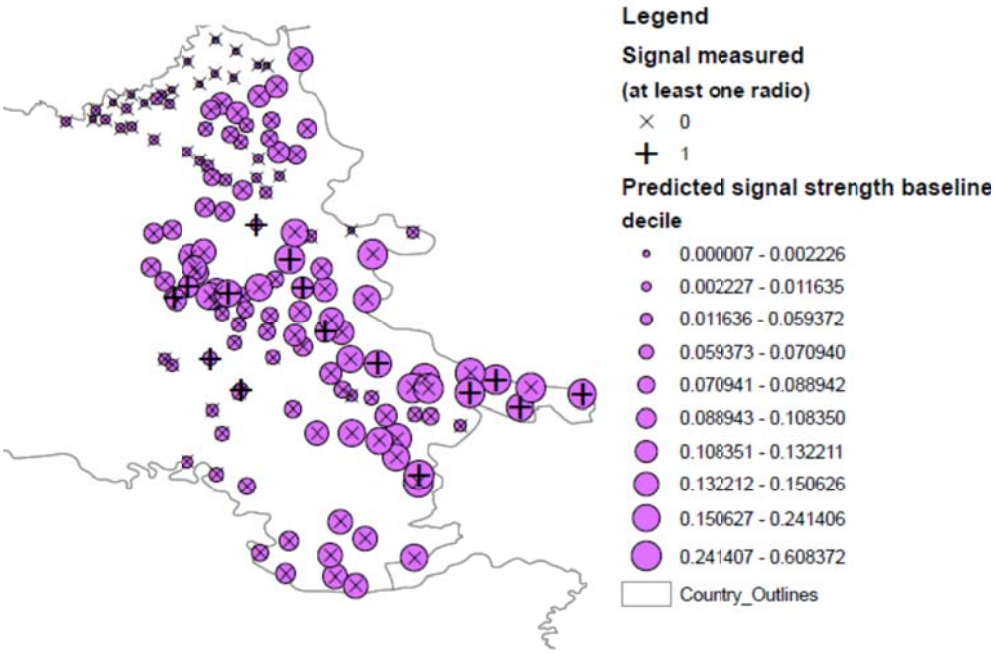


Figure 1c. Map of the area with the extended sample of villages, showing the predicted reception of Serbian radio.

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

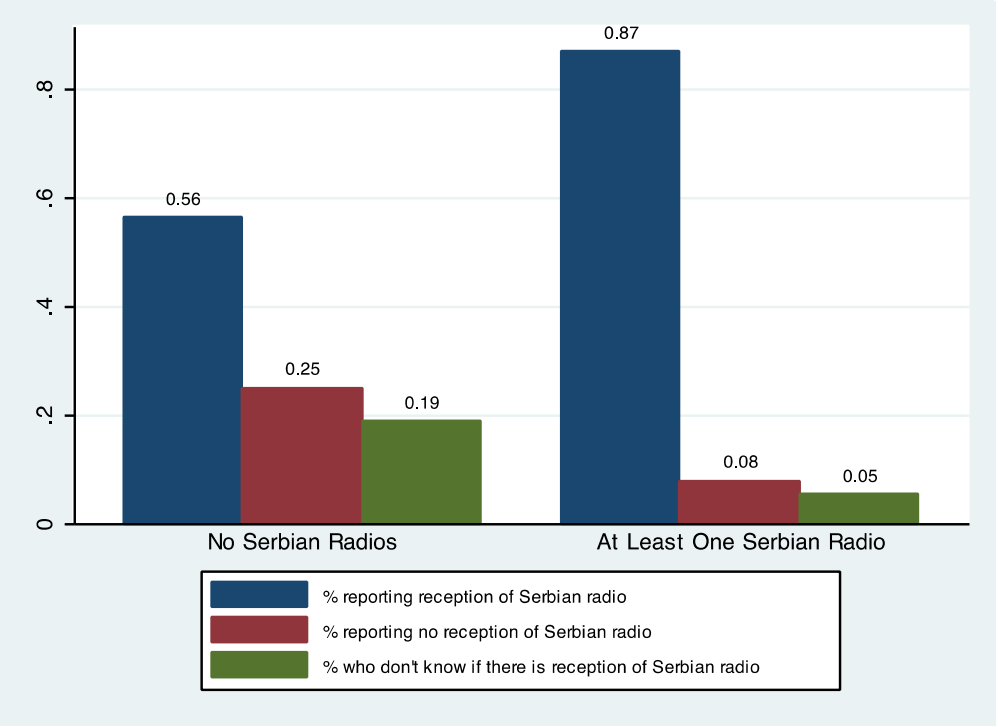
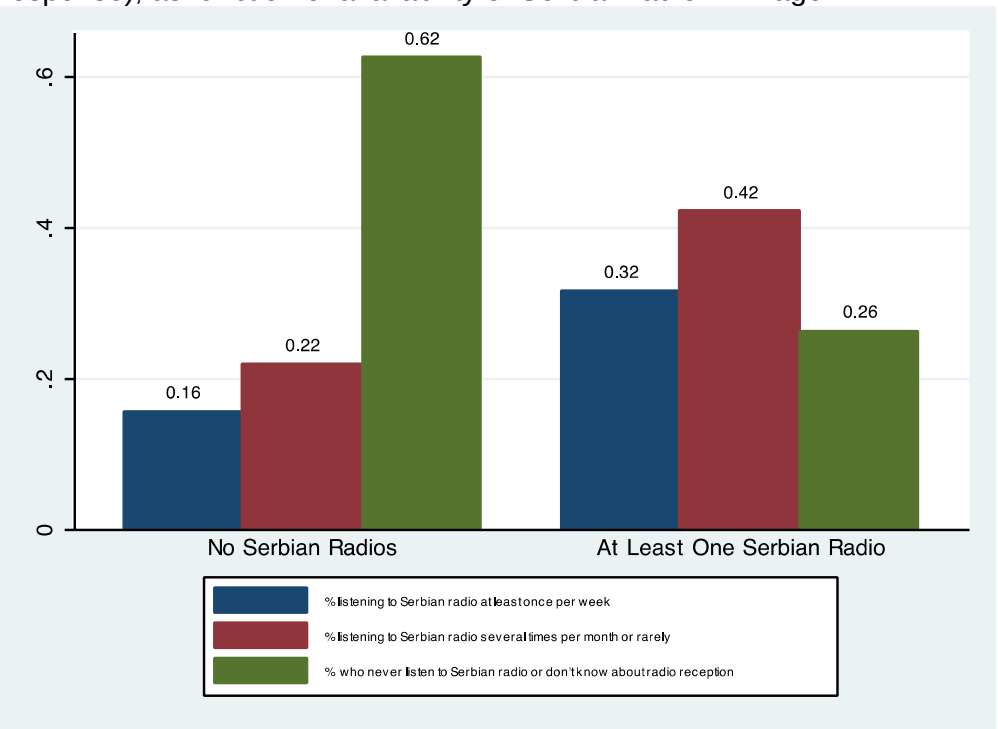


Figure 2b. Reported frequency of listening to Serbian radio (survey response), as function of availability of Serbian radio in village



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 3. Vote share for extreme nationalistic parties in villages with, and without, reception of Serbian radio (no controls)

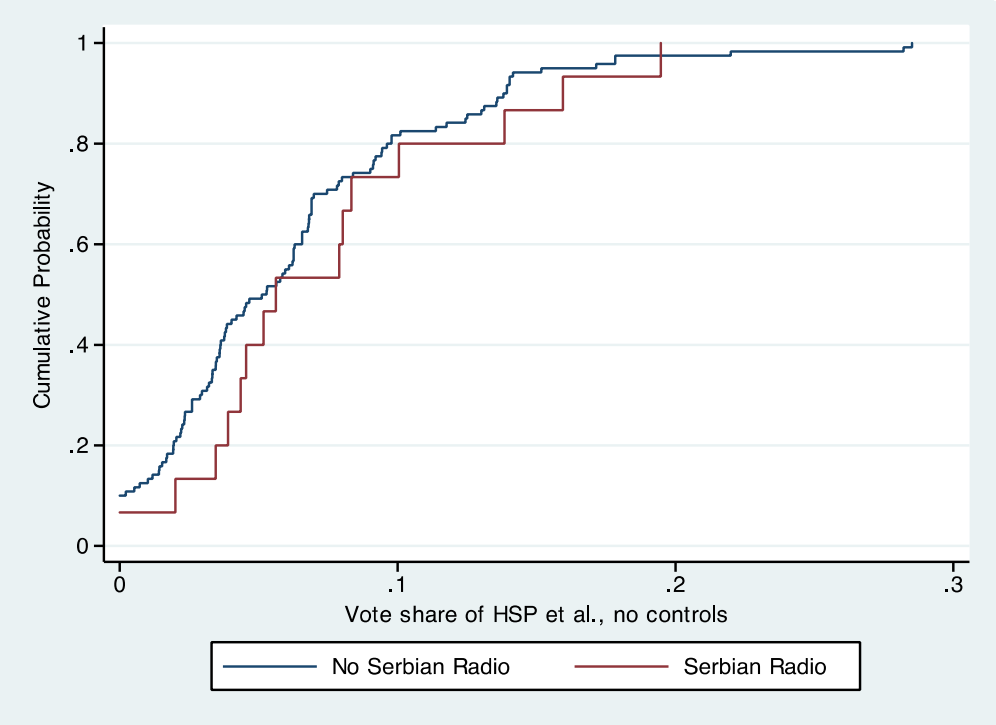


Figure 3b. Vote share for extreme nationalistic parties in villages with, and without, reception of Serbian radio (controls).

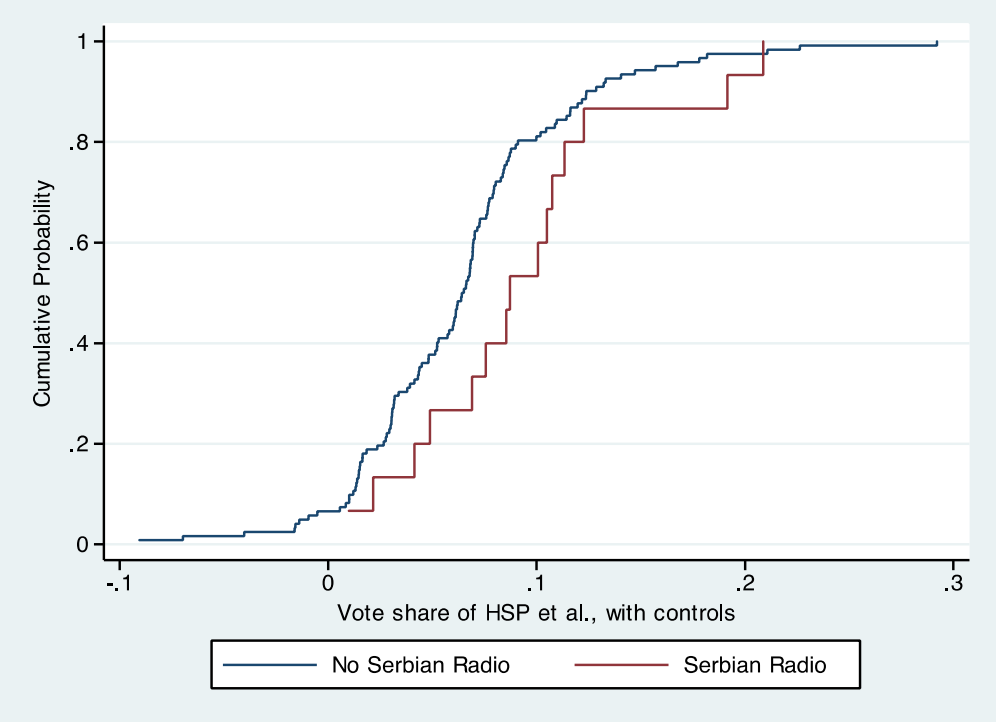


Figure 3c. Map of the vote share for extremely nationalistic parties (with controls) and the measured reception of Serbian radio.

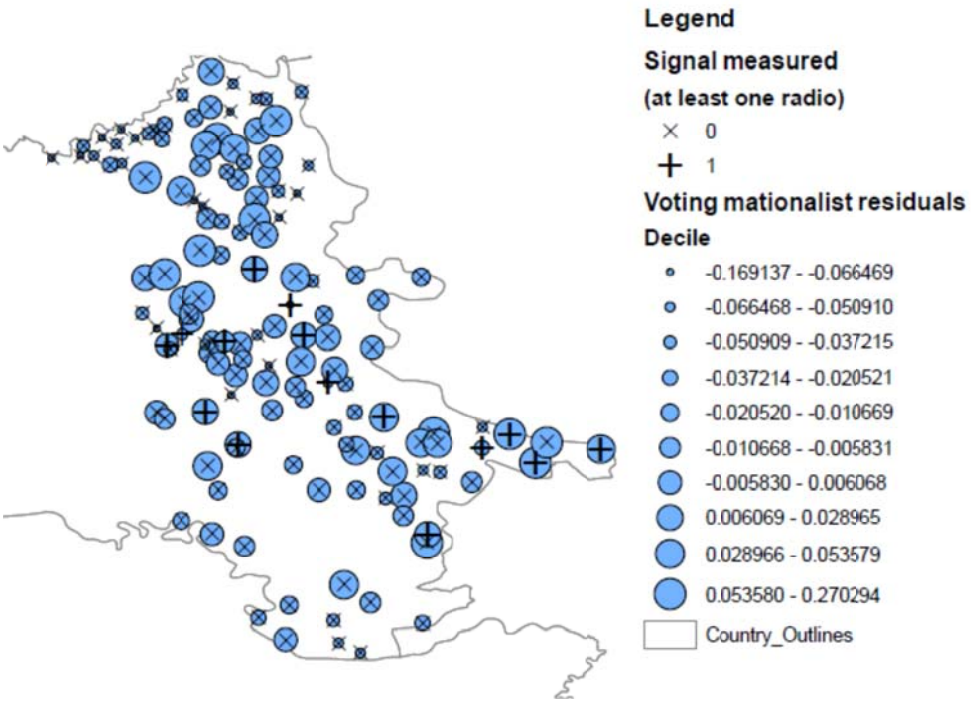
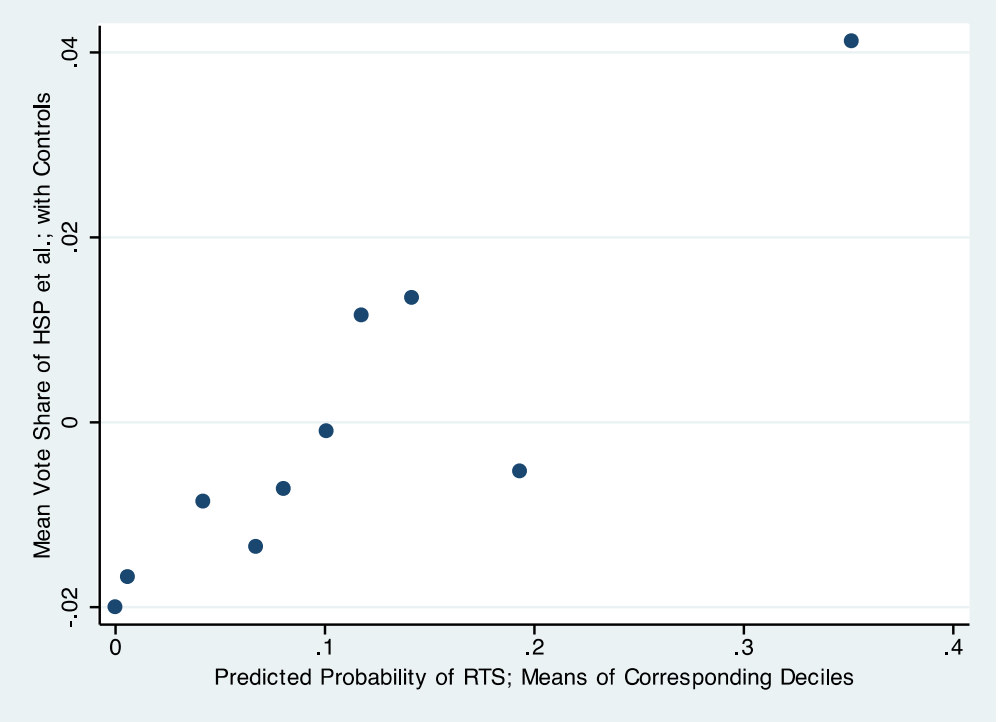
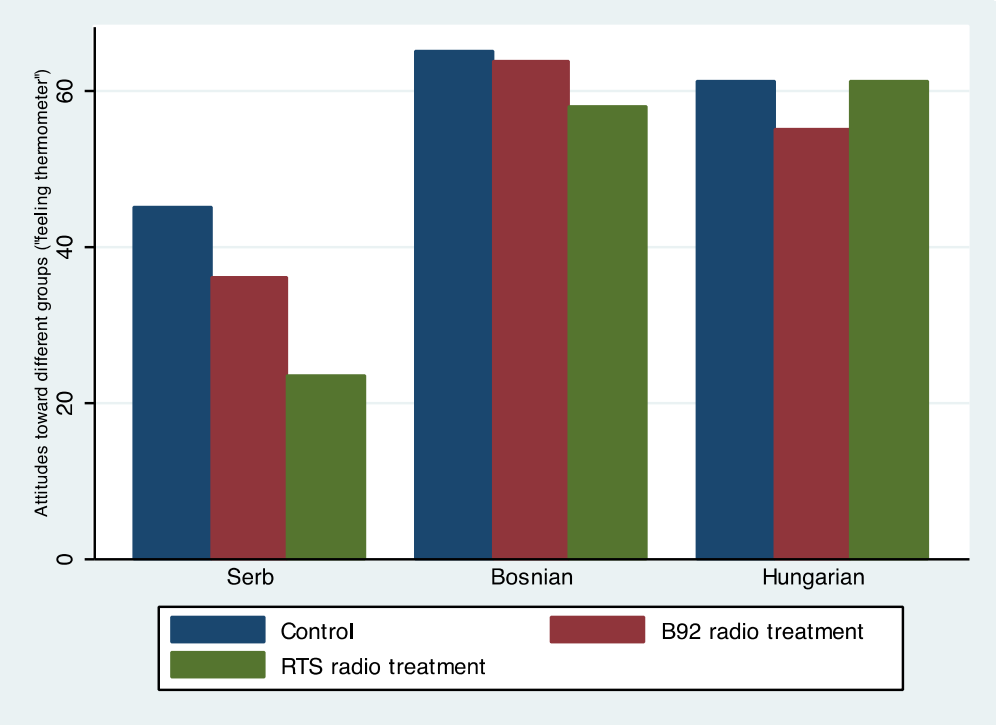


Figure 4. Vote share of extremely nationalistic parties as function of predicted availability of Serbian radio in village (controls, baseline sample).



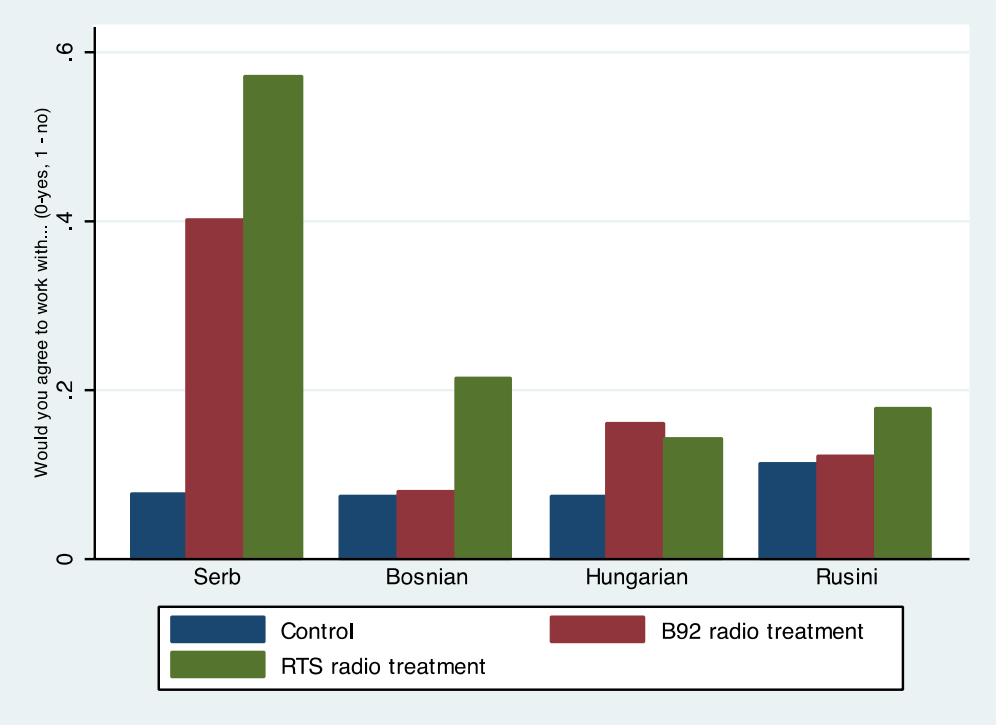
Notes: The picture shows mean share of votes for HSP et al. and mean predicted availability of Serbian radio after taking controls into account. The means are taken by deciles of the predicted availability of Serbian radio. Residuals are taken from the specification presented in column (3) of Table 3.

Figure 5a. Feeling thermometer toward people of different ethnic groups (Laboratory Experiment)



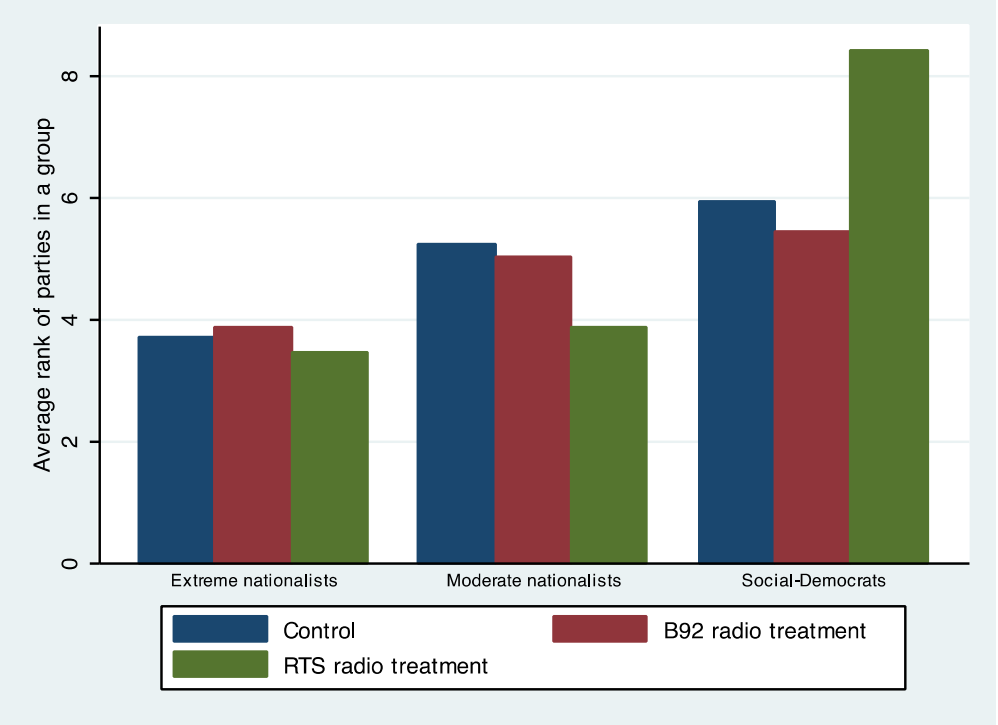
Notes: Difference between control and RTS treatment for feeling towards Serbs is significant at 1% level. All other differences are not significant.

Figure 5b. Disagreeing to work with people from different ethnic groups (Laboratory Experiment)



Notes: Differences between control and both treatments for Serbs are significant at 1% level. For all the other ethnic groups, the difference is not significant.

Figure 5c. Average rank of parties (Laboratory Experiment)



Note: Difference between control and RTS treatment for moderate nationalists is significant at 5% level. The difference between control and RTS treatment for social Democrats is significant at 1% level. All other differences are not significant.

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

	Indicator for Survey Respondent Who Reports Listening to Serbian Radio					
	At least rarely			Often		
	(1)	(2)	(3)	(4)	(5)	(6)
At least 1 Serbian radio available	0.362***	0.313*		0.16	0.144	
	[0.089]	[0.139]		[0.110]	[0.111]	
Predicted availability of at least 1 Serbian radio			2.534**			1.462
			[0.992]			[0.904]
Constant	4.188***	3.924***	5.302***			
	[0.217]	[0.308]	[0.751]			
Controls	No	Yes	Yes	No	Yes	Yes
Observations	70	70	70	70	70	70
R-squared	0.13	0.45	0.42	0.03	0.28	0.27
Effect of 1 st. dev. change			0.119			0.069

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 adjusted for clusters by villages in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

Table 2. Determinants of the availability of Serbian radio

	Indicator for measured Availability of at least 1 Serbian (RTS) radio		Predicted Availability of at least 1 Serbian (RTS) radio	
	(1)	(2)	(3)	(4)
Maximum signal strength of all Serbian RTS radios		0.00881**		
		[0.00358]		
Distance to Serbia, logged	-0.0552	-0.0218	-0.0740***	-0.0468***
	[0.0339]	[0.0318]	[0.0194]	[0.0110]
Population (logged)	-0.034	-0.0416	0.00856	-0.000137
	[0.0307]	[0.0333]	[0.00647]	[0.000815]
% of Croats	-0.169	-0.0391	-0.105	0.0194
	[0.223]	[0.188]	[0.0662]	[0.0293]
% of people with higher education	3.659**	2.740**	0.523	-0.0416
	[1.487]	[1.260]	[0.436]	[0.135]
% of male population	-1.419	-1.676	-0.137	-0.0152
	[1.137]	[1.193]	[0.213]	[0.0120]
Economically active population (%)	-0.252	-0.223	0.0336	0.0398
	[0.910]	[0.931]	[0.364]	[0.0384]
% of aged 21-40	-2.311	-2.388	-0.121	-0.0215
	[1.780]	[1.980]	[0.363]	[0.0173]
% of aged 41-60	-1.594	-0.982	-0.610**	-0.0394**
	[1.134]	[1.101]	[0.298]	[0.0174]
% of aged 61+	-1.477*	-1.217	-0.274	-0.0187
	[0.846]	[0.893]	[0.208]	[0.0117]
Disabled after the war of independence (%)	-1.032	-3.835	2.933***	1.231***
	[2.380]	[2.944]	[1.068]	[0.374]
Large forest nearby	-0.114	-0.118*	-0.0274	
	[0.0684]	[0.0640]	[0.0262]	
Region fixed effects	Yes	Yes	Yes	Yes
Additional controls	Yes	Yes	Yes	No
Sample	Baseline	Baseline	Baseline	Extended
Observations	138	138	138	948
R-squared	0.16	0.20	0.55	0.67
F-stat for controls	1.25	1.30	6.73***	5.41***

Notes: Additional control variables include dummy variables for monument in the honor of died defendants of the town, names of the streets in Cyrillic script, names of the streets in Hungarian, Serbian beer in bars.F-stat for the test that all the variables except for signal strength and the large forest nearby are not significant. The standard errors in brackets are clustered by mjnicipality, allowing for correlation between villages in the same mjnicipality. * significant at 10%; ** significant at 5%; *** significant at 1%

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

	Vote share for extremely nationalistic parties						
	OLS	OLS	OLS	OLS	OLS	IV	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
At least 1 Serbian (RTS) radio available	0.006	0.022*	0.024**	0.023**	0.006	0.170**	
	[0.020]	[0.013]	[0.009]	[0.009]	[0.009]	[0.072]	
At least 2 Serbian (RTS) radios available					0.030*		
					[0.016]		
Predicted availability of at least 1 Serbian (RTS) radio							0.183***
							[0.041]
Distance to Serbia, logged		-0.005	-0.012	-0.011	-0.01	0.003	0.004
		[0.008]	[0.007]	[0.010]	[0.010]	[0.011]	[0.010]
Region fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Census controls	No	No	Yes	Yes	Yes	Yes	Yes
Additional controls	No	No	No	Yes	Yes	Yes	Yes
Mean of Dependent Variable	0.070	0.070	0.070	0.070	0.070	0.070	0.070
R-squared	0.001	0.29	0.52	0.53	0.54	0.10	0.57
Observations	138	138	138	138	138	138	138
Implied Persuasion Rates	0.012	0.042	0.047	0.043	0.012	0.318	0.041
F-stat for instruments						7.13	
Effect of 1 st. dev. change							0.02

Notes: The specification report the results of OLS and IV specifications, with the observations weighed by village population. This baseline sample includes villages directly visited by the authors in 2009 and 2010 to measure the radio availability in the main street. The instrument for radio availability in Column 6 is the maximum signal strength of Serbian RTS radios. The variable "Predicted availability" (Column 7) is estimated from a probit regression of measured availability on the computed maximum signal strength of Serbian RTS radios. The full set of control variables is listed in Appendix Table A1. The standard errors in brackets are clustered by mjnicipality, allowing for correlation between villages in the same mjnicipality. * significant at 10%; ** significant at 5%; *** significant at 1%

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

	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	0.023**		-0.036		0.009		-0.002	
	[0.009]		[0.024]		[0.020]		[0.023]	
Predicted availability of at least 1 Serbian (RTS) radio		0.183***		-0.200***		0.056		0.052
		[0.041]		[0.064]		[0.062]		[0.070]
Region 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	0.53	0.57	0.78	0.78	0.78	0.78	0.58	0.58
Observations	138	138	138	138	138	138	138	138
Implied Persuasion rates	0.04	0.04	-0.11	-0.06	0.02	0.01	-0.01	0.02
Effect of 1 st. dev. change		0.02		-0.02		0.006		0.005

Notes: The specification report the results of OLS and IV specifications, with the observations weighed by village population. This baseline sample includes villages directly visited by the authors in 2009 and 2010 to measure the radio availability in the main street. The instrument for radio availability in Column 6 is the maximum signal strength of Serbian RTS radios. The variable "Predicted availability" (Column 7) is estimated from a probit regression of measured availability on the computed maximum signal strength of Serbian RTS radios. The full set of control variables is listed in Appendix Table A1. 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. Extended sample results.

	Vote share of extreme nationalists		Vote share of moderate nationalists		Vote share of social-democrats		Turnout	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Predicted availability of at least 1 Serbian (RTS) radio	0.111**	0.126**	0.034	-0.171*	-0.086	0.096	-0.125	-0.033
	[0.053]	[0.051]	[0.121]	[0.097]	[0.107]	[0.105]	[0.119]	[0.137]
Region fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Census and geographic controls	No	Yes	No	Yes	No	Yes	No	Yes
Mean of Dependent Variable	0.054	0.054	0.384	0.384	0.252	0.252	0.592	0.592
R-squared	0.032	0.30	0.00	0.53	0.00	0.56	0.02	0.28
Observations	948	948	948	948	948	948	948	948
Effect of 1 st. dev. change	0.006	0.007	0.002	-0.010	-0.005	0.006	-0.007	-0.0019
Persuasion rates	0.03	0.03	0.01	-0.05	-0.03	0.03	-0.07	-0.01

Notes: The specification report the results of OLS specifications, with the observations weighed by village population. This extended sample includes villages in the broader Croatian region not directly visited by the authors. The variable "Predicted availability" (Columns 2, 4, 6, 8) is estimated from a probit regression of measured availability on the computed maximum signal strength of Serbian RTS radios. The full set of control variables is listed in Appendix Table A1. 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 ethnically offensive graffiti.

	Indicator for ethnically offensive graffiti in a village						
	OLS	OLS	OLS	OLS	OLS	IV	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
At least 1 Serbian (RTS) radio available	0.373***	0.283**	0.269**	0.250*	0.188	0.509	
	[0.115]	[0.120]	[0.132]	[0.129]	[0.202]	[0.419]	
At least 2 Serbian (RTS) radios available					0.107		
					[0.278]		
Predicted availability of at least 1 Serbian (RTS) radio							-0.041
							[0.383]
Region fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Distance to Serbia, logged	No	Yes	Yes	Yes	Yes	Yes	Yes
Census and geographic controls	No		Yes	Yes	Yes	Yes	Yes
Additional controls	No		No	Yes	Yes	Yes	Yes
Mean of Dependent Variable	0.26	0.26	0.26	0.26	0.26	0.26	0.26
R-squared	0.07	0.19	0.24	0.28	0.28	0.25	0.25
Observations	138	138	138	138	138	138	138
χ^2-stat for instruments						8.07	

Notes: The specification report the results of OLS and IV specifications, with the observations weighed by village population. This 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 instrument for radio availability in Column 6 is the maximum signal strength of Serbian RTS radios. The variable "Predicted availability" (Column 7) is estimated from a probit regression of measured availability on the computed maximum signal strength of Serbian RTS radios. The full set of control variables is listed in Appendix Table A1. 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%

Appendix Figure A1. Example of an ethnically offensive graffiti: “Ubi Srbina” - “Kill the Serb”

Appendix Table A1. Summary Statistics

	Baseline Sample		Extended Sample	
	Mean	Std. Dev.	Mean	Std. Dev.
Radio Availability Measures				
At least 1 RTS radio available	0.10	0.30		
At least 2 RTS radios available	0.06	0.23		
Predicted availability of at least 1 RTS radio	0.11	0.11	0.05	0.08
Predicted availability of at least 2 RTS radios	0.07	0.14	0.02	0.08
Dependent Variables				
Vote share of extreme nationalistic party	0.06	0.06	0.06	0.05
Vote share of moderate nationalistic party	0.40	0.14	0.38	0.12
Vote share of social-democratic party	0.26	0.13	0.27	0.11
Turnout	0.56	0.09	0.59	0.08
Ethnically offensive graffiti	0.42	0.50		
Census Controls				
Population	8305	10846	10015	16246
% of Croats	75.05	27.21	86.55	17.88
Disabled after the war of independence	0.02	0.01	0.01	0.01
Economically active population	0.41	0.03	0.41	0.03
People with higher education (%)	0.04	0.03	0.04	0.03
Male (%)	0.48	0.01	0.49	0.02
People aged 21-40 (%)	0.27	0.02	0.27	0.03
People of aged 41-60 (%)	0.26	0.03	0.25	0.03
People of aged 61+ (%)	0.21	0.04	0.21	0.05
Geographic Controls				
Distance to Serbia	16.20	8.96	59.33	38.86
Large forest nearby	0.23	0.42	0.23	0.42
Additional Controls				
Monument in honor of defendants of the town	0.64	0.48		
Names of the streets in Cyrillic script	0.09	0.29		
Names of the streets in Hungarian	0.03	0.17		
Serbian beer in bars	0.08	0.26		
Was important during the war	0.26	0.44		
Number of observations	138		948	

Notes: List of all the control variables for the baseline sample of villages (first two columns) and for the extended sample (next two columns).

Appendix Table A2. Summary of the Design of the Laboratory Experiment

	Control (Croatian Radio)	**B92 Serbian Radio Treatment**	**RTS Serbian Radio Treatment**
5 min	News on neutral Croatian Radio (Imports of natural gas in Croatia secured for the next three years, news on trading in shares of the INA company, Workers of Trimot, government owned company in Imotski, will be paid their outstanding wages for previous 6 months)		
2 min	Song: Hladno pivo – Teško je ful biti kul *(Croatian song)*	Song: Jelena Karleuša – Insomnia *(Neutral Serbian song)*	Song: Ceca -Lepi grome moj *(Loaded Serbian song)*
3 min	News on neutral Croatian Radio 2 (News on the process of extradition of Croatian former Prime Minister from the Republic of Austria to Croatian judiciary, Austrian prosecution for his involvement in money laundering, INTERPOL discovered his secret accounts, Sanadres's involvement in the affair Hypo Alpe-Adria-Bank)		
30 sec.	Signature tune of Croatian radio	Signature tune of B92	Signature tune of RTS Radio Belgrad
2 min	Song: Magazin -Sijamski blizanci *(Croatian song)*	Song: Željko Samardžić - 9000 metara *(Neutral Serbian song)*	Song: Riblja Čorba - Letovanje *(Loaded Serbian song)*
5 min	News from Croatian Radio: Awards given for the establishment of the first Croatian radio in Istra, Radio Pula. Awards given for contribution to its work and for maintaining it in unfavorable political conditions. Museum exhibition of mammals that lived on the territory of Croatia during the last Ice Age has been opened.	News from B92: Report by Dick Marty, which claims that Kosovo Prime Minister Hashim Thaci was involved in trafficking human organs form detained Serbian and non-Albanian civilians in war(1999-2000), has been accepted, Serbia has great interest in discovering the full truth about war crimes for future relations with Kosovo.	News from RTS Radio Belgrad: Report by Dick Marty, which reports about Kosovo's Prime Minister HashimaThaci involvement in weapon and human organs trafficking has been accepted, Talk about the problems that this report carries: questions about the institutions responsible for these crimes, intimidating witnesses, many institutions were aware of the facts disclosed in the report, political and judicial consequences of the report. Talk about the significance of this report for Serbia, since it itself is investigated war crimes committed in Kosovo.