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# The voice of radio in the battle for equal rights: Evidence from the U.S. South

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**Abstract**

Although the 1960s race riots have gone down in history as America's most violent and destructive ethnic civil disturbances, a consensus on the factors able to explain their insurgence is yet to be found. Using a novel data set on the universe of radio stations airing Black-appeal programming, the effect of the media on riots is found to be sizable and statistically significant. A marginal (1%) increase in signal reception from these stations is estimated to lead to a 2.4% and 4.1% rise in the mean levels of the frequency and intensity of riots, respectively. Several mechanisms behind this result are considered, with the quantity, quality, and length of exposure to radio programming all being decisive factors.

**KEYWORDS**

conflict, enfranchisement, media, minority rights

The masses of African Americans who have been deprived of educational and economic opportunity are almost totally dependent on radio as their means of relating to the society at large. They do not read the newspapers .... Television speaks not to their needs, but to upper middle class America. One need only recall the Watts tragedy and the quick adaptation of the “Burn Baby Burn”

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slogan to illustrate the pervasive influence of the radio announcer on the community.

—Martin Luther King Jr., *keynote address, National Association of Radio and Television Announcers Convention, Atlanta, September 28, 1967.*

## 1 | INTRODUCTION

During the 8-year period between 1964 and 1971, 752 race riots occurred across the United States. These episodes of social unrest led to 228 deaths, almost 70,000 arrests and 16,000 episodes of arson and other destructive events.<sup>1</sup> For their frequency and destructiveness, the 1960s riots have been studied in depth by both policy-makers and scholars alike and, mainly due to their apparent unpredictability, explaining the causes of such riots has been the primary focus of analysis (Bryan, 1979; McPhail, 1994; McPhail & Wohlstein, 1983; Myers, 2010). Notwithstanding the fact that numerous theoretical and empirical explanations have been put forward in this literature over the past 50 years, no consensus has yet emerged on what drove the social unrest.

In this paper, I build on existing anecdotal evidence to provide the first quantitative assessment of the role that the media has played in driving both the frequency and the severity of the race riots. In particular, using both cross-sectional and panel data sets, southern radio stations airing Black-appeal programming are estimated to be a highly significant predictor for both the insurgence and the severity of riots. Through their active and ingrained engagement in local African American communities, these radio stations are found to be the channel through which knowledge of random sparks happening within the county's boundaries reached a wide enough audience for riots to emerge. For their ability to coordinate subsequent protests and demonstrations, these radio stations also played a key role in affecting the conflicts' overall destructiveness.

To quantify the role played by Black-appeal radio stations, a novel and comprehensive list of all stations active in 1964 is collected, along with information on the location, power and frequency of each antenna. These variables, in conjunction with geographic information system applications, are then used as inputs in a model of electromagnetic signal propagation to estimate the transmission of radio waves across the U.S. South. In the main analysis, the exogeneity of the treatment variable is validated by showing that the variation in the reception of the signal is uncorrelated to all those county-level characteristics that might have had an effect on riots. Subsequently, the reception of the signal from a Black-appeal radio station is found to be a strong and robust predictor of both more frequent and more severe disturbances. Importantly, this effect remains robust to the inclusion of a wide array of controls, and to the use of either propensity score analyses, regression discontinuity designs, instrumental variables specifications and panel techniques. In the preferred specification, a marginal (1%) increase in the share of the county receiving the signal from a Black-appeal radio station is estimated to lead to a 2.4% and 4.1% rise in the mean levels of the frequency and intensity of riots, respectively.

To shed light on the underlying mechanisms at play, information is also collected on both the type of programming aired by each station and on the share of Black-appeal programming in the weekly schedule. Furthermore, by leveraging on the fact that most of

these stations tended to be relatively small and poorly funded—and were thus active for only a handful of years—the list of all Black-appeal radio stations is assembled also for 1968. First, the results are driven by the subset of radio stations that devoted a larger fraction of their weekly schedule to airing Black-appeal programs: the quantity of programming mattered. Second, even within the subset of stations exclusively airing Black-appeal programs, only the stations that aired more politically charged content had a meaningful impact on the emergence of riots: the content of programming mattered. Lastly, by exploiting the idiosyncratic survival rate of radio stations, it emerges that only those stations that stayed in operation for longer had a robust effect on the frequency and severity of riots, while those stations that either quickly shut down or only subsequently opened up had no meaningful impact: the resilience of radio stations mattered.

The contributions of this paper are threefold, and span several fields of research. First, by demonstrating that Black-appeal radio stations were important actors in developing ethnic conflicts, this paper provides a direct empirical application to the theoretical argument stating that individuals prefer to obtain like-minded information from the media, and that these biased media outlets can exert a nontrivial persuasion effect (Knight & Tribin, 2018). In fact, while there exists an extensive literature on the effect played by either the television or the print media, relatively less is known on the impact of radio in affecting people's attitudes toward social and political issues.<sup>2</sup> Among the existing studies finding a robust effect of radio on political participation, Yanagizawa-Drott (2014) provides evidence that historical variation in the hate-radio station RTLM contributed to the Rwandan Genocide, by leading to persuasion and imitation by neighboring communities. Blouin and Mukand (2019) instead find that exposure to the government Radio Rwanda led to higher interethnic trust and cooperation as well as lower ethnic salience. In the context of the Nazi-fascist occupation of Italy between 1943 and 1945, Gagliarducci et al. (2020) show that BBC radio counter-propaganda significantly affected the intensity of the resistance movement against the Nazi occupation and fascist regime, while Adena et al. (2015) find a strongly positive effect of the Nazi radio propaganda on the popular support to the Nazi regime. Exploiting a similar estimation strategy to the one used in this paper—based on the variation in radio signal strength resulting from topographic factors—Wang (2021) measures the extent to which charismatic individuals exploit the media to shape political outcomes by focusing on the impact of the first populist radio personality in American history: Father Charles Coughlin.<sup>3</sup> Although all these studies point to the significant persuasion exerted by radio, they do so by analyzing one single radio station at a time. This paper adds a layer of complexity by considering the effect of all those radio stations that aired at least 12 h of Black-appeal programming a week: 200 stations in 1964 and 157 additional ones in 1968. The variation stemming from this large set of stations is exploited to more precisely pin down the persuasion effect of radio. In particular, Black-appeal radio stations could be expected to have exerted a significant effect on riots, by coordinating and pooling local African American communities, when: (i) radio stations are more ingrained in the local community (proxied by the share of airtime devoted to Black-appeal programming or by the length of operation of radio stations); and (ii) radio stations more openly discuss political topics in their programs. This paper finds support to both of these hypotheses.

Second, this paper sheds light on over 50 years of debate seeking to isolate the common drivers of the 1960s race riots. Since the early work by Spilerman (1970, 1971, 1972, 1976), a wide array of theoretical explanations for both the frequency and destructiveness of riots

have been put forward and empirically tested (Bryan, 1979; McPhail, 1994; McPhail & Wohlstein, 1983). Although these lied across a wide spectrum ranging from structural strain arguments (Smelser, 1962) to absolute and relative deprivation (Downes, 1968; Gurr, 1968), to lack of political representation (Lieberson & Silverman, 1965), only two variables were ever found to satisfactorily explain most of the variation in riots observed across cities: the size of the non-White population and a regional dummy indicator. More recently, starting with the observation that upheavals tend to cluster geographically and temporally, diffusion models assess whether riots are indeed more likely as a result of contagion from similar events, by exploiting functional forms for both spatial and temporal proximity, as studied in Myers (1997, 2010).<sup>4</sup> Through quantifying the role exerted by Black-appeal radio stations in channeling the information of single sparks and in coordinating protests, this paper lends support to this diffusion argument. It does so by directly measuring the relevance of such communication networks through testing the role of radio stations on the emergence and severity of riots. Riots ought not to be treated as unpredictable and random events, for the nexus between isolated sparks and full-blown riots is provided by the presence of Black-appeal radio stations. Analyzing the local media is important, as it further controls for the fact that most of the 1960s riots tended to be relatively small events that likely did not receive national media coverage.

Third, this paper contributes to the literature studying the social and economic consequences of the 1960s race riots in the short, medium and long-run. With riots taking place mostly in African American neighborhoods, Collins and Margo (2007) and Collins and Smith (2007) find that these civil disturbances led to a statistically significant and large fall in the value of African American property. The 1960s riots are also associated with long-term changes in the ethnic composition of cities, through their role in the *white flight* observed across urban hubs (Boustan, 2010; Collins & Margo, 2007) and in worsening the labor market outcomes of African Americans (Collins & Margo, 2004).<sup>5</sup> For a lack of an identifiable common driver, all these studies have resulted in treating race riots as if generating from a black-box when, however, these ought not to be treated as unpredictable or idiosyncratic events. Augmenting these ex-post evaluations with the mechanisms linking single sparks to full-blown civil disturbances might lead to additional insights, that are specific to those communities with access to these radio stations. For instance, for their ingrained presence across African American communities, Black-appeal radio stations might have had a long-lasting social and economic impact above and beyond the insurgence of riots. In communities deeply affected by riots, radio stations could have contributed to increased participation in postriot reconstruction efforts, while reducing the salience of ethnicity and augmenting interethnic trust.

The remainder of the paper is organized as follows. Section 2 presents the institutional framework. Section 3 describes the data set assembled for this study, including a description of the novel and comprehensive list of radio stations and race riots. Section 4 constitutes the main body of analysis. After documenting the exogeneity of radio signals (Section 4.1), Section 4.2 analyzes the effect of radio stations on the frequency and intensity of riots, with these results validated also through the use of instrumental variables in Section 4.3. Section 4.4 considers the role played by the content of the programming aired by the radio stations in driving the overall results, and panel techniques in Section 4.5 reinforce the main results while highlighting additional underlying mechanisms at play. Section 5 presents an overall discussion of the results and Section 6 concludes.



## 2 | INSTITUTIONAL CONTEXT

The 1960s has gone down in history as a decade of radical and extreme change. Across civil and voting rights, African Americans made historic gains toward legal equality, while race riots caused persistent divisions within and between cities. The radio represented the dominant mass medium of the age, and Black-appeal radio stations started to establish themselves as the most influential communication tool among African American communities.

The key determinant in driving the results of this paper is whether—and to what extent—Black-appeal radio stations were an important source of knowledge and information for African Americans during the sample period under consideration. Indeed, these radio stations could have had an impact on riots only if African Americans tuned in regularly to listen to these stations, and the messages aired were well-received by their audiences. As data to empirically prove both of these points have never been collected systematically, surveys and anecdotal evidence are used to document the ingrained and pervasive role of Black-appeal radio stations. These results, presented in Appendix F, confidently indicate that, during the 1960s: (i) African Americans relied on the radio as the leading source of information and entertainment; (ii) preference leaned strongly toward Black-appeal radio stations; and (iii) these stations had an important influence on the behavior of its audience.

### 2.1 | The race riots of the 1960s

Although ethnic conflicts, demonstrations and protests already emerged in the first half of the 20th century, the concentration of the 1960s riots, both in terms of their intensity, frequency and geographic distribution, made them entirely unique and unprecedented events. Importantly for this study, the 1960s race riots emerged, almost exclusively, within African American communities. And although sociologists tend to classify the 1960s riots with the term *black aggression*, attacking whites was not the aim of these riots; rather, as identified in the Kerner Commission report, “while the civil disorders of 1967 were racial in character, they were not interracial. The 1967 disorders, as well as earlier disorders of the recent period, involved action within Negro neighborhoods against symbols of white American society—authority and property—rather than against white persons.” Furthermore, the background of these disorders was characterized by heavily localized and county-specific features. From the report, these include “severely disadvantaged conditions for Negroes, especially as compared with those for whites; a local government often unresponsive to these conditions; federal programs which had not yet reached a significantly large proportion of those in need; and the resulting reservoir of pervasive and deep grievance and frustration in the ghetto.” Black-appeal radio stations are necessary, albeit not sufficient for riots to emerge. Radio stations acted as a coordination device by propagating the knowledge of the first spark, with the latter in itself remaining, in part, a random event: “At some point in the mounting tension, a further incident—in itself often routine or even trivial— became the breaking point, and the tension spilled over into violence.”<sup>6</sup>

But could Black-appeal radio stations then be condemned for the insurgence of riots? In the report’s Chapter 15—“The News Media and the Disorders”—the Commission openly criticized the news media for their lack of substantive coverage of the African American community, having “thus far failed to report adequately on the causes and consequences of civil disorders and underlying problems of race relations,” and blaming the media as an important factor

contributing to the riots. “The Commission was particularly interested in public reaction to media coverage; specifically, what people in the ghetto look at and read and how it affects them. ... Most Negroes distrust what they refer to as the ‘white press’.” And although the ‘Black press’ was not criticized as the culprit for rioting, Black-appeal radio stations were the only type of media that was identified as having contributed to the social disorders by exacerbating riots through over-detailed news reporting. “Among the established media, television and radio are far more popular in the ghetto than newspapers. ... In other age groups, the response of most people about what they listen to on the radio was ‘anything,’ leading to the conclusion that radio in the ghetto is basically a background accompaniment. But the fact that radio is such a constant background accompaniment can make it an important influence on people’s attitudes, and perhaps on their actions once trouble develops. This is true for several reasons. News presented on local ‘rock’ stations seldom constitutes much more than terse headline items which may startle or frighten but seldom inform. Radio disc jockeys and those who preside over the popular ‘talk shows’ keep a steady patter of information going over the air. When a city is beset by civil strife, this pattern can both inform transistor radio-carrying young people where the action is, and terrify their elders and much of the white community. ‘Burn, baby, burn,’ the slogan of the Watts riot, was inadvertently originated by a radio disc jockey. Thus, radio can be an instrument of trouble and tension in a community threatened or inundated with civil disorder” (U.S. National Advisory Commission on Civil Disorders, 1968, pp. 207–211) All in all, the report stressed that Black-appeal radio stations had a meaningful role to play in the coverage of urban unrest.<sup>7</sup>

### 3 | DATA

This paper estimates the effect that Black-appeal radio stations had on African American communities in the U.S. South. To carry out this analysis, a rich novel data set has been built, and its key elements are described below.

#### 3.1 | Black-appeal radio stations

A novel and comprehensive data set on Black-appeal radio stations active in both 1964 and 1968 has been assembled by combining different sources of the media industry. To the best of my knowledge, this is the most complete set of information on Black-appeal radio stations that has ever been used in the empirical literature.

To construct the 1964 sample, the primary source is Sponsor (1964). From the early 1950s until the mid-1960s, this magazine has been the first and most reliable outlet to present detailed statistics and analyses on African Americans’ role and impact in shaping the media (chiefly radio) industry. It did so for the sake, and from the eyes, of the advertising industry, which constituted the magazine’s key readership. Starting in 1952, it began to publish the once-per-annum report titled *Negro market* and, by the early 1960s, it further included the *Directory of major Negro-appeal radio stations in the United States*. However, it is only with the 1964 publication that this list includes all those stations with a significant amount of Black-appeal programming to be safely classified as Black-programmed radio stations. In particular, out of the close to 500 stations that are mentioned to be having some appeal to the African American

community in 1964, only 200 southern stations enter this list by airing at least 12 h of Black-appeal programming a week and, of these, 59 are reported to be 100% Black-appeal stations.<sup>8</sup>

The magazine *Sponsor* ceased to exist in 1964. Therefore, to construct the 1968 sample, the directory—titled *Radio stations regularly scheduling Negro programs*—by Spot Radio Rates and Data (1968) is instead considered. Besides being published by Standard Rate & Data Service, Inc.—a traditional source of reliable market data in the media industry—this directory is the only one that, to the best of my knowledge, in these post-1964 years, reports not only a list of Black-appeal radio stations but also the total number of hours airing these programs. From the 1968 directory, information on all radio stations that broadcast at least 12 h of Black-appeal programming has been collected and digitized.<sup>9</sup> In 1968, there were 157 southern stations airing at least 12 h of Black-appeal programming a week and, of these, 59 were 100% Black-appeal. Although the total number of radio stations that exclusively targeted African Americans is the same for both years in the sample, there is a considerable degree of variation across counties and states over time. Table A2 presents a summary of the radio stations used in this study.

### 3.2 | The Irregular Terrain Model (ITM)

For each station in the data set, information on the location, frequency and strength of each radio tower (200 in 1964 and 157 in 1968) has been used to construct the predicted spatial propagation of the radio signal. The model used to predict coverage is the ITM, in conjunction with publicly available Shuttle Radar Topography Mission (SRTM) terrain data. To make the estimated coverage from ITM and SRTM operational for this study—to geocode and georeference the signal coverage of each radio station with the counties—three geographic information system (GIS) applications (Google Earth, ArcGIS, and QGIS) have all been used.<sup>10</sup>

To address the role that topography has in this physical model of electromagnetic signal propagation, variables related to the surface over which the signal travels have been constructed and included as controls in the analysis. Furthermore, the predicted free-space (line of sight) coverage signal is included as an additional regressor in this study: for each radio station, it measures the expected coverage had there not been obstacles to the propagation of the radio waves. In practice, there are a number of elements (e.g., buildings, mountains, parks, but also the air and the curvature of the earth) that make the signal decay faster. By including the free-space signal as an additional regressor, the role of topography is further isolated, and the estimated effect is obtained only out of the variation in signal reception that is due to topography.

### 3.3 | Measuring the race riots of the 1960s

Starting with the early 1970s, sociologists have started to collect information from media outlets and government agencies to systematically study the riots of the 1960s. Among others, the sources exploited for these studies include the Riot Data Review compiled by the Lemberg Center for the Study of Violence at Brandeis University, the Congressional Quarterly's Civil Disorder Chronology of 1967, the Kerner Commission report of 1968 and newsclips from both the *New York Times* and the *Washington Post*. As these sources are based on either different definitions of riots, different samples or time horizons, this paper is based on their combination,

by following the approach firstly developed by Spilerman (1970) and subsequently refined by Carter (1986).<sup>11</sup> Spilerman's definition of a race riot being a spontaneous event, which involved at least 30 people, some of whom African Americans, resulting in either aggressive behavior, looting, or property damage, has become the standard academic definition when studying the 1960s riots. Importantly, this definition excludes all the protests which could have been resulted from civil rights activism and protests, by considering only disturbances that occurred outside of school settings and civil rights demonstrations. This paper exploits Carter's original data set to measure both the extensive and intensive margins of race riots.

As for the extensive margin, I consider the frequency of riots at the county-level, by focusing on the share of race riots (the total number of riots in county  $c$  in state  $s$  standardized by the total number of riots in all southern counties):

$$\text{Extensive Margin}_{c,s} = 100 \cdot \left[ \frac{\sum_r^R \text{Riot}_{r,c,s}}{\sum_c \sum_r^R \text{Riot}_{r,c,s}} \right]. \quad (1)$$

The intensive margin is instead based on a cumulative index of riot severity:

$$\text{Intensive Margin}_{c,s} = \sum_r^R \text{Severity Index}_{r,c,s} = 100 \cdot \left[ \sum_{i=1}^5 \frac{X_{i,r,c,s}}{X_{i,T}} \right], \quad (2)$$

where  $X_{i,r,c,s}$  is one of the five indicators of severity collected by Carter (1986), for each riot  $r$  that occurred in county  $c$  and state  $s$ . These are: (i) days of rioting; (ii) number of deaths; (iii) injuries; (iv) arrests; and (v) episodes of arson reported by police during the riot.  $X_{i,T}$  is the sum of each indicator  $i$  across all the riots that occurred in the U.S. South during 1964–1971. For each riot  $r$ , the sum of all the five ratios (one for each indicator  $i$ ) is the severity index associated with that given riot: *Severity Index* <sub>$r,c,s$</sub> .<sup>12</sup> To allow for the possibility that more than one riot  $r$  could have occurred within a given county, the sum of this index across all the riots that occurred in county  $c$  and state  $s$  is considered to form the cumulative index of severity: *Intensive Margin* <sub>$c,s$</sub> .

When measuring the impact of the media on riots using a panel dimension, I augment the data set of Carter (1986) with the information on riots collected in Olzak (2015). The latter is similarly based on Spilerman (1970), but considers all race conflicts during the period 1954–1992. It differs from Carter (1986) on the source of information used (Olzak, 2015 only considers the *New York Times*) and on the definition of what constitutes a race riot: a demonstration where at least 50 people participated, with some form of violence and lasting for at least two hours. In this study, information on the period 1960–1963 available from Olzak (2015) is added to the one previously considered (1964–1971). Before doing so, the correspondence between the two datasets has been carefully cross-checked.<sup>13</sup>

### 3.4 | Other controls and summary statistics

Summary statistics on all the variables included in this study are presented in Table A1. In line with knowledge of how radio waves propagate over land and water, treated counties (i.e., those receiving the radio signal) are smaller and have both fewer rivers and lakes, while being less mountainous. These counties have larger shares of African Americans in the total population (also measured through the share of non-White households) and are more likely to be covered

by the Voting Rights Act (VRA) of 1965. They are also more populous (higher density) and have a larger manufacturing sector, along with a more ingrained presence of historically Black colleges and universities (HBCUs), and with a larger fraction of the population enrolled in school. On the other hand, the two groups are more similar along other indicators of socioeconomic development, such as the unemployment rate, as well as poverty and income levels. Birth rates, the age distribution, the average number of members in the households and median school years are similar between the two groups. Indicators for the standard of living also tend to be comparable: the share of farms with electricity, and the share of households with television sets and cars. Treated counties have smaller agricultural and mining sectors and have fewer farms (measured as either the land covered by farms or through an indicator of agricultural productivity). They also have lower per capita expenditures on highways. Regarding indicators of race relations pre-1964, the counts of lynchings against African Americans are similar between the two groups, while treated counties experienced more episodes of anti-Black activism, and had more local branches of both the National Association for the Advancement of Colored People (NAACP) during 1957–1964 and the Ku Klux Klan (KKK) during 1925–1940.

Some of these differences are statistically significant and large in magnitude. To address this potential endogeneity threat, which would inevitably lead to biased estimates, several techniques are considered in the rest of the paper. Reassuringly, the main results of the paper remain robust in these more demanding specifications.

## 4 | THE VOICE OF BLACK-APPEAL RADIO STATIONS

Radio is found to have shaped the behavior of its listeners in an important way: Black-appeal radio stations, especially those more ingrained in the local communities they served, led to significantly more frequent and more severe riots. This result also depends on the length of operation of radio stations and on the amount of coverage of political events.

### 4.1 | Media and county characteristics

This study exploits signal reception of Black-appeal radio stations as an exogenous determinant of media bias through radio listenership. The identification strategy is modeled through both cross-sectional and panel frameworks, along with instrumental variables, propensity score matching techniques and regression discontinuity designs, and it is based on the county-level variation in the signal reception of Black-appeal radio stations. The exposure to the signal received is computed either as a continuous statistic (the share of the county being covered) or through a dummy indicator equal to one when the majority of the county is covered.

As a first step in ensuring that the requirements for a successful identification of the effects are met, I verify that radio coverage (the independent variable in the main analysis) is unrelated to all the county-level characteristics that might have had an effect on the dependent variables (the extensive and intensive margins of race riots). I hereby propose a specification to formally assess whether the exposure to radio stations is balanced with respect to a wide array of pre-period county-level controls.

First, I include state fixed effects to control for the most persistent structural differences across states in the U.S. South. Second, I consider a vector of topographic controls: since the electromagnetic signal propagates differently over land and water, as well as deviating when

hitting large obstacles (such as mountains or hills), these variables include the size of lakes, the length of rivers, the overall size of the county, the presence of National Parks and of mountains, and a dummy indicator for those counties facing the sea. Controlling for these topographic variables also helps to account for all the unobserved differences in political or social organizations between, for instance, mountainous counties and their maritime counterparts, or between counties extensively covered by forests or lakes. This further lends support to the validity of the analysis, as these differences might also be important in how riots emerge and evolve.

To test for the orthogonality between the signal reception and a range of socioeconomic characteristics, I estimate the following regression for the cross-section of southern counties:

$$\text{Radio Signal}_{c,s} = \alpha_s + \mathbf{X}_{c,s}\gamma_1 + \text{Topography}_{c,s}\gamma_2 + \epsilon_{c,s}. \quad (3)$$

In this model, the dependent variable,  $\text{Radio Signal}_{c,s}$ , measures whether county  $c$  in state  $s$  is exposed to a Black-appeal radio station,  $\text{Topography}_{c,s}$  is a vector including the full set of geographic controls and  $\alpha_s$  are state fixed effects. If the exposure to Black-appeal radio stations is to be balanced with respect to pre-period county characteristics, which are represented by the vector  $\mathbf{X}_{c,s}$ , then the vector of estimated coefficients  $\gamma_1$  should be indistinguishable from zero.<sup>14</sup>

Table 1 reports the coefficients  $\gamma_1$  of Equation (3) estimated through ordinary least squares (OLS). The first two columns suggest that the degree to which a southern county receives the signal from any Black-appeal radio station is unrelated to 24 variables. The only factor reaching significance at conventional levels is the one measuring the share of households with a television handset in 1960. And if any of the included controls were to be relevant in predicting signal reception, television ownership is arguably the most plausible one: after controlling for all other county-level socioeconomic variables, more television sets (which remained a significant investment in 1960) could be expected to be purchased in counties with better signal reception (Table 2).<sup>15</sup>

Importantly, whether or not a county receives the radio signal is not related to pre-existing measures of race relations in the county. The  $p$  value from a joint  $F$ -test of the lynching variable, the counts of episodes of anti-Black activism, and the location of both NAACP branches and KKK's Klaverns is 0.50 for column (1) and 0.43 for column (2), thus indicating that the estimated coefficients on these variables are jointly indistinguishable from zero. This partly addresses the threat of reverse causality by showing that more Black-appeal radio stations were not set up as a response to more conflicts in the first half of the 20th century (nor in the first half of the 1960s). This, and the fact that no other pre-period control is correlated with the propagation of radio waves, in turn ought to provide support in claiming the exogeneity of radio coverage in the subsequent analyses of this paper.

To directly assess how each of the 25 controls affects the main dependent variables, the specification presented in Equation (3) is estimated with either the extensive margin of riots, column (3) of Table 1, or the intensive margin, column (4). Most of the controls that were not relevant in predicting radio coverage now reach significance at conventional levels. In particular, the pre-1964 measures of race relations seem to have a persistent effect on the dependent variables of columns (3) and (4): more lynchings of African Americans and more frequent episodes of anti-Black activism translate into fewer riots during the period 1964–1971, perhaps due to more stringent law enforcement in these counties. On the other hand, localities with a more pervasive presence of the KKK exhibit both more frequent and more destructive episodes of riots, with the presence of NAACP branches counteracting this effect.<sup>16</sup>



TABLE 1 The determinants of radio signals and riots

|                                    | Radio signal      |                     | Race riots          |                      |
|------------------------------------|-------------------|---------------------|---------------------|----------------------|
|                                    | Dummy<br>(1)      | Continuous<br>(2)   | Frequency<br>(3)    | Intensity<br>(4)     |
| Share of African Americans, 1960   | 0.005<br>(0.006)  | 0.519<br>(0.421)    | 0.033**<br>(0.014)  | 0.179<br>(0.102)     |
| VRA coverage in 1965               | −0.106<br>(0.130) | −13.638<br>(10.650) | −0.314**<br>(0.119) | −2.292***<br>(0.638) |
| Population density, 1960           | 0.238<br>(0.210)  | 19.068<br>(13.465)  | 0.755*<br>(0.371)   | 7.943*<br>(4.375)    |
| Manufacturing size, 1960           | −0.003<br>(0.004) | −0.067<br>(0.271)   | −0.001<br>(0.006)   | −0.147<br>(0.092)    |
| Agriculture size, 1960             | 0.000<br>(0.004)  | 0.191<br>(0.244)    | −0.002<br>(0.006)   | −0.063<br>(0.043)    |
| Mining size, 1950                  | −0.002<br>(0.004) | 0.121<br>(0.280)    | 0.013**<br>(0.005)  | −0.031<br>(0.088)    |
| Agricultural intensity, 1960       | −0.003<br>(0.004) | −0.004<br>(0.325)   | −0.022**<br>(0.009) | −0.121<br>(0.113)    |
| Unemployment rate, 1960            | 0.016<br>(0.014)  | 1.239<br>(1.030)    | −0.021<br>(0.032)   | −0.093<br>(0.255)    |
| Share of families in poverty, 1960 | −0.013<br>(0.013) | −0.670<br>(1.024)   | −0.005<br>(0.026)   | −0.413*<br>(0.195)   |
| Median family income, 1960         | −0.000<br>(0.000) | 0.005<br>(0.014)    | −0.000<br>(0.000)   | −0.004<br>(0.002)    |
| Birth rate, 1960                   | 0.000<br>(0.004)  | 0.266<br>(0.303)    | −0.003<br>(0.010)   | −0.121<br>(0.100)    |
| Household members, 1960            | 0.167<br>(0.168)  | 3.660<br>(9.516)    | −0.833**<br>(0.301) | −2.258<br>(2.621)    |
| Size of farms, 1959                | −0.001<br>(0.001) | 0.009<br>(0.098)    | −0.004**<br>(0.001) | −0.044<br>(0.030)    |
| Non-White households, 1950         | 0.005<br>(0.006)  | 0.356<br>(0.448)    | −0.008<br>(0.014)   | 0.002<br>(0.107)     |
| Farms w. electricity, 1954         | 0.004<br>(0.003)  | −0.027<br>(0.247)   | 0.008<br>(0.012)    | −0.021<br>(0.182)    |
| Households w. tv, 1960             | 0.006*<br>(0.003) | 0.463**<br>(0.216)  | 0.004<br>(0.006)    | 0.091<br>(0.079)     |

(Continues)

TABLE 1 (Continued)

|   | Radio signal      |                    | Race riots          |                     |
|---|-------------------|--------------------|---------------------|---------------------|
|   | Dummy<br>(1)      | Continuous<br>(2)  | Frequency<br>(3)    | Intensity<br>(4)    |
| Households w. two or more cars, 1960      | 0.001<br>(0.005)  | 0.349<br>(0.313)   | 0.014<br>(0.008)    | 0.147*<br>(0.074)   |
| Older than 65 years, 1960                 | 0.023<br>(0.015)  | 1.560<br>(0.977)   | −0.098<br>(0.063)   | −0.266<br>(0.373)   |
| Expenditure on highways, 1962             | −0.017<br>(0.017) | −0.393<br>(1.603)  | −0.013<br>(0.049)   | 0.012<br>(0.373)    |
| Median school years, 1960                 | 0.032<br>(0.041)  | 0.916<br>(2.909)   | −0.011<br>(0.088)   | −0.948<br>(0.705)   |
| Enrolled in school, 1950                  | −0.001<br>(0.001) | −0.032<br>(0.070)  | −0.003**<br>(0.001) | 0.001<br>(0.012)    |
| Lynchings of Afr. Am., 1902–1964          | −0.168<br>(0.129) | −11.652<br>(8.518) | −0.695*<br>(0.383)  | −2.791<br>(3.198)   |
| Anti-black activism, 1960–1964            | −0.001<br>(0.012) | −0.036<br>(0.746)  | −0.038**<br>(0.014) | −0.616**<br>(0.254) |
| NAACP branches, 1957–1964                 | 0.039<br>(0.056)  | 3.936<br>(3.998)   | −0.242**<br>(0.100) | −1.632*<br>(0.866)  |
| KKK Klaverns, 1925–1940                   | 0.031<br>(0.036)  | 1.741<br>(2.916)   | 0.489***<br>(0.120) | 1.826*<br>(0.963)   |
| State fixed effects                       | Yes               | Yes                | Yes                 | Yes                 |
| Topographic                               | Yes               | Yes                | Yes                 | Yes                 |
| Mean dep. var.                            | 0.153             | 16.053             | 0.084               | 0.413               |
| Joint <i>p</i> value: Race relations      | 0.502             | 0.429              | 0.000               | 0.001               |
| Joint <i>p</i> value: All non-topographic | 0.609             | 0.536              | 0.001               | 0.001               |
| <i>R</i> <sup>2</sup>                     | 0.46              | 0.52               | 0.66                | 0.48                |
| <i>N</i>                                  | 1022              | 1022               | 1022                | 1022                |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects and topographic variables. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties.

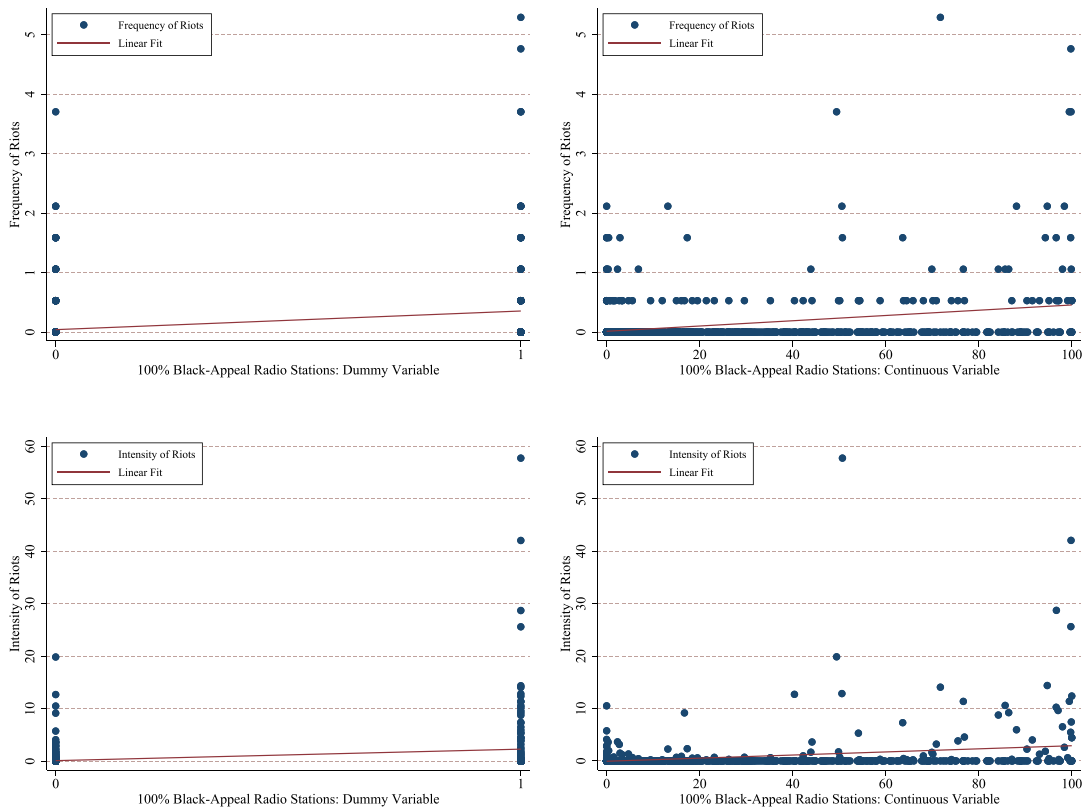
\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Lastly, and in line with expectations and anecdotal evidence, more riots are observed in those counties that are more densely populated and that have a larger fraction of African Americans in the total population. The fact that these controls are significant only with respect to race riots—and not with signal coverage—shows just how important it is to include them

**TABLE 2** The race riots by year and state

|  | 1964 | 1965 | 1966 | 1967   | 1968   | 1969 | 1970 | 1971 | Total  |
|--|------|------|------|--------|--------|------|------|------|--------|
| <i>Panel A. Race Riots in the U.S.</i>                 |      |      |      |        |        |      |      |      |        |
| Number of riots  | 11   | 11   | 53   | 158    | 289    | 124  | 68   | 38   | 752    |
| Days of riots  | 34   | 20   | 109  | 408    | 739    | 284  | 126  | 82   | 1,802  |
| People killed  | 2    | 35   | 11   | 83     | 66     | 13   | 13   | 5    | 228    |
| People injured   | 996  | 1132 | 525  | 2801   | 5302   | 861  | 710  | 414  | 12,741 |
| People arrested  | 2917 | 4219 | 5107 | 17,011 | 31,680 | 4730 | 2027 | 1408 | 69,099 |
| Episodes of arson                                      | 238  | 3006 | 812  | 4627   | 6041   | 369  | 283  | 459  | 15,835 |
| Intensity of riots                                     | 0.16 | 0.50 | 0.28 | 1.35   | 1.96   | 0.37 | 0.23 | 0.15 | 5.00   |
| <i>Panel B. Race Riots in the U.S. South</i>           |      |      |      |        |        |      |      |      |        |
| Number of riots  | 1    | 0    | 10   | 26     | 74     | 35   | 17   | 26   | 189    |
| Days of riots  | 3    | 0    | 17   | 47     | 227    | 74   | 39   | 58   | 465    |
| People killed  | 0    | 0    | 0    | 3      | 11     | 3    | 10   | 3    | 30     |
| People injured   | 15   | 0    | 36   | 164    | 1463   | 91   | 223  | 298  | 2290   |
| People arrested  | 465  | 0    | 207  | 1176   | 4373   | 1070 | 720  | 969  | 8980   |
| Episodes of arson                                      | 0    | 0    | 10   | 322    | 1139   | 81   | 113  | 291  | 1956   |
| Intensity of riots                                     | 0.07 | 0.00 | 0.08 | 0.57   | 2.56   | 0.46 | 0.65 | 0.61 | 5.00   |
| <i>Panel C. Race riots in the U.S. South, by state</i> |      |      |      |        |        |      |      |      |        |
| Alabama  | 0    | 0    | 3    | 1      | 1      | 2    | 1    | 0    | 8      |
| Arkansas   | 0    | 0    | 0    | 1      | 8      | 2    | 1    | 0    | 12     |
| Florida  | 1    | 0    | 4    | 5      | 16     | 7    | 5    | 12   | 50     |
| Georgia  | 0    | 0    | 3    | 4      | 7      | 0    | 3    | 5    | 22     |
| Louisiana  | 0    | 0    | 0    | 3      | 1      | 2    | 4    | 1    | 11     |
| Mississippi  | 0    | 0    | 0    | 1      | 3      | 1    | 0    | 2    | 7      |
| North Carolina   | 0    | 0    | 0    | 2      | 14     | 8    | 2    | 3    | 29     |
| South Carolina   | 0    | 0    | 0    | 0      | 4      | 4    | 0    | 0    | 8      |
| Tennessee  | 0    | 0    | 0    | 3      | 7      | 3    | 0    | 3    | 16     |
| Texas  | 0    | 0    | 0    | 2      | 4      | 4    | 0    | 0    | 10     |
| Virginia   | 0    | 0    | 0    | 4      | 9      | 2    | 1    | 0    | 16     |

when quantifying the impact that Black-appeal radio stations had on both the frequency and the intensity of riots. Furthermore, some of these estimated coefficients move in the opposite direction between columns (1) and (2) and columns (3) and (4), making the inclusion of these variables even more important.



**FIGURE 1** Riots and radio stations: A visual inspection. The figures show the frequency and the intensity of riots against measures of coverage of the radio signal [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/leap.12213)]

## 4.2 | Media and race riots

To visualize the effect of Black-appeal radio stations on the 1960s race riots, both the frequency and the intensity of riots are plotted against the dummy indicator and the continuous variable for the radio signal coverage. As shown in Figure 1, more frequent and more severe riots are registered in the localities that are exposed to radio coverage. Although already apparent with the dummy indicator, this impact is especially pronounced when the continuous variable is considered, as the effect seems to increase with the exposure to Black-appeal radio stations. Figure 2, which exploits the time dimension of the data, further shows that a larger number of riots occurred in the set of counties that were exposed to Black-appeal radio stations.

The orthogonality of treatment with respect to pre-period county characteristics, and the fact that many of these controls instead do affect race riots directly, provide support in exploring whether radio stations had an effect in spurring riots in a full specification with state fixed effects, socioeconomic and topographic controls, as well as pre-1964 measures of race relations. The following regression is estimated, based on the cross-sectional differences in signal coverage across southern counties:

$$Race\ Riots_{c,s} = \alpha_s + \beta_1 Radio\ Signal_{c,s} + \mathbf{X}_{c,s}\gamma_1 + \epsilon_{c,s}, \quad (4)$$



**FIGURE 2** Riots over time by radio signal coverage status. The figure shows the number of race riots for the two set of counties: with and without access to the radio signal [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

where now  $\mathbf{X}_{c,s}$  includes both the vector of pre-period county-level characteristics considered in Equation (3) and also the full set of topographic variables.  $Race Riots_{c,s}$  represents either the extensive or the intensive margins of the 1960s race riots, while the independent variable of interest,  $Radio Signal_{c,s}$ , corresponds to either the dummy indicator or the continuous variable for the coverage of the radio signal from Black-appeal radio stations.<sup>17</sup>

Equation (4) is estimated separately over five different samples of radio stations, according to the share of their weekly programming that is devoted to air Black-appeal content. In the analysis, the following five brackets are considered: (i) all stations with at least 12 h of Black-appeal programming, from as little as 4%–100% (200 stations); (ii) all stations with at least 25% of Black-appeal content (148 stations); (iii) at least 50% (121 stations); (iv) at least 75% (65 stations); and (v) the subset of stations exclusively airing programs that are of interest to African Americans (59 stations). Estimating Equation (4) separately for each bracket is motivated by the a priori expectation that, if Black-appeal radio stations mattered for the frequency and for the intensity of riots, then this effect ought to increase with the extent of being entrenched and ingrained across local African American communities, as proxied by the percentage of the total airtime that is devoted to programs that are of interest to African Americans.

This is exactly what is found in Table 3, where the coefficient  $\beta_1$  from estimating Equation (4) is presented, separately for each bracket, separately for the two definitions of signal coverage, and also separately for the two dependent variables of interest: the frequency of riots, columns (1)–(5), and the intensity of riots, columns (6)–(10). The estimated relationship between the dummy indicator of coverage associated with *any* Black-appeal radio station and both the extensive and intensive margins of riots is positive, although it is not statistically significant. Importantly, restricting the sample to those radio stations that dedicated more airtime to Black-appeal programming has a marked impact on the estimates, with coefficients that both grow in magnitude and are more precisely estimated.

TABLE 3 The effect of radio stations on riots

|  | Frequency of riots |         |         |         |         | Intensity of riots |          |         |         |         |
|--|--------------------|---------|---------|---------|---------|--------------------|----------|---------|---------|---------|
|  | (1)                | (2)     | (3)     | (4)     | (5)     | (6)                | (7)      | (8)     | (9)     | (10)    |
| <i>Panel A: Black-appeal radio stations: Dummy variable</i>      |                    |         |         |         |         |                    |          |         |         |         |
| 100%   | 0.102**            |         |         |         |         | 1.113**            |          |         |         |         |
|  | (0.044)            |         |         |         |         | (0.454)            |          |         |         |         |
| >75%   |                    | 0.099** |         |         |         |                    | 1.081**  |         |         |         |
|  |                    | (0.041) |         |         |         |                    | (0.434)  |         |         |         |
| >50%   |                    |         | 0.063*  |         |         |                    |          | 0.575** |         |         |
|  |                    |         | (0.033) |         |         |                    |          | (0.236) |         |         |
| >25%   |                    |         |         | 0.057*  |         |                    |          |         | 0.454** |         |
|  |                    |         |         | (0.029) |         |                    |          |         | (0.183) |         |
| >0%  |                    |         |         |         | 0.024   |                    |          |         |         | 0.274   |
|  |                    |         |         |         | (0.027) |                    |          |         |         | (0.180) |
| State fixed effects  | Yes                | Yes     | Yes     | Yes     | Yes     | Yes                | Yes      | Yes     | Yes     | Yes     |
| Topographic  | Yes                | Yes     | Yes     | Yes     | Yes     | Yes                | Yes      | Yes     | Yes     | Yes     |
| Socioeconomic  | Yes                | Yes     | Yes     | Yes     | Yes     | Yes                | Yes      | Yes     | Yes     | Yes     |
| Pre-VRA race relations   | Yes                | Yes     | Yes     | Yes     | Yes     | Yes                | Yes      | Yes     | Yes     | Yes     |
| Mean dep. var.   | 0.084              | 0.084   | 0.084   | 0.084   | 0.084   | 0.413              | 0.413    | 0.413   | 0.413   | 0.413   |
| R <sup>2</sup>   | 0.46               | 0.46    | 0.46    | 0.46    | 0.45    | 0.29               | 0.29     | 0.28    | 0.28    | 0.28    |
| N  | 1022               | 1022    | 1022    | 1022    | 1022    | 1022               | 1022     | 1022    | 1022    | 1022    |
| <i>Panel B: Black-appeal radio stations: Continuous variable</i> |                    |         |         |         |         |                    |          |         |         |         |
| 100%   | 0.002**            |         |         |         |         | 0.017***           |          |         |         |         |
|  | (0.001)            |         |         |         |         | (0.004)            |          |         |         |         |
| >75%   |                    | 0.002** |         |         |         |                    | 0.017*** |         |         |         |
|  |                    | (0.001) |         |         |         |                    | (0.004)  |         |         |         |
| >50%   |                    |         | 0.001*  |         |         |                    |          | 0.008** |         |         |
|  |                    |         | (0.001) |         |         |                    |          | (0.004) |         |         |
| >25%   |                    |         |         | 0.001*  |         |                    |          |         | 0.006*  |         |
|  |                    |         |         | (0.001) |         |                    |          |         | (0.003) |         |
| >0%  |                    |         |         |         | 0.001   |                    |          |         |         | 0.003   |
|  |                    |         |         |         | (0.001) |                    |          |         |         | (0.003) |
| State fixed effects  | Yes                | Yes     | Yes     | Yes     | Yes     | Yes                | Yes      | Yes     | Yes     | Yes     |
| Topographic  | Yes                | Yes     | Yes     | Yes     | Yes     | Yes                | Yes      | Yes     | Yes     | Yes     |
| Socioeconomic  | Yes                | Yes     | Yes     | Yes     | Yes     | Yes                | Yes      | Yes     | Yes     | Yes     |



TABLE 3 (Continued)

|                        | Frequency of riots |       |       |       |       | Intensity of riots |       |       |       |       |
|------------------------|--------------------|-------|-------|-------|-------|--------------------|-------|-------|-------|-------|
|                        | (1)                | (2)   | (3)   | (4)   | (5)   | (6)                | (7)   | (8)   | (9)   | (10)  |
| Pre-VRA race relations | Yes                | Yes   | Yes   | Yes   | Yes   | Yes                | Yes   | Yes   | Yes   | Yes   |
| Mean dep. var.         | 0.084              | 0.084 | 0.084 | 0.084 | 0.084 | 0.413              | 0.413 | 0.413 | 0.413 | 0.413 |
| $R^2$                  | 0.46               | 0.46  | 0.46  | 0.46  | 0.45  | 0.29               | 0.29  | 0.28  | 0.28  | 0.28  |
| $N$                    | 1022               | 1022  | 1022  | 1022  | 1022  | 1022               | 1022  | 1022  | 1022  | 1022  |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, topographic variables, Socioeconomic controls, and pre-VRA indicators of race relations. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

The estimates behave in a similar fashion if radio coverage is measured through a continuous statistic. Significant coefficients on the extensive and intensive margins of riots are obtained for the top brackets of radio stations, and this further highlights that the persuasion effect of the media is channeled through radio outlets that are more deeply rooted across local communities. As for the magnitude of the effect, Panel B of Table 3 indicates that a 1% increase in the county's share that is covered by a 100% Black-appeal radio station translates into 0.2% more frequent and 1.7% more severe riots. As there is a substantial amount of southern counties without riots, it is interesting to consider mean values. With the mean levels of the frequency and intensity of riots being 0.084 and 0.413, respectively, the marginal (1%) increase in the share of the county covered by a 100% Black-appeal radio station is then found to lead to a 2.4% and 4.1% increase in the frequency and severity of riots.

Radio signal coverage is orthogonal to a wide array of pre-period controls (Section 4.1). However, to further address additional concerns on the validity of the identification strategy, Equation (5) further includes the variation in the waves' propagation that is due to the role of topography alone. This indicator,  $Unobstructed Signal_{c,s}$ , measures the counterfactual signal propagation of each radio station had there not been any physical obstacles (i.e., with a direct line of sight) between each station's tower and each receiver.<sup>18</sup> Correspondingly, with the inclusion of  $Unobstructed Signal_{c,s}$  as an additional regressor, the  $\beta_1$  coefficient now captures the effect of topography alone, alleviating any remaining concern on the exogeneity in the signal's idiosyncrasies.

$$\begin{aligned}
 Race Riots_{c,s} = & \alpha_s + \beta_1 Radio Signal_{c,s} \\
 & + \beta_2 Unobstructed Signal_{c,s} + \mathbf{X}_{c,s} \gamma_1 + \epsilon_{c,s}.
 \end{aligned} \tag{5}$$

TABLE 4 The effect of radio stations and the free-space signal on riots

|   | Frequency of riots |                    |                   |                   |                  | Intensity of riots  |                     |                    |                    |                  |
|---|--------------------|--------------------|-------------------|-------------------|------------------|---------------------|---------------------|--------------------|--------------------|------------------|
|   | (1)                | (2)                | (3)               | (4)               | (5)              | (6)                 | (7)                 | (8)                | (9)                | (10)             |
| <i>Panel A: Black-appeal radio stations: Dummy variable and free-space dummy signal</i>           |                    |                    |                   |                   |                  |                     |                     |                    |                    |                  |
| 100%  | 0.093**<br>(0.041) |                    |                   |                   |                  | 1.110**<br>(0.469)  |                     |                    |                    |                  |
| >75%  |                    | 0.089**<br>(0.039) |                   |                   |                  |                     | 1.070**<br>(0.446)  |                    |                    |                  |
| >50%  |                    |                    | 0.063*<br>(0.034) |                   |                  |                     |                     | 0.598**<br>(0.230) |                    |                  |
| >25%  |                    |                    |                   | 0.057*<br>(0.029) |                  |                     |                     |                    | 0.471**<br>(0.176) |                  |
| >0%   |                    |                    |                   |                   | 0.023<br>(0.028) |                     |                     |                    |                    | 0.285<br>(0.179) |
| Free-space signal   | Yes                | Yes                | Yes               | Yes               | Yes              | Yes                 | Yes                 | Yes                | Yes                | Yes              |
| State fixed effects   | Yes                | Yes                | Yes               | Yes               | Yes              | Yes                 | Yes                 | Yes                | Yes                | Yes              |
| Topographic   | Yes                | Yes                | Yes               | Yes               | Yes              | Yes                 | Yes                 | Yes                | Yes                | Yes              |
| Socioeconomic   | Yes                | Yes                | Yes               | Yes               | Yes              | Yes                 | Yes                 | Yes                | Yes                | Yes              |
| Pre-VRA race relations  | Yes                | Yes                | Yes               | Yes               | Yes              | Yes                 | Yes                 | Yes                | Yes                | Yes              |
| Mean dep. var.  | 0.084              | 0.084              | 0.084             | 0.084             | 0.084            | 0.413               | 0.413               | 0.413              | 0.413              | 0.413            |
| R <sup>2</sup>  | 0.46               | 0.46               | 0.46              | 0.46              | 0.45             | 0.29                | 0.29                | 0.28               | 0.28               | 0.28             |
| N   | 1022               | 1022               | 1022              | 1022              | 1022             | 1022                | 1022                | 1022               | 1022               | 1022             |
| <i>Panel B: Black-appeal radio stations: Continuous variable and free-space continuous signal</i> |                    |                    |                   |                   |                  |                     |                     |                    |                    |                  |
| 100%  | 0.002*<br>(0.001)  |                    |                   |                   |                  | 0.019***<br>(0.005) |                     |                    |                    |                  |
| >75%  |                    | 0.002*<br>(0.001)  |                   |                   |                  |                     | 0.019***<br>(0.005) |                    |                    |                  |
| >50%  |                    |                    | 0.001*<br>(0.001) |                   |                  |                     |                     | 0.010**<br>(0.004) |                    |                  |
| >25%  |                    |                    |                   | 0.001*<br>(0.001) |                  |                     |                     |                    | 0.008**<br>(0.003) |                  |
| >0%   |                    |                    |                   |                   | 0.001<br>(0.001) |                     |                     |                    |                    | 0.004<br>(0.004) |
| Free-space signal   | Yes                | Yes                | Yes               | Yes               | Yes              | Yes                 | Yes                 | Yes                | Yes                | Yes              |
| State fixed effects   | Yes                | Yes                | Yes               | Yes               | Yes              | Yes                 | Yes                 | Yes                | Yes                | Yes              |

TABLE 4 (Continued)

|                        | Frequency of riots |       |       |       |       | Intensity of riots |       |       |       |       |
|------------------------|--------------------|-------|-------|-------|-------|--------------------|-------|-------|-------|-------|
|                        | (1)                | (2)   | (3)   | (4)   | (5)   | (6)                | (7)   | (8)   | (9)   | (10)  |
| Topographic            | Yes                | Yes   | Yes   | Yes   | Yes   | Yes                | Yes   | Yes   | Yes   | Yes   |
| Socioeconomic          | Yes                | Yes   | Yes   | Yes   | Yes   | Yes                | Yes   | Yes   | Yes   | Yes   |
| Pre-VRA race relations | Yes                | Yes   | Yes   | Yes   | Yes   | Yes                | Yes   | Yes   | Yes   | Yes   |
| Mean dep. var.         | 0.084              | 0.084 | 0.084 | 0.084 | 0.084 | 0.413              | 0.413 | 0.413 | 0.413 | 0.413 |
| $R^2$                  | 0.46               | 0.46  | 0.46  | 0.46  | 0.45  | 0.29               | 0.29  | 0.28  | 0.28  | 0.28  |
| $N$                    | 1022               | 1022  | 1022  | 1022  | 1022  | 1022               | 1022  | 1022  | 1022  | 1022  |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, topographic variables, socioeconomic controls, pre-VRA indicators of race relations, and the unobstructed radio signals. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4 presents the estimated coefficients  $\beta_1$ . The impact of Black-appeal radio stations, which is now estimated only out of the variation in topography, remains strong and robust. It is somewhat larger in the specification with the intensity of riots, leading to a 4.6% increase in the mean level of the dependent variable in the specification with 100% Black-appeal radio stations. The firm similarity between the  $\beta_1$  coefficients estimated using Equations (4) and (5) would suggest that the idiosyncrasy of the topography across southern counties is key in driving the results. This further provides support to the exogeneity of the media variable used.<sup>19</sup>

These estimates consistently point to a scenario in which Black-appeal radio stations mattered significantly, and more so as their role in the local community rose. In what follows, for their larger role in spurring civil disorders, the focus is on the 100% Black-appeal radio stations. As a first check of the main results, in Table 5, the robustness of the  $\beta_1$  coefficients is assessed in a series of alternative specifications. In columns (1) and (5), Equation (5) is estimated using only state fixed effects. In this case, the marginal (1%) increase in the share of the county covered by a 100% Black-appeal radio station is estimated to lead to a 2.4% and 3.6% increase in the frequency and severity of riots. Across all specifications, the coefficients are in line with those obtained from the preferred specification of Equation (5). Any form of omitted variable bias is then partially addressed by the inclusion of topographic controls and measures of pre-period race relations, columns (2) and (6). Lastly, both columns (3) and (7)—corresponding to Equation (4)—and columns (4) and (8)—Equation (5)—include the four indicators of pre-period race relations.

Additional techniques are considered to measure the stability of the main results. For instance, propensity scores are constructed for both the subset of treated and untreated counties as a function of the underlying observables (Appendix B.2). As shown in Table B2,

TABLE 5 The stability of the effect of radio stations on riots

|   | Frequency of riots |                   |                    |                    | Intensity of riots |                    |                     |                     |
|---|--------------------|-------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|
|   | (1)                | (2)               | (3)                | (4)                | (5)                | (6)                | (7)                 | (8)                 |
| <i>Panel A: 100% Black-appeal radio stations: Dummy variable</i>      |                    |                   |                    |                    |                    |                    |                     |                     |
| Radio signal  | 0.111<br>(0.064)   | 0.090<br>(0.057)  | 0.102**<br>(0.044) | 0.093**<br>(0.041) | 1.070**<br>(0.468) | 1.061*<br>(0.481)  | 1.113**<br>(0.454)  | 1.110**<br>(0.469)  |
| Free-space signal   |                    |                   |                    | 0.036**<br>(0.016) |                    |                    |                     | 0.008<br>(0.099)    |
| State fixed effects   | Yes                | Yes               | Yes                | Yes                | Yes                | Yes                | Yes                 | Yes                 |
| Topographic   | No                 | Yes               | Yes                | Yes                | No                 | Yes                | Yes                 | Yes                 |
| Socioeconomic   | No                 | No                | Yes                | Yes                | No                 | No                 | Yes                 | Yes                 |
| Pre-VRA race relations  | No                 | Yes               | Yes                | Yes                | No                 | Yes                | Yes                 | Yes                 |
| Mean dep. var.  | 0.084              | 0.084             | 0.084              | 0.084              | 0.413              | 0.413              | 0.413               | 0.413               |
| R <sup>2</sup>  | 0.39               | 0.42              | 0.46               | 0.46               | 0.26               | 0.27               | 0.29                | 0.29                |
| N   | 1140               | 1140              | 1022               | 1022               | 1140               | 1140               | 1022                | 1022                |
| <i>Panel B: 100% Black-appeal radio stations: Continuous variable</i> |                    |                   |                    |                    |                    |                    |                     |                     |
| Radio signal  | 0.002*<br>(0.001)  | 0.002*<br>(0.001) | 0.002**<br>(0.001) | 0.002*<br>(0.001)  | 0.015**<br>(0.005) | 0.016**<br>(0.005) | 0.017***<br>(0.004) | 0.019***<br>(0.005) |
| Free-space signal   |                    |                   |                    | 0.000<br>(0.000)   |                    |                    |                     | −0.003**<br>(0.001) |
| State fixed effects   | Yes                | Yes               | Yes                | Yes                | Yes                | Yes                | Yes                 | Yes                 |
| Topographic   | No                 | Yes               | Yes                | Yes                | No                 | Yes                | Yes                 | Yes                 |
| Socioeconomic   | No                 | No                | Yes                | Yes                | No                 | No                 | Yes                 | Yes                 |
| Pre-VRA race relations  | No                 | Yes               | Yes                | Yes                | No                 | Yes                | Yes                 | Yes                 |
| Mean dep. var.  | 0.084              | 0.084             | 0.084              | 0.084              | 0.413              | 0.413              | 0.413               | 0.413               |
| R <sup>2</sup>  | 0.39               | 0.42              | 0.46               | 0.46               | 0.26               | 0.27               | 0.29                | 0.29                |
| N   | 1140               | 1140              | 1022               | 1022               | 1140               | 1140               | 1022                | 1022                |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects. Topographic variables are included in columns (2)–(4) and (6)–(8). Socioeconomic controls are included in columns (3)–(4) and (7)–(8). Pre-VRA indicators of race relations are included in columns (2)–(4) and (6)–(8). The unobstructed radio signals are included in columns (4) and (8). Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

regardless of which propensity score framework is considered, the estimated coefficients remain stable in terms of sign, magnitude and significance. The stability of the coefficients is also observed through a regression discontinuity design (Appendix B.2), where only counties within a 15-mile radius from a radio station are considered, and also by replicating the analysis on the subset of counties in which African Americans are a minority of the population (Appendix B.2). Quartic polynomial regressions (Appendix B.2), the Oster (2019) test (Appendix B.2), lasso cross-validation and elastic net techniques (Appendix B.2) are also considered. The balance obtained from these more demanding specifications highlights that the results presented thus far are not reliant on the heterogeneity of covariates in the sample of southern counties, but instead pick up the effect of the media.

### 4.3 | Instrumental variables

Measurement errors in the radio signal variables could threaten the accuracy of the whole analysis.<sup>20</sup> This type of error, which is inherently untestable, would lead to OLS estimates on all included regressors to be both biased and inconsistent. As a first, informal, attempt to provide support to the accuracy of the radio signal variables, the areas generated through the ITM are shown to coincide with historical maps on the radio stations' coverage (Appendix D). To address any remaining inaccuracy in the process generating the signals, or in the measurement of the inputs feeding into the ITM, an instrumental variables (IV) method is considered. The use of IV further addresses the problem of both unobservable and omitted factors.

The included instrument considers the enrollment data of historically Black colleges and universities (HBCUs), standardized by the African American population in the county. This takes into account the decisive role played by HBCUs in the setup and running of many Black-appeal radio stations (Barlow, 1999). The results using the instrument on HBCUs are presented in Table 6, separately for the extensive and intensive measures of riots. The IV coefficient converges to the OLS estimate, with the former remaining between 3.5—for the extensive margin—and 1.9—for the intensive margin—larger than the latter estimate (Panel A). As shown in Panel B via the first stage and the reduced form, the instrument is both valid and informative, as it affects the proportion of counties exposed to the radio signal. It is also partially and sufficiently strongly correlated with the measures of riots once the other independent variables are controlled for.

The larger IV estimates could imply that the OLS specifications are suffering from downward asymptotic bias. For instance, this could be driven by lower estimates of coverage from the ITM in the set of counties experiencing riots. Alternatively, this could be due to unobserved factors positively related to radio signal propagation and negatively related to riots. The difference between the coefficients estimated via IV and OLS might further capture a systematic difference between the local average treatment effect and the average treatment effect (Angrist & Imbens, 1994). The IV only estimates the effect on riots stemming from the set of counties that had radio coverage because they were exposed to HBCUs (and would not have received radio coverage otherwise). The larger IV coefficients might further be driven by either small sample bias or a potential violation of the exclusion restriction. While the former remains a concern—as the  $F$  statistic is smaller than 10—the latter is partly addressed by the fact that the measures of riots considered in this paper exclude disturbances directly associated with civil rights protests and demonstrations, or that occurred in a school setting.<sup>21</sup> By considering this set of events, HBCUs are more likely to impact riots only through their effect on radio stations.

TABLE 6 IV estimates of the effect of radio stations on riots

|   | Frequency of riots |                     | Intensity of riots  |                    |
|---|--------------------|---------------------|---------------------|--------------------|
|   | OLS                | IV                  | OLS                 | IV                 |
|   | (1)                | (2)                 | (3)                 | (4)                |
| <i>Panel A: 100% Black-appeal radio stations: Continuous variable</i> |                    |                     |                     |                    |
| Predicted signal  | 0.002**<br>(0.001) | 0.007***<br>(0.002) | 0.017***<br>(0.004) | 0.032**<br>(0.014) |
| State fixed effects   | Yes                | Yes                 | Yes                 | Yes                |
| Topographic   | Yes                | Yes                 | Yes                 | Yes                |
| Socioeconomic   | Yes                | Yes                 | Yes                 | Yes                |
| Pre-VRA race relations  | Yes                | Yes                 | Yes                 | Yes                |
| Mean dep. var.  | 0.085              | 0.085               | 0.419               | 0.419              |
| N   | 1021               | 1021                | 1021                | 1021               |
| <i>Panel B: IV Summary statistics</i>                                 |                    |                     |                     |                    |
| First stage   |                    |                     |                     |                    |
| HBCUs enrollment  |                    | 0.206**<br>(0.087)  |                     | 0.206**<br>(0.087) |
| F statistic   |                    | 5.531               |                     | 5.531              |
| p value   |                    | 0.040               |                     | 0.040              |
| Reduced form  |                    |                     |                     |                    |
| HBCUs enrollment  |                    | 0.002***<br>(0.000) |                     | 0.007*<br>(0.004)  |

*Note:* Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, topographic variables, socioeconomic controls, and pre-VRA indicators of race relations. The First Stage specification regresses the radio signal continuous variable on the enrollment of HBCUs: the instrument has explanatory power, and it is both valid and informative. The Reduced Form specification regresses the measures of race riots on the enrollment of HBCUs: the instrument is shown to be partially and sufficiently strongly correlated with the measures of riots once the other independent variables are controlled for.

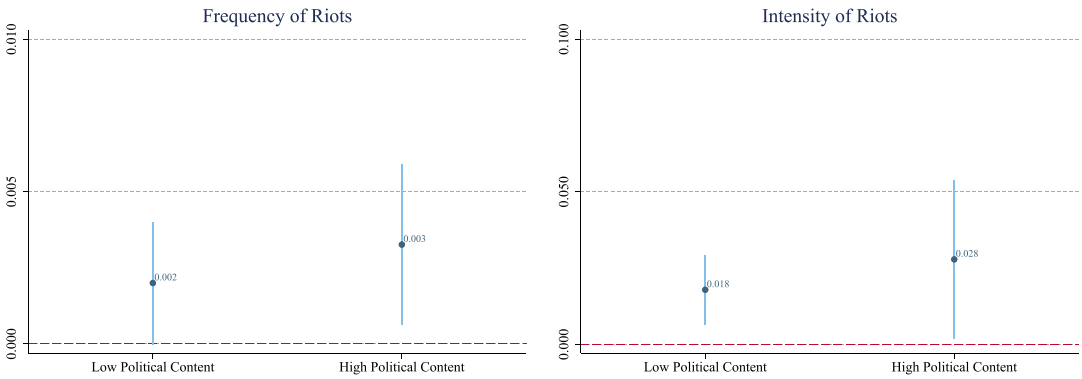
\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Either through measurement errors or latent factors, all these results suggest that the OLS estimates measure a lower bound of the effect of the radio signal on the extensive and intensive margins of riots.

#### 4.4 | The political content of Black-appeal radio stations

Radio stations affect the behavior of their audience through the content they air. That is, although the aggregate effect on riots has been shown to be consistently strong and robust across the board, within-group differences could still exist and might depend on the stations' programming. Out of the 59 stations that exclusively aired Black-appeal programs, comprehensive information on the content of their weekly programming has been collected for 57 of





**FIGURE 3** The political content of radio stations' programming. The two figures plot the  $\delta_1$  and  $\delta_2$  coefficients estimated from the specification presented in Equation (6). The confidence intervals shown are set at the 90% level of statistical significance. Robust standard errors are adjusted for clustering at the state-level. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940 [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

them. Then, a statistic measuring the political content of each station's programming is constructed as the ratio of the sum of the total weekly hours airing programs of news, interviews, religion and public service, divided by the total weekly hours of all programs in the station.<sup>22</sup>

To disentangle whether the aggregate effect on riots might vary depending on the political content of radio stations, the following specification is estimated:

$$\begin{aligned} \text{Race Riots}_{c,s} = & \alpha_s + \delta_1 \text{High Political Radio}_{c,s} \\ & + \delta_2 \text{Low Political Radio}_{c,s} + \mathbf{X}_{c,s} \gamma_1 + \epsilon_{c,s}, \end{aligned} \quad (6)$$

where  $\mathbf{X}_{c,s}$  includes both the vector of pre-period county-level characteristics and the full set of topographic variables. It further includes the share of the county that is covered by the unobstructed radio signals. Then,  $\delta_1$  measures the effect on riots stemming for a marginal (1%) increase in the county's share covered by the signal from a 100% Black-appeal radio station lying in the top tertile of the distribution of political content (*High Political Radio*<sub>c,s</sub>), while  $\delta_2$  measures the effect from less politically-charged programming (*Low Political Radio*<sub>c,s</sub>).

As depicted on the left-hand side of Figure 3, the content of the programming seems to matter as for the extensive margin of riots. In fact, a positive and statistically significant effect is estimated for the subset of stations with a high level of political content, while only a weaker effect is found for the other radio stations. A similar, although less stark, pattern between the two categories of radio stations is found as for the intensity of riots, as shown on the right-hand

side of Figure 3. The point estimate of the coefficient on the *High Political Radio*<sub>c,s</sub> variable is somewhat higher than the one of *Low Political Radio*<sub>c,s</sub>, although not statistically so.

#### 4.5 | Time variation in the exposure to radio stations

The results presented thus far are all based on the cross-sectional variation of signal coverage across southern counties in 1964. They paint a consistent picture: Black-appeal radio stations had a significant and sizable effect on both the extensive and intensive margins of the 1960s race riots. To assess whether the effect on riots varied depending on the length to which stations stayed in operation, the variability in the survival rate of radio stations is exploited. The length of exposure matters on the ability of Black-appeal radio stations to have: (i) a large enough listenership base to have a meaningful impact on riots; (ii) the infrastructure to follow the events as they evolved; and (iii) a sufficient revenue stream to be willing to tackle the most controversial topics. To systematically tackle this question, pre-1964 information on riots has been obtained to cover the whole period 1960–1971. Considering this longer time series on riots allows to rule out that the results that have been uncovered in the rest of the paper could be attributed to other pre-existing variations across southern counties. In particular, although Black-appeal radio stations existed even before 1964, the ex-ante expectation of no pre-1964 effect is supported by qualitative evidence that these stations did very little in addressing controversial topics during the 1950s and early 1960s (Barlow, 1999; Halper, 2014). If Black-appeal radio stations are found to have an effect on pre-1964 indicators of riots, then this would confound the validity of the whole analysis.

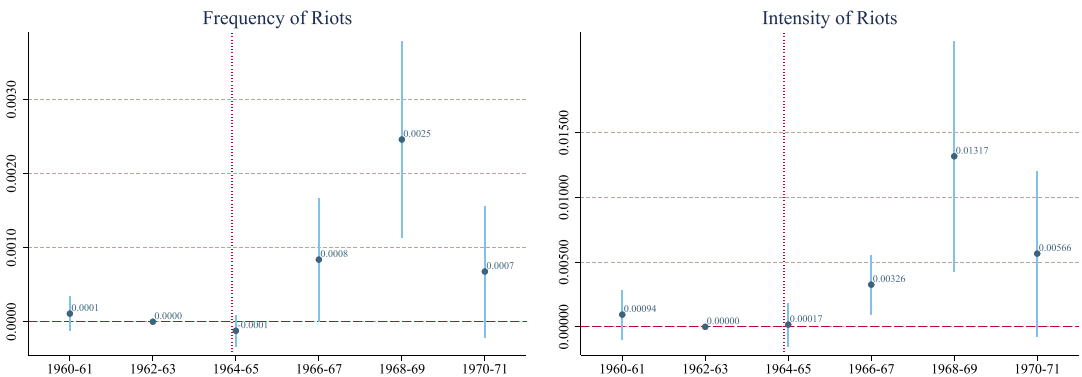
As a first step in this direction, the following event study specification is estimated:

$$\begin{aligned} \text{Race Riots}_{c,s,t} = & \alpha_{s,t} + \alpha_c + \sum_{n=1960-61}^{1970-71} \beta_{1n} D_n^t \text{Radio Signal}_{c,s,1964} \\ & + \mathbf{X}_{c,s,t} \gamma_1 + \epsilon_{c,s,t}, \end{aligned} \quad (7)$$

where, compared to Equation (5), the coefficient measuring the effect of radio stations is allowed to vary between 1960 and 1971. The dependent variable, *Race Riots*<sub>c,s,t</sub>, represents the time series of either the extensive or intensive margins of riots, where  $\alpha_{s,t}$  and  $\alpha_c$  are state-year interactions and county fixed effects, respectively.  $D_n^t$  is an indicator equal to one whenever  $n = t$ ,  $\mathbf{X}_{c,s,t}$  includes the year interactions of all controls as well as the signal's unobstructed propagation for each radio station.

Figure 4 plots the coefficient  $\beta_{1n}$  for each  $n$  from 1960 to 1961 until 1970–1971. The estimates indicate that, in the pre-1964 period, the relationship between the media and riots is indistinguishable from zero for either treated or untreated counties (those receiving and not receiving the radio signal, respectively). However, after 1964, a different pattern emerges: the impact of the media becomes positive and this relationship is steeper in the subset of counties that are exposed to the radio stations. Nevertheless, this larger effect (expressed as the difference in the gradient between treated and untreated counties) is not immediate and slowly builds up in 1966–1967, peaks in 1968–1969, before fading somewhat in 1970–1971.

To explore this nonlinearity in the effect, the list of Black-appeal radio stations has been assembled also for 1968.<sup>23</sup> Then, exploiting information on radio stations in both 1964 and 1968, the treatment is analyzed through the lens of a two-way fixed effects (generalized difference-in-differences) model. It is specified as



**FIGURE 4** Event study of the effect of radio stations on riots. The two figures plot the  $\beta_{1n}$  coefficients estimated from the specification presented in Equation (7). The confidence intervals shown are set at the 90% level of statistical significance. Robust standard errors are adjusted for clustering at the state-level.

Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of all the mountains above 800 m; an indicator for all the coastal counties [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

$$\text{Race Riots}_{c,s,t} = \alpha_{s,t} + \alpha_c + \beta_1 \text{Active Radio}_{c,s,t} + \epsilon_{c,s,t}, \quad (8)$$

where now the independent variable of interest, *Active Radio*<sub>*c,s,t*</sub>, includes information on the radio stations from both years and, specifically, it is set equal to one when the county is treated (i.e., when the majority of the county receives the signal from the Black-appeal radio station). Alternatively, using a continuous measure, it is set equal to the exact share of the county receiving the signal in any given year.<sup>24</sup> As shown in Table 7, Black-appeal radio stations are found to have a highly significant and positive effect: the switch toward treatment is found to lead to a 6.4% and 9.8% increase in the mean levels of the extensive and intensive margins of riots. However, to better capture the (nonlinear) build-up of the effect over time, two additional specifications are considered. The first includes leads in the two-way fixed effects model, while the second directly allows for the effect of the media to vary depending on the idiosyncratic survival rate of stations.

In Table 8, the generalized difference-in-differences model is augmented with two additional terms: *Lead*<sub>1,*c,s*,1964</sub> and *Lead*<sub>2,*c,s*,1964</sub>. That is, the counties that are exposed to Black-appeal radio stations in 1964 (either through the dummy indicator or through the continuous statistic) are now assumed to have received the same treatment also in 1962–1963 and in 1960–1961, respectively. Performing this placebo test of the effect allows to check for differential outcomes in the pretreatment period. In all specifications, the estimates on *Lead*<sub>2,*c,s*,1964</sub> are indistinguishable from zero, and the absence of a significant effect on this counterfactual scenario reinforces the validity of the main estimates of the paper: Black-appeal radio stations did little in addressing controversial topics during the 1950s and early 1960s (Barlow, 1999 and Halper, 2014). The coefficient on *Lead*<sub>1,*c,s*,1964</sub> is found to be weakly negative in the specification of Panel A: if anything, the would-be treated counties were actually experiencing fewer and less severe riots in the 2 years before 1964. In fact, these radio stations often played a positive and cooling effect in their communities during the early 1960s, until the struggle intensified over the following few years as the civil rights campaign gained momentum (the Civil Rights Act

TABLE 7 Generalized diff-in-diff estimates of the effect of radio stations on riots

|   | Frequency of riots<br>(1) | Intensity of riots<br>(2) |
|---|---------------------------|---------------------------|
| <i>Panel A: 100% Black-appeal radio stations: Dummy variable</i>      |                           |                           |
| Black radio in 1964 and 1968  | 0.058***<br>(0.018)       | 0.306**<br>(0.112)        |
| County fixed effects  | Yes                       | Yes                       |
| State-year fixed effects  | Yes                       | Yes                       |
| Mean dep. var.  | 0.014                     | 0.055                     |
| R <sup>2</sup>  | 0.06                      | 0.02                      |
| N   | 6840                      | 6840                      |
| <i>Panel B: 100% Black-appeal radio stations: Continuous variable</i> |                           |                           |
| Black radio in 1964 and 1968  | 0.001**<br>(0.000)        | 0.005**<br>(0.002)        |
| County fixed effects  | Yes                       | Yes                       |
| State-year fixed effects  | Yes                       | Yes                       |
| Mean dep. var.  | 0.014                     | 0.055                     |
| R <sup>2</sup>  | 0.06                      | 0.03                      |
| N   | 6840                      | 6840                      |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

and the Voting Rights Act were signed into law in 1964 and 1965, respectively). Only at that point, many of the transmitted messages had a social, rather than a religious, nature (U.S. National Advisory Commission on Civil Disorders, 1968), creating “a communications network that facilitated the flow of information among the faithful, and mobilized public opinion in support of the crusade” (Barlow, 1999). Then, the strong effect found from 1964 onward could be considered a lower bound of the true effect of being exposed to Black-appeal radio stations (Table 9).

To allow for both non-linearities and for the build-up of the effect over time, Equation (9) splits the aggregate effect into three components: from the stations that were active both in 1964 and 1968, from the stations that closed down in 1968 and from those that opened up only in 1968.

$$\begin{aligned} \text{Race Riots}_{c,s} = & \alpha_s + \beta_1 \text{Always On}_{c,s} + \beta_2 \text{Switch Off}_{c,s} \\ & + \beta_3 \text{Switch On}_{c,s} + \mathbf{X}_{c,s} \gamma_1 + \epsilon_{c,s}. \end{aligned} \quad (9)$$

The coefficients on *Switch Off*<sub>c,s</sub> and *Switch On*<sub>c,s</sub> are estimated to be indistinguishable from zero, while  $\beta_1$  follows the coefficient estimated when no distinction is made on the survival rate of stations: the effect on riots is concentrated in the subset of counties receiving the radio signal

**TABLE 8** Generalized diff-in-diff estimates of the effect of radio stations on riots, with leads

|   | Frequency of riots  |                     |                     | Intensity of riots |                    |                    |
|---|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
|   | (1)                 | (2)                 | (3)                 | (4)                | (5)                | (6)                |
| <i>Panel A: 100% Black-appeal radio stations: Dummy variable</i>      |                     |                     |                     |                    |                    |                    |
| Black radio in 1964 and 1968  | 0.058***<br>(0.018) | 0.051**<br>(0.018)  | 0.058**<br>(0.019)  | 0.306**<br>(0.112) | 0.251**<br>(0.103) | 0.301**<br>(0.101) |
| 1964 radio in 1962  |                     | −0.018**<br>(0.007) |                     |                    | −0.140*<br>(0.069) |                    |
| 1964 radio in 1960  |                     |                     | 0.001<br>(0.009)    |                    |                    | −0.015<br>(0.074)  |
| County fixed effects  | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| State fixed effects   | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| Year fixed effects  | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| Mean dep. var.  | 0.014               | 0.014               | 0.014               | 0.055              | 0.055              | 0.055              |
| R <sup>2</sup>  | 0.06                | 0.06                | 0.06                | 0.02               | 0.02               | 0.02               |
| N   | 6840                | 6840                | 6840                | 6840               | 6840               | 6840               |
| <i>Panel B: 100% Black-appeal radio stations: Continuous variable</i> |                     |                     |                     |                    |                    |                    |
| Black radio in 1964 and 1968  | 0.001**<br>(0.000)  | 0.001**<br>(0.000)  | 0.001***<br>(0.000) | 0.005**<br>(0.002) | 0.005*<br>(0.003)  | 0.006**<br>(0.003) |
| 1964 radio in 1962  |                     | −0.000<br>(0.000)   |                     |                    | −0.000<br>(0.002)  |                    |
| 1964 radio in 1960  |                     |                     | 0.000<br>(0.000)    |                    |                    | 0.001<br>(0.002)   |
| County fixed effects  | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| State fixed effects   | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| Year fixed effects  | Yes                 | Yes                 | Yes                 | Yes                | Yes                | Yes                |
| Mean dep. var.  | 0.014               | 0.014               | 0.014               | 0.055              | 0.055              | 0.055              |
| R <sup>2</sup>  | 0.06                | 0.06                | 0.06                | 0.03               | 0.03               | 0.03               |
| N   | 6840                | 6840                | 6840                | 6840               | 6840               | 6840               |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

throughout the whole period. The length of exposure is important: Black-appeal radio stations active in both years had a larger impact on the frequency of riots and on their severity. As they stayed in operation for longer, they likely had more independence, a wider audience and a better infrastructure to discuss controversial topics such as civil disorders.

TABLE 9 Early adopters, early exiters and late adopters

|                        | Frequency of riots   |                       |                       |                       | Intensity of riots    |                       |                       |                       |
|------------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                        | (1)                  | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   | (7)                   | (8)                   |
| All active in 1964     | 0.0031**<br>(0.0013) | 0.0075***<br>(0.0023) |                       |                       | 0.0282***<br>(0.0078) | 0.0699***<br>(0.0190) |                       |                       |
| Always on              |                      |                       | 0.0076***<br>(0.0023) | 0.0074***<br>(0.0023) |                       |                       | 0.0709***<br>(0.0195) | 0.0700***<br>(0.0192) |
| Switch off             |                      |                       | 0.0204<br>(0.0230)    | 0.0198<br>(0.0226)    |                       |                       | 0.0392<br>(0.0576)    | 0.0371<br>(0.0553)    |
| Switch on              |                      | −0.0038<br>(0.0040)   |                       | −0.0037<br>(0.0038)   |                       | −0.0129<br>(0.0310)   |                       | −0.0133<br>(0.0306)   |
| Free-space signal 1964 | Yes                  | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   |
| Free-space signal 1968 | No                   | Yes                   | No                    | Yes                   | No                    | Yes                   | No                    | Yes                   |
| State fixed effects    | Yes                  | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   |
| Topographic            | Yes                  | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   |
| Pre-VRA race relations | Yes                  | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   | Yes                   |
| Mean dep. var.         | 0.0845               | 0.0845                | 0.0845                | 0.0845                | 0.4131                | 0.4131                | 0.4131                | 0.4131                |
| R <sup>2</sup>         | 0.29                 | 0.55                  | 0.55                  | 0.55                  | 0.17                  | 0.40                  | 0.40                  | 0.40                  |
| N                      | 1140                 | 1134                  | 1134                  | 1134                  | 1140                  | 1134                  | 1134                  | 1134                  |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, topographic variables, pre-VRA indicators of race relations, and unobstructed radio signals in 1964 and 1968. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

## 5 | DISCUSSION

Building on diffusion models, and on anecdotal and qualitative evidence, word of mouth is a likely mechanism able to channel the information of a single event to a wide enough audience for a riot to emerge (Myers, 1997, 2010). In this paper, word of mouth is identified with Black-appeal radio stations. The impact is large and statistically significant: in the preferred specification, a 1% increase in the share of the county receiving the signal from a Black-appeal radio station is estimated to lead to a 2.4% and 4.1% increase in the mean levels of the frequency and intensity of riots, respectively.

This paper has considered different samples and specifications. The results from the cross-sectional analysis are robust. When only state fixed effects are included, the impact on the frequency of riots remains stable at 2.4%, while it is found to be weaker at 3.6% as for intensity



of riots. An increasingly richer model removes this downward bias in the latter estimate. The IV results using the instrument on HBCUs show a tenfold increase when compared to the OLS counterparts. This reflects a downward asymptotic bias in the OLS estimates: either working through measurement errors or latent factors, this indicates that the latter estimates measure a lower bound for the true effect of receiving radio signals on the extensive and intensive margins of riots. In addition, considering as instrument the presence of HBCUs likely over-estimates the impact of the media on riots by isolating the localities where there would be more participation in local uprisings. Lastly, a panel setting confirms the importance of radio stations in conveying information on social unrest and showing a 6.4% and 9.8% increase in the mean levels of the extensive and intensive margins of riots.

How do these estimates compare to other studies in the literature? In Yanagizawa-Drott (2014), a one standard deviation in the variation of radio coverage increases participation in total violence by 12%–13%, in militia violence by 13%–14% and in individual violence by 10%–11% during the Rwandan Genocide. The magnitudes are similar to the ones found in this paper: the one standard deviation change in Black-appeal radio coverage is found to lead to 14% more frequent and 16% more severe riots. In Gagliarducci et al. (2020), a one standard deviation increase in the signal strength is associated with a threefold rise (3.1) in the episodes with victims, relative to its average, in the context of the Nazi-fascist occupation of Italy. This large effect of an improvement in the quality of the radio signal on the intensity of the Italian resistance is somewhat larger than what is estimated in this paper: a rise of 0.6 in the frequency and 1.1 in the intensity of the race riots, relative to their corresponding average. This difference could be partly explained by the fact that Gagliarducci et al. (2020) consider variations in the quality of reception of BBC radio based on sunspot activities—which varies over time—while this paper considers variations in signal reception based on—fixed—topographic elements. Radio exposure in the former study could reach a wider set of municipalities over the sample period, leading to a larger aggregate effect.

## 6 | CONCLUSIONS

In this paper, a mechanism able to explain both the frequency and the severity of ethnic disturbances is proposed and empirically tested. Black-appeal radio stations, through their active and ingrained role within African American communities across southern counties, helped small and isolated events to reach a wide enough audience for large-scale riots to emerge. This result lends empirical support to the theoretical argument linking individual preferences to like-minded information from the media, with nontrivial persuasion effects exerted by such biased media outlets. This paper also contributes to a long-standing debate on the existence of driving channels responsible for the 1960s race riots by providing quantitative evidence on one of these factors.

The signal coverage is measured through a model of electromagnetic signal propagation in conjunction with GIS applications exploiting information on each station's antenna. The impact of Black-appeal radio stations on the 1960s race riots is then identified through alternative techniques, based on both cross-sectional and panel datasets. Exploiting county-level variations, a marginal (1%) rise in the share of the county receiving the radio signal increased by 2.4% and 4.1% the mean levels of the frequency and intensity of riots, respectively. Black-appeal radio stations significantly changed the fabric of southern counties, through their sizable and robust impact on the frequency and on the severity of the 1960s race riots. By analyzing the

individual features of each station, this paper has touched upon possible mechanisms at play, based on both the quantity and quality of programming, as well as on the survival rate of stations.

Several additional avenues for research appear worth exploring. First, Black-appeal radio stations in southern counties might be systematically different from those set up elsewhere in the United States. As large riots also emerged in the North of the country, an interesting question is whether the impact of radio stations is found to be similar to the one unveiled in this paper, or whether additional channels become important. Second, as the 1960s riots have been found to have had large and significant consequences on several economic outcomes in the affected cities, it remains to be tested whether such outcomes have also depended on the presence of Black-appeal radio stations. Third, these radio stations might have had spillover effects into other important dynamics at play during the 1960s. Through their highly effective engagement of local communities, they could have had meaningful effects on the progress observed across voting and civil rights, by rising voter registration rates and leading to more African American candidates in local elections. All these questions are left to further research.

The masses of African Americans who have been deprived of educational and economic opportunity are almost totally dependent on radio as their means of relating to the society at large. They do not read the newspapers .... Television speaks not to their needs, but to upper middle class America. One need only recall the Watts tragedy and the quick adaptation of the “Burn Baby Burn” slogan to illustrate the pervasive influence of the radio announcer on the community.

—Martin Luther King Jr., *keynote address, National Association of Radio and Television Announcers Convention, Atlanta, September 28, 1967.*

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## ENDNOTES

- <sup>1</sup> In the U.S. South alone, during 465 days of riots spread across 189 individual events, 30 people lost their lives, while 2290 got injured and 8980 were arrested.
- <sup>2</sup> Knight and Tribin (2019, 2018), Snyder and Strömberg (2010), Gentzkow and Shapiro (2010), and Puglisi and Snyder (2015) all analyze the impact of television or the print media.
- <sup>3</sup> Olken (2009) is the first study to assess the effect of heterogeneity of signal transmission on economic outcomes, finding that the Indonesian radio and television both lowered participation in social organizations and self-reported trust.
- <sup>4</sup> Olzak and Shanahan (1996) and Myers (1997) focus on differences in the labor market, trying to explain race riots through changes in the level of competition for jobs. In this paper, the share of African Americans in the county population, state fixed effects and several indicators of labor market tightness are included in all specifications.
- <sup>5</sup> Earlier attempts to quantitatively measure the economic consequences of the 1960s riots are found in Frey (1979) and Kelly and Snyder (1980).
- <sup>6</sup> See pages 107–109 of the U.S. National Advisory Commission on Civil Disorders (1968). Chaired by Otto Kerner, it is more commonly known as the Kerner Commission report.
- <sup>7</sup> For instance, “Richard Salant, president of CBS News, spoke of ‘bawling the hell out of’ Walter Cronkite and executive producer Leslie Midgely after interview with Negro arsonist in Baltimore was included in coverage of civil disorders following assassination of Dr. Martin Luther King.” Similarly, WABC, a Black-appeal radio station in New York, acted as a forum to rioters in Harlem on the night of the murder of Martin Luther King Jr., so to “pour fuel on the fires of racial antagonism at precisely the moment when the opposite was called for.” See Variety (April 17, 1968) for the former episode and Broadcasting (April 22, 1968) for the latter.
- <sup>8</sup> For each station, information on the strength of each radio tower (in watts,  $W$ , or kilowatts,  $kW$ ) and its frequency (in kilocycles per second,  $kc$ ) is obtained. These are important elements to construct the dispersion of the signal using the Irregular Terrain Model. In the event of gaps in the 1964 directory, supplementary information has been obtained from: (i) earlier publications of Sponsor’s *Negro market*; (ii) the 1964 edition of the Broadcasting Yearbook; and (iii) the 1964 edition of the North American Radio-TV Station Guide.
- <sup>9</sup> Other lists of Black-appeal radio stations are included in: (i) the Broadcasting Yearbook; (ii) the magazine Billboard; and (iii) the magazine Cash Box. However, in all of these there is no information on the amount of airtime that is devoted to Black-appeal programming. Further, when cross-checking these directories, it resulted that many of the included stations had very little content of Black-oriented programming to justify their inclusion to the list (for more on this, see Jeter, 1981).
- <sup>10</sup> In this study, the tool provided by Nautel, a manufacturer in radio broadcasting, is used to obtain the predicted coverage of each station. As a reference on the ITM, see Hufford (2002).
- <sup>11</sup> Carter (1986) refined the original data set by including all race riots until 1971. Since then, Carter’s refinement over Spilerman’s has become the new academic standard.
- <sup>12</sup> That is, the severity of riot  $r$  is the proportion of all days of rioting that occurred during riot  $r$ , plus the proportion of all deaths, plus the proportion of all injuries, plus the proportion of all arrests, plus the proportion of all episodes of arson. Correspondingly, summed over all riots in the sample,  $Severity\ Index_{r,c,s}$  equals 500 to reflect the five indicators of severity, as the index is also multiplied by 100. In constructing this severity index, I closely follow Collins and Margo (2004) and Collins and Margo (2007).
- <sup>13</sup> First, while using the definition found in Olzak (2015) leads to fewer and more severe riots during 1964–1971, all the results of the paper still hold if this sample is considered. Second, one of the five indicators of severity (episodes of arson) is not available in Olzak (2015). Reassuringly, in the sample based on the

period 1964–1971, the correlation between the episodes of arson and the remaining four other indicators of severity is strong. Then, using four instead of five indicators of severity in the panel version of the intensive margin remains an inconsequential, albeit necessary, adjustment.

- <sup>14</sup> In this and all subsequent analyses, standard errors are robust and adjusted for clustering at the state-level, to allow for (likely positive) patterns of autocorrelation of riots across counties within states. In fact, since observations are at the county-level, clustering at this level would not allow for spatial autocorrelation (riots beget nearby riots).
- <sup>15</sup> Taking Chicago and 1954 as the representative city and year: a television set (table model, VHF) cost \$204.39 and, to repair it (replacing the transformer), it cost \$23.05. A radio set (table model) cost \$24.12 and a newspaper (daily edition, on the street) cost \$0.05. In 2020 prices, these correspond to about \$1954, \$220, \$231 and \$0.50. The original prices have been reported in U.S. Bureau of Labor Statistics (1956).
- <sup>16</sup> The *P*-value from a joint *F*-test of the lynching variable, the counts of episodes of anti-Black activism, the location of NAACP branches and the location of the Klaverns of the KKK is 0.00 for both column (3) and column (4). Then, the estimates of the coefficients on these variables are jointly significantly different from zero.
- <sup>17</sup> Similarly to Equation (3),  $\alpha_s$  are state fixed effects and standard errors are robust and adjusted for clustering at the state-level.
- <sup>18</sup> Olken (2009) also includes the predicted would-be signal had there not been any obstacles.
- <sup>19</sup> This is relevant also given the fact that the vector of geographic controls (the size of land, lakes, rivers, mountains, and parks, as well as coastal and state indicators) is always included in all specifications.
- <sup>20</sup> Measurement errors could arise from three sources. First, the data set on Black-appeal radio stations, constructed through the collection of several historical sources on the media industry could have resulted in some inconsistency when these sources were combined. Second, the individual sources themselves could have reported somewhat incorrect statistics. Intrinsically, this is due to the survey nature through which they obtained information on each radio station. Third, the ITM might not have precisely estimated the propagation of these radio waves. Every effort to minimize all these potential risks has been carefully followed.
- <sup>21</sup> For inclusion in the data set of Carter (1986), a riot had to “(4) occur outside of a school setting (most of these disorders involved interracial fighting); (5) occur outside the immediate context of an organized civil rights demonstration (communities targeted for protest may have been selected for strategic and organizational reasons that were unrelated to underlying structural conditions).”
- <sup>22</sup> The remaining three categories include: music, sports and other types of programming. The political content variable in these 100% Black-appeal radio stations ranges from 7% to 89% of the total weekly programming. Importantly, with a median at 32% in this spectrum of political content, there is enough idiosyncrasy across stations to estimate the differential effect on riots stemming from the content of radio programs. The threshold used is set at the 66th percentile, dividing the sample into those stations that fall in the lower two tertiles and in the upper tertile of this distribution. Importantly, all the following results remain robust to alternative choices of the cut-off (e.g., being above or below the 75th percentile of the distribution).
- <sup>23</sup> There were 157 active stations in 1968, compared to the 200 stations that existed in 1964. The turnover was high: in 1968, 80 were newly established stations and only 77 carried over from 1964. Focusing on 100% Black-appeal radio stations, there were 59 such stations in either 1964 or 1968 but, importantly, as shown in Table A2, these 59 stations are not the same, and there is a substantial degree of variation across both southern counties and states to be able to study the effect of the length of exposure on riots. In particular, of the 59 stations active in 1968, 45 carried over from the previous period.
- <sup>24</sup> State-year interactions and county fixed effects are shown as  $\alpha_{s,t}$  and  $\alpha_c$ , and they control for all the time-invariant characteristics of the county and of the state, including the pre-period mean levels. For more on the generalized difference-in-differences technique, see Bertrand et al. (2004) and Hansen (2007).
- <sup>25</sup> The exposure to the radio signal coverage is based on the dummy indicator, but similar results are obtained if the continuous measure (reflecting the actual share of coverage) is used instead.

- <sup>26</sup> A Hosmer–Lemeshow test to check the quality of the logistic method used to construct the propensity score highlights that the model is well-specified: an Hosmer–Lemeshow  $\chi^2(8)$  value of 12.58 validates the goodness-of-fit of the model.
- <sup>27</sup> Dividing the distribution into five parts (quintiles) is the smallest level of stratification that allows to have at least one observation in each stratum. As shown by Cochran (1968), balancing the sample using five strata is expected to eliminate, on average, around 90% of the overall confounding.
- <sup>28</sup> Matching could also be carried out by ensuring that a match is found for each and every treated county. This section considers the more stringent type of matching based on setting a caliper, constraining the difference in the propensity scores of treated and untreated counties to lie within a predetermined range. However, similar and robust results still hold with the less stringent type of matching algorithm.
- <sup>29</sup> In the former model, the included counties are those whose propensity scores lie within the range at which both sets are observed. In the latter model, the specification excludes both those untreated counties that have very high values of propensity scores (above the  $100 - \sigma$ th percentile) and those treated counties that have extremely low propensity scores (below the  $\sigma$ th percentile). This section considers  $\sigma$  to be one and thus trims at the 1st percentile.
- <sup>30</sup> Replicating the main specifications present in the paper using dependent variables based on Olzak (2015) do not modify the strong effect of being exposed to Black-appeal radio stations.
- <sup>31</sup> Although the two types of signal function identically, they differ along one key dimension: the modulation of the carrier waves, with the former transmitting sounds through changes in frequency, rather than by varying the wave's amplitude.
- <sup>32</sup> The African American adult sample had information on 618 respondents with some coverage on all the 11 states of the former Confederacy (Matthews & Prothro, 2006). It included the following counties: Elmore, Montgomery (AL); Clark, Pulaski (AK); Leon, Manatee, Sarasota (FL); Gwinnett, Jeff Davis (GA); East Carroll (LA); Walthall (MS); Forsyth, Pitt (NC); Lexington, Richland (SC); Hickman (TN); Erath, Harris, Taylor (TX); Pulaski (VA).
- <sup>33</sup> For the last two studies, see Sponsor (1964) and the *New York Times* (October 11, 1964).
- <sup>34</sup> This survey was conducted at the height of the civil rights movement by the Center for Research in Marketing, Peekskill, N.Y. It found that 90% of African Americans would support a product boycott if it was backed by one of the major civil rights organizations, such as the NAACP, the Urban League, CORE, SNCC, and SCLC.
- <sup>35</sup> Covered counties: Anson, Beaufort, Bertie, Bladen, Camden, Caswell, Chowan, Cleveland, Craven, Cumberland, Edgecombe, Franklin, Gaston, Gates, Granville, Greene, Guilford, Halifax, Harnett, Hertford, Hoke, Jackson, Lee, Martin, Nash, Northampton, Onslow, Pasquotank, Perquimans, Person, Pitt, Robeson, Rockingham, Scotland, Union, Vance, Washington, Wayne and Wilson.

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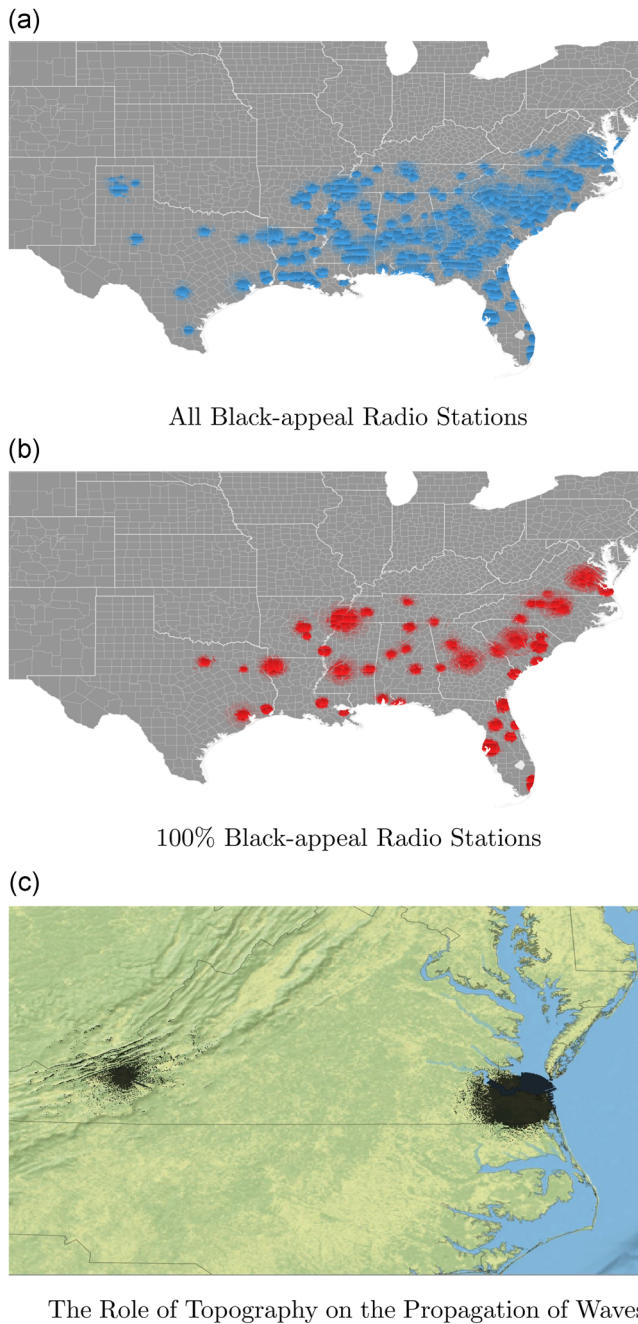
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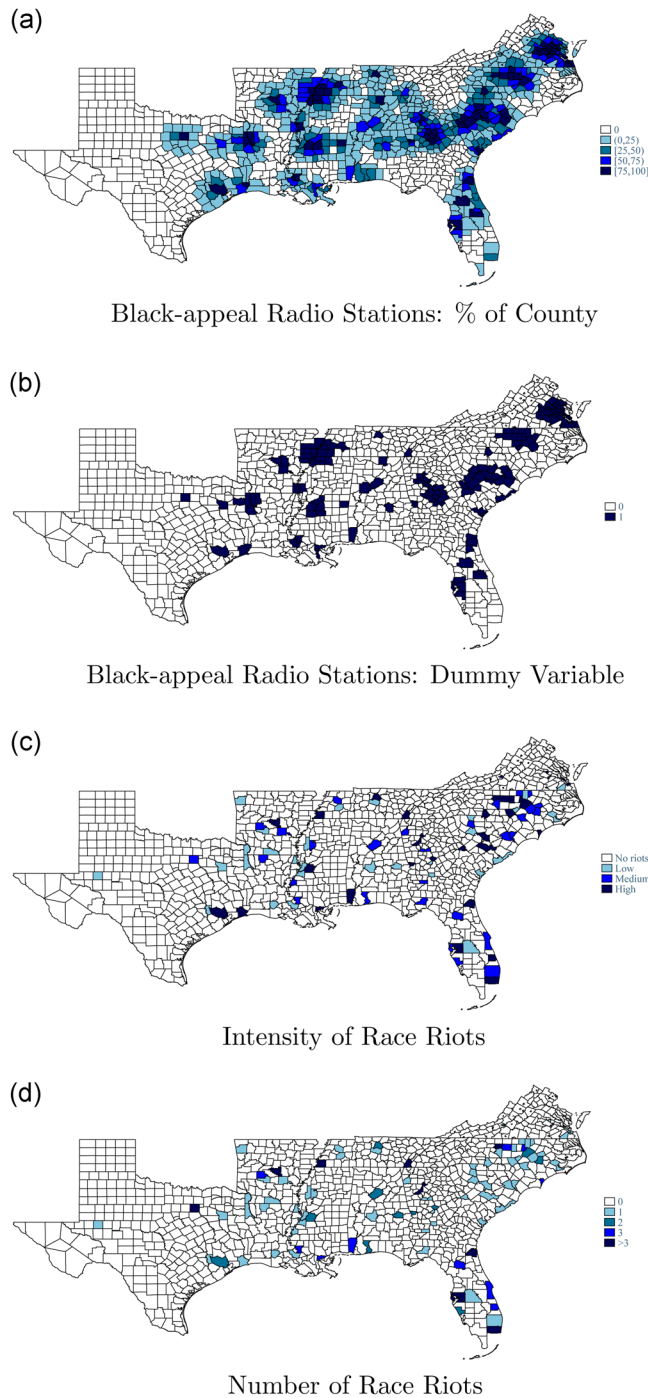


## APPENDIX A: SUMMARY STATISTICS

See Figure A1, A2.



**FIGURE A1** Coverage of Black-appeal radio stations. Map (a) shows the propagation of the radio signal for all 200 stations reporting at least 12 h of Black-appeal programming a week, while Map (b) does the same for the 59 stations that exclusively aired Black-appeal content. Map (c) considers two Black-appeal radio stations in Virginia (WBCR-AM in Christianburg and WRAP-AM in Norfolk) to show the impact of topography on the propagation of the radio waves [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/esp.12213)]



**FIGURE A2** Coverage of radio stations and race riots. The top two maps present the coverage of the radio signal from the 59 stations exclusively airing Black-appeal programming in 1964, with Map (a) showing the continuous indicator (the share of the county covered by the radio signal) and Map (b) showing a dummy indicator taking the value of 1 when the share of the county covered by the signal is at least 50%. The bottom two maps present the intensity and the number of race riots in the U.S. South between 1964 and 1971 [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

TABLE A1 Summary statistics

|   | With radio |          | Without radio |          |
|---|------------|----------|---------------|----------|
|   | Mean       | St. dev. | Mean          | St. dev. |
| <i>Race riots</i>                                 |            |          |               |          |
| Frequency of riots, 1964–1971                     | 0.15       | 0.51     | 0.03          | 0.21     |
| Intensity of race riots, 1964–1971                | 0.83       | 4.04     | 0.06          | 0.84     |
| <i>Topographic variables</i>                      |            |          |               |          |
| County area ( <i>squared miles</i> )              | 523.44     | 275.38   | 737.08        | 531.36   |
| Length of rivers ( <i>miles</i> )                 | 17.51      | 17.35    | 22.57         | 22.74    |
| Area of lakes ( <i>squared miles</i> )            | 4.72       | 13.29    | 9.48          | 24.17    |
| National Parks ( <i>dummy variable</i> )          | 0.06       | 0.24     | 0.05          | 0.22     |
| Height of mountains above 800 m ( <i>m</i> )      | 0.00       | 0.00     | 20.73         | 201.56   |
| Coastal county ( <i>dummy variable</i> )          | 0.11       | 0.32     | 0.10          | 0.30     |
| <i>Socioeconomic variables</i>                    |            |          |               |          |
| Share of Afr. Am. (%), 1960                       | 33.77      | 18.43    | 14.50         | 16.45    |
| VRA coverage ( <i>dummy variable</i> ), 1965      | 0.77       | 0.42     | 0.31          | 0.46     |
| Population density (%), 1960                      | 0.20       | 0.70     | 0.12          | 0.58     |
| Population, 1960                                  | 53.38      | 107.19   | 23.49         | 32.49    |
| Size of manufacturing (%), 1960                   | 23.49      | 11.29    | 18.96         | 13.20    |
| Size of agriculture (%), 1960                     | 18.05      | 13.67    | 20.30         | 12.81    |
| Size of mining (%), 1960                          | 0.77       | 2.34     | 3.46          | 7.54     |
| Agricultural intensity                            | 0.70       | 0.65     | 1.09          | 5.02     |
| Unemployment rate (%), 1960                       | 4.92       | 1.76     | 4.95          | 2.23     |
| Share of families in poverty (%), 1960            | 45.93      | 15.21    | 44.80         | 15.25    |
| Median family income (1960 \$), 1960              | 3358.73    | 1167.83  | 3420.05       | 1187.47  |
| Birth rate (%), 1960                              | 18.86      | 5.79     | 17.54         | 6.27     |
| Members of the households ( <i>counts</i> ), 1960 | 3.72       | 0.49     | 3.46          | 0.52     |
| Size of farms (%), 1959                           | 53.29      | 23.08    | 61.08         | 29.50    |
| Non-White households (%), 1950                    | 32.06      | 17.72    | 13.76         | 15.48    |
| Farms with electricity (%), 1954                  | 85.64      | 19.63    | 87.88         | 16.93    |
| Households with televisions (%), 1960             | 71.91      | 13.48    | 71.85         | 14.23    |
| Households with two or more cars (%), 1960        | 18.05      | 6.23     | 19.75         | 8.70     |
| Population above 65 years (%), 1960               | 8.46       | 2.47     | 10.16         | 3.69     |
| Expenditure on highways (1960 \$), 1962           | 1.47       | 1.31     | 2.04          | 1.68     |
| Median school years, 1960                         | 8.54       | 1.41     | 8.78          | 1.50     |
| Enrolled in school (%), 1950                      | 70.32      | 20.70    | 62.96         | 30.16    |

TABLE A1 (Continued)

|  | With radio |          | Without radio |          |
|--|------------|----------|---------------|----------|
|  | Mean       | St. dev. | Mean          | St. dev. |
| <i>Pre-VRA race relations</i>                    |            |          |               |          |
| Lynchings of African Americans (%), 1902–1964    | 0.03       | 0.08     | 0.03          | 0.16     |
| Anti-black activism ( <i>counts</i> ), 1960–1964 | 0.34       | 2.13     | 0.05          | 0.62     |
| NAACP branches ( <i>counts</i> ), 1957–1964      | 0.53       | 0.67     | 0.27          | 0.51     |
| KKK Klaverns ( <i>counts</i> ), 1925–1940        | 0.17       | 0.51     | 0.10          | 0.37     |
| <i>Instrument</i>                                |            |          |               |          |
| HBCUs enrollment (%), 1976                       | 0.93       | 5.31     | 0.79          | 7.74     |
| Counties   | 524        |          | 616           |          |

*Note:* The set of counties under the *With Radio* category includes those counties with at least 50% of the county being covered by the radio signal in either 1964 or 1968. Conversely, *Without Radio* includes those counties where less than 50% of the total land receives the radio signal.

TABLE A2 The characteristics of radio stations in 1964 and 1968

|                |                    |                           | Number of stations, by Black-appeal content |      |      |      |      |
|----------------|--------------------|---------------------------|---|------|------|------|------|
|                | Power<br>(avg., w) | Black-appeal<br>(avg., %) | >0%   | >25% | >50% | >75% | 100% |
| 1964           |                    |                           |   |      |      |      |      |
| Alabama        | 1420               | 61                        | 22  | 19   | 18   | 7    | 7    |
| Arkansas       | 1821               | 49                        | 7   | 4    | 4    | 2    | 2    |
| Florida        | 2655               | 64                        | 21  | 15   | 14   | 11   | 10   |
| Georgia        | 2018               | 49                        | 28  | 17   | 14   | 9    | 7    |
| Louisiana      | 1525               | 55                        | 20  | 16   | 13   | 5    | 5    |
| Mississippi    | 1903               | 44                        | 18  | 12   | 7    | 3    | 3    |
| North Carolina | 1298               | 49                        | 21  | 15   | 7    | 6    | 6    |
| South Carolina | 2426               | 56                        | 17  | 13   | 12   | 5    | 4    |
| Tennessee      | 7850               | 66                        | 15  | 13   | 12   | 5    | 5    |
| Texas          | 1633               | 53                        | 15  | 10   | 9    | 5    | 5    |
| Virginia       | 1938               | 65                        | 16  | 14   | 11   | 7    | 5    |
| 1968           |                    |                           |   |      |      |      |      |
| Alabama        | 5321               | 65                        | 14  | 9    | 8    | 8    | 8    |
| Arkansas       | 9625               | 57                        | 6   | 3    | 3    | 3    | 3    |
| Florida        | 2817               | 60                        | 15  | 8    | 8    | 8    | 6    |
| Georgia        | 2489               | 47                        | 23  | 10   | 8    | 8    | 8    |
| Louisiana      | 2818               | 49                        | 11  | 5    | 4    | 4    | 4    |

(Continues)

TABLE A2 (Continued)

|                | Power<br>(avg., w) | Black-appeal<br>(avg., %) | Number of stations, by Black-appeal content |      |      |      |      |
|----------------|--------------------|---------------------------|---|------|------|------|------|
|                |                    |                           | >0%   | >25% | >50% | >75% | 100% |
| Mississippi    | 7500               | 34                        | 16  | 6    | 3    | 3    | 3    |
| North Carolina | 1283               | 42                        | 23  | 9    | 7    | 7    | 6    |
| South Carolina | 4750               | 37                        | 18  | 6    | 4    | 4    | 4    |
| Tennessee      | 13750              | 84                        | 8   | 8    | 7    | 6    | 5    |
| Texas          | 1269               | 55                        | 13  | 6    | 6    | 6    | 6    |
| Virginia       | 2200               | 67                        | 10  | 7    | 6    | 6    | 6    |

## APPENDIX B: ROBUSTNESS CHECKS

An important threat for the identification of the results is that the two sets of counties (with and without signal coverage) might be significantly different along several observable characteristics. By leading to biased estimates, this would then inevitably invalidate the analysis.

### Propensity score analysis

The first set of results are obtained from propensity score stratification and matching techniques. These methods are both based on constructing, for each county and from the set of available controls, a propensity score measuring the likelihood of receiving the treatment. Then, restricting the analysis to the comparison of those counties receiving the radio signal with those not receiving it, but that nonetheless hold very similar propensity scores, delivers unbiased estimates of the true effect of treatment (Rosenbaum & Rubin, 1983). Varying degrees in the balancing of the propensity scores then allows to test for the stability of the estimates to different levels of balance in the data and, consequently, to check whether there are indeed biases in the more general specifications of the paper.<sup>25</sup>

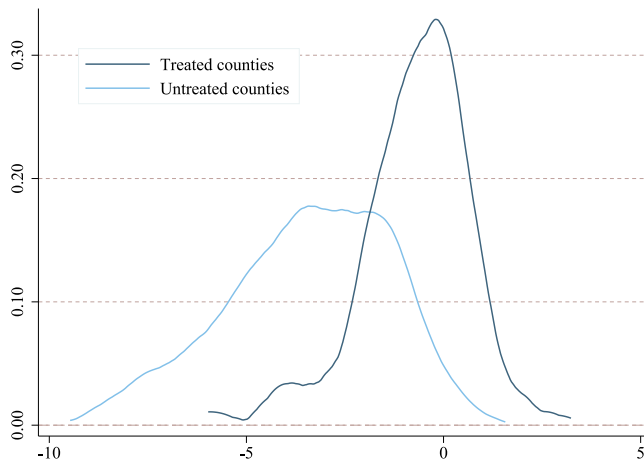
Table B1 lists the ten covariates with the largest standardized difference between the two sets of counties. The two variables with the largest imbalance include those summarizing the ethnicity of the population: those counties with Black-appeal radio stations had, on average, significantly more African Americans in the population. Furthermore, they had a larger presence of the NAACP and they were more likely to be covered by the Voting Rights Act (VRA).

Propensity scores are firstly calculated through a logistic regression and then, to move from skewed to normal distributions, the log of the odds of the propensity scores (also known as the linear predictor) is computed. The distribution of this statistic, which is plotted in Figure B1, highlights that treated counties tend to have higher propensity scores and are more densely concentrated around the mean (i.e., lower variance).<sup>26</sup> Stratification and matching techniques are then applied to the main specification of the paper after balancing the sample on its propensity scores. In particular, stratification allows to estimate the effect of being exposed to the radio signal by comparing treated and untreated counties within each stratum. Stratifying the sample into quintiles reaches a high level of balance in the covariates: as shown in column (6) of Table B1, there is no significant imbalance in the standardized difference between the two groups, with all the controls deviating by 0.15 standard deviations or less.<sup>27</sup> Besides stratification, propensity scores could also be exploited to balance the sample through matching

TABLE B1 Standardized differences in the means

|                               | Sample               |                        |                        | Stratification       |                        |                        | Matching             |                        |                        |
|-------------------------------|----------------------|------------------------|------------------------|----------------------|------------------------|------------------------|----------------------|------------------------|------------------------|
|                               | Mean<br>treat<br>(1) | Mean<br>untreat<br>(2) | Stand.<br>diff.<br>(3) | Mean<br>treat<br>(4) | Mean<br>untreat<br>(5) | Stand.<br>diff.<br>(6) | Mean<br>treat<br>(7) | Mean<br>untreat<br>(8) | Stand.<br>diff.<br>(9) |
| Non-White households, 1950    | 34.96                | 20.29                  | 0.84                   | 34.96                | 34.16                  | 0.05                   | 33.91                | 33.81                  | 0.01                   |
| Share of Afr. Am., 1960       | 36.27                | 21.47                  | 0.81                   | 36.27                | 35.42                  | 0.05                   | 35.07                | 34.99                  | 0.00                   |
| NAAACP branches, 1957–1964    | 0.81                 | 0.32                   | 0.75                   | 0.81                 | 0.74                   | 0.12                   | 0.77                 | 0.72                   | 0.07                   |
| Median income, 1960           | 3968.29              | 3322.05                | 0.54                   | 3968.29              | 3812.20                | 0.13                   | 3873.15              | 3891.36                | −0.01                  |
| Older than 65 years, 1960     | 7.99                 | 9.65                   | −0.54                  | 7.99                 | 8.14                   | −0.05                  | 8.03                 | 8.21                   | −0.06                  |
| VRA coverage                  | 0.72                 | 0.48                   | 0.50                   | 0.72                 | 0.71                   | 0.02                   | 0.72                 | 0.68                   | 0.07                   |
| Household poverty, 1960       | 39.1                 | 46.57                  | −0.49                  | 39.10                | 40.87                  | −0.12                  | 40.22                | 40.15                  | 0.01                   |
| Population density, 1960      | 0.45                 | 0.11                   | 0.38                   | 0.45                 | 0.31                   | 0.15                   | 0.33                 | 0.37                   | −0.03                  |
| Expenditure on highways, 1962 | 1.35                 | 1.85                   | −0.31                  | 1.35                 | 1.38                   | −0.02                  | 1.41                 | 1.29                   | 0.08                   |
| Household members, 1960       | 3.70                 | 3.58                   | 0.26                   | 3.70                 | 3.71                   | −0.02                  | 3.71                 | 3.69                   | 0.04                   |

Note: The 10 covariates with the largest standardized difference in the means between treated and untreated counties are listed. The standardized difference is also reported after the sample is balanced on the propensity score.



**FIGURE B1** Distribution of the log of the odds of the propensity score. The figure presents the distribution of the log of the odds of the propensity score, with the latter statistic computed—separately for treated and untreated counties—from a logistic regression based on the full set of covariates [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/resp.12213)]

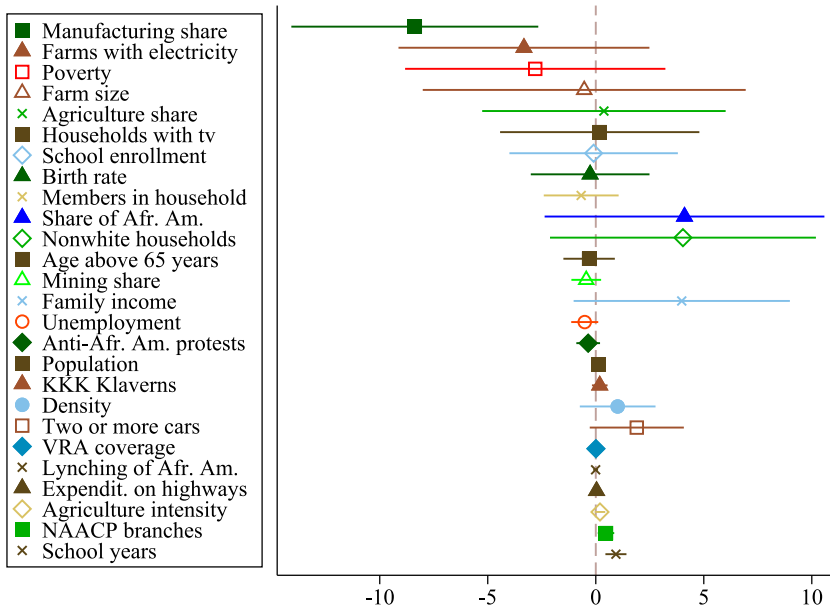
**TABLE B2** Propensity score analysis

|                           | Not<br>balanced<br>(1) | Propensity score analysis: Intensity of riots |                                |                          |                                       |
|---------------------------|------------------------|---|--------------------------------|--------------------------|---------------------------------------|
|                           |                        | Stratification<br>in quintiles<br>(2)         | Matching<br>caliper 0.1<br>(3) | Common<br>support<br>(4) | Stratification<br>and trimming<br>(5) |
| Predicted signal          | 1.110**<br>(0.469)     | 0.947**<br>(0.415)                            | 0.941<br>(0.806)               | 1.150**<br>(0.482)       | 0.907**<br>(0.387)                    |
| Free-space signal         | Yes                    | Yes   | Yes                            | Yes                      | Yes                                   |
| State fixed effects       | Yes                    | Yes   | Yes                            | Yes                      | Yes                                   |
| Topographic               | Yes                    | Yes   | Yes                            | Yes                      | Yes                                   |
| Socioeconomic             | Yes                    | Yes   | Yes                            | Yes                      | Yes                                   |
| Pre-VRA race<br>relations | Yes                    | Yes   | Yes                            | Yes                      | Yes                                   |
| Mean dep. var.            | 0.413                  | 0.413   | 1.337                          | 0.470                    | 0.366                                 |
| $R^2$                     | 0.29                   | 0.29  | 0.33                           | 0.28                     | 0.25                                  |
| $N$                       | 1022                   | 1022  | 225                            | 871                      | 873                                   |

*Note:* Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, topographic variables, socioeconomic controls, pre-VRA indicators of race relations, and the unobstructed radio signals. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.





**FIGURE B2** Balance in the values of the covariates: 15-mile radius. The figure presents the estimated coefficients obtained by regressing each variable on the VRA indicator, topographic variables, and state fixed effects. Robust standard errors are adjusted for clustering at the state-level. The confidence intervals shown are set at the 95% level of statistical significance [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

techniques. The chosen algorithm ensures that the observations in matched pairs hold propensity scores falling within an arbitrarily small range (known as caliper).<sup>28</sup> Inevitably, this method throws away all those treated counties for which a valid match with untreated counties lying within the specified caliper could not be found. However, by exploiting only the relatively best matches, the balance between the two sets of counties is of a much superior quality: with a demanding caliper of 0.1, the standardized difference reported in column (9) of Table B1 perform slightly better than stratification, and markedly better than the original sample, with the difference in the means across all covariates ranging at around 0.08 standard deviations or less.

Column (1) of Table B2 reports the main coefficient presented in the paper (Table 4). Then, in columns (2) and (3), the same specification is run after either stratifying the sample into quintiles or matching counties by their propensity scores (and imposing a caliper of 0.1). Although the sample size is reduced by about 80% in the latter model, the estimates are very robust in magnitude across both specifications (although statistical significance is not reached in the latter specification). The regression is also estimated by either trimming the sample to its common support, column (4), or by excluding, on top of the stratification into quintiles, the largest outliers in the sample, column (5).<sup>29</sup> Although both techniques lead to a considerably smaller sample size (reduced by about 20%), the estimated coefficients remain broadly robust, in terms of both magnitude and significance.

### Geographic regression discontinuity design

The choices leading to the set up of a Black-appeal radio station in any given county could still be driven by factors that are both unobservable and county-specific, and the propensity score analysis might not entirely abate these confounding factors. To correct for this

TABLE B3 The effect of radio stations on riots in neighboring counties

|  | Frequency of riots |         | Intensity of riots |         |
|--|--------------------|---------|--------------------|---------|
|  | (1)                | (2)     | (3)                | (4)     |
| <i>Panel A: 100% Black-appeal stations</i>                       |                    |         |                    |         |
| Dummy  | 0.329*             |         | 0.666**            |         |
|  | (0.184)            |         | (0.290)            |         |
| Continuous   |                    | 0.008** |                    | 0.011** |
|  |                    | (0.003) |                    | (0.004) |
| R <sup>2</sup>   | 0.58               | 0.64    | 0.36               | 0.36    |
| N  | 150                | 150     | 150                | 150     |
| <i>Panel B: 100% Black-appeal stations and free-space signal</i> |                    |         |                    |         |
| Dummy  | 0.329*             |         | 0.669**            |         |
|  | (0.185)            |         | (0.292)            |         |
| Continuous   |                    | 0.008** |                    | 0.012** |
|  |                    | (0.003) |                    | (0.005) |
| R <sup>2</sup>   | 0.58               | 0.64    | 0.36               | 0.36    |
| N  | 150                | 150     | 150                | 150     |
| <i>Panel C: Generalized difference-in-differences</i>            |                    |         |                    |         |
| Dummy  | 0.057              |         | 0.111*             |         |
|  | (0.038)            |         | (0.057)            |         |
| Continuous   |                    | 0.001*  |                    | 0.001   |
|  |                    | (0.001) |                    | (0.001) |
| R <sup>2</sup>   | 0.56               | 0.56    | 0.31               | 0.31    |
| N  | 900                | 900     | 900                | 900     |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, and all the controls that are not balanced in the sample: *manufacturing size, 1960; median school years, 1960; NAACP branches, 1957–1964*.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

omitted variable bias, the analysis is carried out using the sample of southern counties lying within a 15-mile radius from any of the radio stations exclusively airing Black-appeal programming. This is in the spirit of a regression discontinuity design. The county where each station lies is also excluded from this analysis to address the concern that specific factors leading to the set up of the station might exist, and that these factors could also be correlated with the riots. On the other hand, whether neighboring counties are able to receive the radio signal is entirely dependent on exogenous features, such as the topography and the characteristics of the terrain.

Then, comparing treated and untreated counties spanning the border with the county having the 100% Black-appeal radio station (or by lying nonetheless within a 15-mile radius from such radio station) allows to drastically reduce the heterogeneity in the covariates, while estimating the effect of the media on riots by exploiting the exogenous variation in the

**TABLE B4** The effect of radio stations on riots in minority-African American counties

|  | Frequency of riots  |                    | Intensity of riots |                     |
|--|---------------------|--------------------|--------------------|---------------------|
|  | (1)                 | (2)                | (3)                | (4)                 |
| <i>Panel A: 100% Black-appeal stations</i>                       |                     |                    |                    |                     |
| Dummy  | 0.153***<br>(0.047) |                    | 1.573**<br>(0.534) |                     |
| Continuous   |                     | 0.003**<br>(0.001) |                    | 0.022***<br>(0.004) |
| R <sup>2</sup>   | 0.47                | 0.48               | 0.31               | 0.31                |
| N  | 897                 | 897                | 897                | 897                 |
| <i>Panel B: 100% Black-appeal stations and free-space signal</i> |                     |                    |                    |                     |
| Dummy  | 0.143**<br>(0.046)  |                    | 1.590**<br>(0.556) |                     |
| Continuous   |                     | 0.003**<br>(0.001) |                    | 0.025***<br>(0.005) |
| R <sup>2</sup>   | 0.48                | 0.48               | 0.31               | 0.31                |
| N  | 897                 | 897                | 897                | 897                 |
| <i>Panel C: Generalized difference-in-differences</i>            |                     |                    |                    |                     |
| Dummy  | 0.058***<br>(0.018) |                    | 0.306**<br>(0.112) |                     |
| Continuous   |                     | 0.001**<br>(0.000) |                    | 0.005**<br>(0.002)  |
| R <sup>2</sup>   | 0.06                | 0.06               | 0.02               | 0.03                |
| N  | 6840                | 6840               | 6840               | 6840                |

*Note:* Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, topographic variables, socioeconomic controls, and pre-VRA indicators of race relations. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

propagation of radio waves. In fact, as shown in Figure B2, the difference between treated and untreated counties is indistinguishable from zero in all but three variables. Importantly, the share of African Americans in the population is found to be strongly balanced between the two sets of counties. Table B3 presents the estimation results using this regression discontinuity design. Despite the significant reduction in the sample size, all the main results remain broadly

robust. This provides further evidence that the main estimates of the paper are isolating the true effect of Black-appeal radio stations on the 1960s race riots.

### Minority-Black counties

Although all the results have remained stable to different degrees of balance in the data, the location of Black-appeal radio stations might still be endogenous and might depend on the

**TABLE B5** The effect using quartic polynomial regressions

|  | Frequency of riots |                    | Intensity of riots |                     |
|--|--------------------|--------------------|--------------------|---------------------|
|  | (1)                | (2)                | (3)                | (4)                 |
| <i>Panel A: 100% Black-appeal stations</i>                       |                    |                    |                    |                     |
| Dummy  | 0.101**<br>(0.042) |                    | 1.071**<br>(0.439) |                     |
| Continuous   |                    | 0.002**<br>(0.001) |                    | 0.017***<br>(0.004) |
| $R^2$  | 0.46               | 0.47               | 0.30               | 0.30                |
| N  | 1022               | 1022               | 1022               | 1022                |
| <i>Panel B: 100% Black-appeal stations and free-space signal</i> |                    |                    |                    |                     |
| Dummy  | 0.094**<br>(0.041) |                    | 1.062**<br>(0.454) |                     |
| Continuous   |                    | 0.002*<br>(0.001)  |                    | 0.018***<br>(0.005) |
| $R^2$  | 0.46               | 0.46               | 0.30               | 0.30                |
| N  | 1022               | 1022               | 1022               | 1022                |
| <i>Panel C: Generalized difference-in-differences</i>            |                    |                    |                    |                     |
| Dummy  | 0.056**<br>(0.018) |                    | 0.294**<br>(0.107) |                     |
| Continuous   |                    | 0.001**<br>(0.000) |                    | 0.005**<br>(0.002)  |
| $R^2$  | 0.07               | 0.08               | 0.03               | 0.03                |
| N  | 6840               | 6840               | 6840               | 6840                |

*Note:* Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, topographic variables, socioeconomic controls, and pre-VRA indicators of race relations. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

share of African Americans in the population. To address this threat, the specifications of the paper are estimated over the subset of counties with an African American population in 1960 that is below 50%. Table B4 presents all the main results when the sample is restricted to those counties where African Americans represented a minority of the population. Across all panels, the estimates are very similar in both magnitude and significance to the ones found in the more general specifications reported in the paper.

### Quartic polynomial

To further alleviate the concern of the existence of a mechanical effect of urban African American population density on both the location decision of African American radio stations and the probability of rioting, the main effect is estimated through a quartic polynomial regression of the African American population. Table B5 shows that all the main results and significance levels are maintained in this polynomial regression, providing additional evidence of the exogeneity of the treatment and the stability of the identified effects.

### Bias due to selection on unobservables

The results have proved to be robust to a wide set of controls and fixed effects, as well as different specifications. To assess how important selection on unobservables has to be to explain away the estimated positive effect of Black-appeal radio stations on the 1960s race riots, the Oster (2019) test is considered.

In a nutshell, the Oster (2019) test compares the estimated coefficients and the  $R^2$  in a model with full covariates relative to a model with a smaller set of factors. In this paper, the restricted model controls only for fixed effects. Then, the  $\delta$  estimated via the Oster (2019) test measures the bias due to unobservable factors that would have to exist to set the coefficient on Black-appeal radio stations to zero (Bugge & Nafziger, 2021). At the extreme,  $\delta = 1$  would imply that both selection on unobservables and selection on observables have the same effect on the estimated coefficient of interest. Reassuringly, as shown in Table B6, the  $\delta$  that is computed in this test is consistently larger than 1: selection on unobservable factors would have to be

**TABLE B6** Bias due to selection on unobservables: The Oster (2019) test

|                          | Frequency of riots |            | Intensity of riots |            |
|--------------------------|--------------------|------------|--------------------|------------|
|                          | Dummy              | Continuous | Dummy              | Continuous |
|                          | (1)                | (2)        | (3)                | (4)        |
| $\delta$ for $\beta = 0$ | 1.196              | 1.140      | 1.362              | 1.065      |

*Note:* A value of  $\delta$  larger than 1 implies that selection on unobservable factors would have to be significantly larger than selection on observable factors to explain away the positive results of Black-appeal radio stations on the 1960s race riots. See Oster (2019) for further details. All regressions include state fixed effects, topographic variables, socioeconomic controls, and pre-VRA indicators of race relations. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940.

TABLE B7 Model selection: Lasso cross-validation and elastic net

|                                     | Frequency of riots |                   |                    | Intensity of riots  |                    |                    |
|-------------------------------------|--------------------|-------------------|--------------------|---------------------|--------------------|--------------------|
|                                     | Table 5<br>(1)     | Lasso CV<br>(2)   | Elastic net<br>(3) | Table 5<br>(4)      | Lasso CV<br>(5)    | Elastic net<br>(6) |
| <i>Panel A: Dummy indicator</i>     |                    |                   |                    |                     |                    |                    |
| Predicted signal                    | 0.093**<br>(0.041) | 0.105<br>(0.063)  | 0.105<br>(0.063)   | 1.110**<br>(0.469)  | 1.070**<br>(0.468) | 1.040**<br>(0.434) |
| R <sup>2</sup>                      | 0.46               | 0.40              | 0.40               | 0.29                | 0.26               | 0.26               |
| N                                   | 1022               | 1134              | 1134               | 1022                | 1140               | 1140               |
| <i>Panel B: Continuous variable</i> |                    |                   |                    |                     |                    |                    |
| Predicted signal                    | 0.002*<br>(0.001)  | 0.002*<br>(0.001) | 0.002*<br>(0.001)  | 0.019***<br>(0.005) | 0.015**<br>(0.005) | 0.015**<br>(0.005) |
| R <sup>2</sup>                      | 0.46               | 0.40              | 0.41               | 0.29                | 0.26               | 0.27               |
| N                                   | 1022               | 1134              | 1134               | 1022                | 1140               | 1140               |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects, and all the controls that are isolated from lasso cross-validation (CV) and elastic net model selection, respectively. To isolate the covariates through these models, 75% of the original sample is used as the training data set, while 25% forms the testing data set (used to test the predictions of the models).

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

significantly larger than selection on observable factors to explain away the positive results of the media on riots. With these values of  $\delta$ , the results could be considered to be robust, in the sense that they remain significantly different from zero to a substantial degree of selection on unobservables. Then, it could be argued that a bias of the main estimates due to unobservable factors would be unlikely.

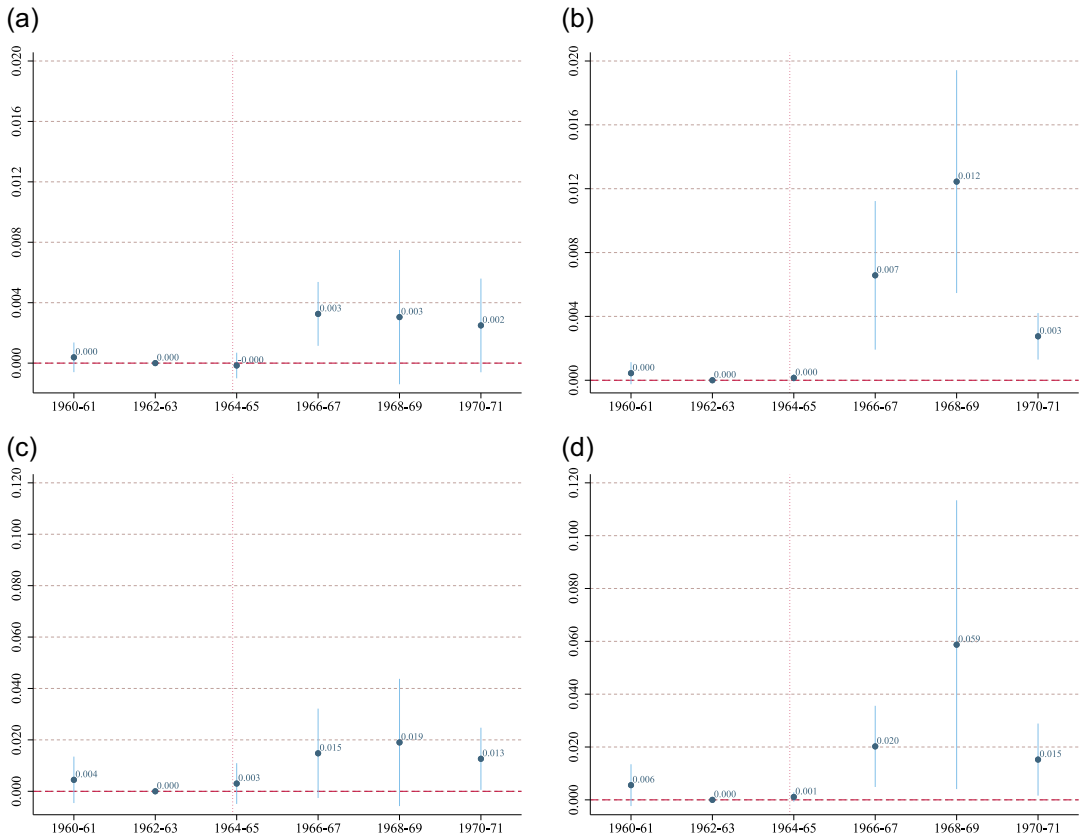
### Model selection: Lasso cross-validation and elastic net

A concern with the chosen specification is that the main regression equation includes a large number of covariates. As a result of this, over-fitting—the inclusion of extra parameters that improve the in-sample fit but increase the out-of-sample prediction error—could occur. It is then important to check that the main effects of interest are not dependent on this over-fitting. Table B7 presents the results obtained from using two methods of model selection: lasso cross-validation and elastic net (a mixture of lasso and ridge). After splitting the original sample into a training sample and a testing sample (including 75% and 25% of the total number of observations, respectively), estimates are obtained using the training sample only, while the model performance is then evaluated using the testing sample. From each model selection procedure, the most important predictors for the dependent variables are then isolated. As shown in Table B7, the magnitudes and significance of the results are largely unaffected from restricting the set of controls to the covariates chosen through these two processes.

### Event study on the political content of radio stations

Figure B3 presents the results from an event study disentangling the effect on riots by the different levels of political content of radio stations. This analysis builds on the results of Section 4.4, in which it emerged that the type of programming mattered substantially for the

frequency of riots. When the cross-sectional analysis of Section 4.4 is augmented with the event study of Section 4.5, that result is confirmed. Radio stations airing more politically-charged content are found to be more important drivers for both the frequency and the intensity of riots, with larger and more significant coefficients when compared to the set of stations with a lower amount of political content in their programming.



**FIGURE B3** The effect of the political content of radio stations over time. (a) Frequency of riots and low political content, (b) frequency riots and high political content, (c) intensity of riots and low political content, and (d) intensity of riots and high political content. The confidence intervals shown are set at the 90% level of statistical significance. Robust standard errors are adjusted for clustering at the state-level. Topographic controls include: the size of the county (in squared mi); the total length (in miles) of the county covered by rivers; the total area (in squared miles) of the county covered by lakes; an indicator for the National Parks in the county; the height (in m) of the all the mountains above 800 m; an indicator for all the coastal counties. Socioeconomic controls include: share of African Americans, 1960; VRA coverage dummy; population density, 1960; population, 1960; manufacturing size, 1960; agricultural size, 1960; mining size, 1960; agricultural intensity, 1960; unemployment rate, 1960; share of families in poverty, 1960; median family income, 1960; birth rate, 1960; household members, 1960; size of farms, 1959; non-White households, 1950; farms with electricity, 1954; households with tv, 1960; households with two or more cars, 1960; older than 65 years, 1960; expenditure on highways, 1962; median school years, 1960; enrolled in school, 1950. Indicators of pre-VRA race relations include: lynchings of African Americans, 1902–1964; anti-black activism, 1960–1964; NAACP branches, 1957–1964; KKK Klaverns, 1925–1940 [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



## APPENDIX C: ALTERNATIVE DATA ON CONFLICTS

Olzak (2015) collected information on all ethnic conflicts that occurred during the period 1954–1992, including riots, meetings, rallies, spontaneous disruptions, boycotts, conflicts at the workplace, episodes of picketing and ethnic vandalism. Compared to Carter (1986), Olzak (2015) considered the *New York Times* as the main source of information, and defined a race riot as a demonstration involving at least 50 people, with some form of violence, and lasting for at least two hours. In the paper, Carter's (1986) data set forms the basis to construct the main dependent variables, but Olzak (2015) is also considered when panel techniques, rather than cross-sectional analyses, are used on a time series spanning 1960–1971.

Before augmenting the information from Carter (1986) with the one from Olzak (2015), the similarity between these two data sets has been considered. A summary of all ethnic conflicts is presented in Table C1, separately by year, type of conflict and state. Focusing on race riots (Panel B), the bulk of episodes occurred within the period 1964–1971 even according to the definition used by Olzak (2015). Still, there is a nontrivial amount of riots happening between 1960 and 1963 to justify extending the time series to cover the full period 1960–1971. In Table C2, the impact of the full array of 25 controls on the frequency and intensity of both all ethnic conflicts, columns (1) and (2), and race riots, columns (3) and (4), is presented. Similarly to the results shown in columns (3) and (4) of Table 1, a large set of controls (including the share of African Americans in the county population, as well as the indicators of pre-period race relations) are found to be important determinants of ethnic disorders.<sup>30</sup>

Figure C1 plots both datasets. Although Olzak (2015) might understate the actual number of riots (by considering only the *New York Times* and by imposing a threshold of minimum 50 participants), while Carter (1986) might overstate it (by including more sources and by allowing for a slightly weaker definition of riots), the overlap between the two sources (especially in the years 1964–1966) is visible.

TABLE C1 The race riots between 1960 and 1975

|  | 60   | 61   | 62   | 63   | 64   | 65   | 66   | 67   | 68   | 69   | 70   | 71   | 72   | 73   | 74   | 75   | Total  |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| <i>Panel A. Aggregate race conflicts in the U.S. South</i> |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |
| Total number   | 163  | 74   | 24   | 27   | 31   | 43   | 26   | 31   | 27   | 25   | 17   | 22   | 9    | 0    | 4    | 3    | 526    |
| Days of conflict   | 277  | 548  | 95   | 30   | 39   | 67   | 40   | 956  | 37   | 35   | 30   | 49   | 14   | 0    | 4    | 3    | 2224   |
| People killed  | 1    | 0    | 1    | 404  | 1    | 1    | 1    | 2    | 5    | 1    | 11   | 1    | 5    | 0    | 0    | 0    | 434    |
| People injured   | 181  | 30   | 5    | 113  | 131  | 23   | 51   | 84   | 80   | 47   | 140  | 37   | 49   | 0    | 0    | 2    | 973    |
| People arrested  | 1473 | 1147 | 378  | 2543 | 1020 | 1060 | 93   | 291  | 400  | 326  | 772  | 479  | 22   | 0    | 36   | 5    | 10,045 |
| Size of conflict   | 382  | 174  | 68   | 96   | 89   | 112  | 78   | 89   | 87   | 85   | 56   | 65   | 30   | 0    | 12   | 10   | 1433   |
| Severity index   | 0.73 | 0.51 | 0.14 | 1.38 | 0.32 | 0.24 | 0.14 | 0.61 | 0.21 | 0.16 | 0.30 | 0.16 | 0.09 | 0.00 | 0.01 | 0.01 | 5.00   |
| <i>Panel B. Race riots in the U.S. South</i>               |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |        |
| Total Number   | 5    | 1    | 2    | 7    | 3    | 0    | 5    | 14   | 6    | 5    | 4    | 8    | 3    | 0    | 0    | 0    | 63     |
| Days of conflict   | 24   | 1    | 2    | 7    | 3    | 0    | 7    | 23   | 15   | 7    | 14   | 26   | 5    | 0    | 0    | 0    | 134    |
| People killed  | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 2    | 4    | 1    | 11   | 0    | 4    | 0    | 0    | 0    | 25     |
| People injured   | 60   | 5    | 1    | 68   | 14   | 0    | 35   | 81   | 25   | 46   | 138  | 22   | 48   | 0    | 0    | 0    | 543    |
| People arrested  | 412  | 48   | 56   | 223  | 19   | 0    | 83   | 273  | 250  | 198  | 100  | 286  | 22   | 0    | 0    | 0    | 1970   |
| Size of conflict   | 21   | 5    | 8    | 32   | 10   | 0    | 16   | 44   | 19   | 18   | 13   | 26   | 11   | 0    | 0    | 0    | 223    |
| Severity Index   | 0.63 | 0.06 | 0.08 | 0.47 | 0.10 | 0.00 | 0.27 | 0.74 | 0.53 | 0.36 | 0.91 | 0.50 | 0.35 | 0.00 | 0.00 | 0.00 | 5.00   |

|  |     |    |    |    |    |    |   |   |    |    |    |   |   |   |   |   |     |
|--|-----|----|----|----|----|----|---|---|----|----|----|---|---|---|---|---|-----|
| <i>Panel C. Meetings and rallies in the U.S. South</i> |     |    |    |    |    |    |   |   |    |    |    |   |   |   |   |   |     |
| Total Number   | 105 | 45 | 15 | 15 | 11 | 20 | 3 | 8 | 12 | 9  | 8  | 3 | 6 | 0 | 3 | 1 | 264 |
| Days of conflict                                       | 124 | 52 | 28 | 18 | 12 | 37 | 3 | 9 | 13 | 11 | 10 | 3 | 9 | 0 | 3 | 1 | 333 |
| People killed  | 0   | 0  | 0  | 0  | 0  | 0  | 0 | 0 | 0  | 0  | 0  | 0 | 1 | 0 | 0 | 0 | 1   |
| People injured   | 0   | 1  | 0  | 7  | 0  | 0  | 0 | 0 | 0  | 0  | 0  | 0 | 1 | 0 | 0 | 0 | 9   |

(Continues)

TABLE C1 (Continued)

|   | 60   | 61   | 62   | 63   | 64   | 65   | 66   | 67   | 68   | 69   | 70   | 71   | 72   | 73   | 74   | 75   | Total |
|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| People arrested                                 | 903  | 1051 | 307  | 1601 | 357  | 1046 | 0    | 11   | 18   | 53   | 670  | 0    | 0    | 0    | 24   | 0    | 6041  |
| Size of conflict                                | 247  | 100  | 42   | 51   | 30   | 69   | 12   | 22   | 41   | 31   | 27   | 12   | 19   | 0    | 9    | 5    | 717   |
| Severity Index                                  | 0.87 | 0.58 | 0.19 | 1.17 | 0.14 | 0.38 | 0.03 | 0.06 | 0.10 | 0.09 | 0.18 | 0.03 | 1.16 | 0.00 | 0.03 | 0.01 | 5.00  |
| Panel D. Race riots in the U.S. South, by state |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
| Alabama   | 1    | 0    | 0    | 5    | 1    | 0    | 0    | 3    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 10    |
| Arkansas  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1     |
| Florida   | 1    | 0    | 0    | 0    | 0    | 0    | 3    | 2    | 1    | 3    | 3    | 3    | 0    | 0    | 0    | 0    | 16    |
| Georgia   | 0    | 0    | 2    | 0    | 0    | 0    | 2    | 2    | 0    | 0    | 1    | 3    | 0    | 0    | 0    | 0    | 10    |
| Louisiana                                       | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 2    | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 0    | 5     |
| Mississippi                                     | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1     |
| North Carolina                                  | 0    | 1    | 0    | 1    | 0    | 0    | 0    | 2    | 1    | 0    | 0    | 1    | 2    | 0    | 0    | 0    | 8     |
| South Carolina                                  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0     |
| Tennessee                                       | 1    | 0    | 0    | 1    | 0    | 0    | 0    | 2    | 1    | 1    | 0    | 1    | 0    | 0    | 0    | 0    | 7     |
| Texas   | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 2     |
| Virginia  | 1    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 2    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 3     |

**TABLE C2** The determinants of all conflicts and riots, using Olzak (2015) data, 1964–1971

|                                    | <b>All race conflicts</b> |                   | <b>Race riots</b>  |                    |
|------------------------------------|---------------------------|-------------------|--------------------|--------------------|
|                                    | <b>Frequency</b>          | <b>Intensity</b>  | <b>Frequency</b>   | <b>Intensity</b>   |
|                                    | <b>(1)</b>                | <b>(2)</b>        | <b>(3)</b>         | <b>(4)</b>         |
| Share of African Americans, 1960   | 0.065**<br>(0.023)        | 0.209*<br>(0.097) | 0.072**<br>(0.028) | 0.254**<br>(0.104) |
| VRA coverage in 1965               | −0.548***<br>(0.157)      | 0.347<br>(1.148)  | 0.041<br>(0.229)   | 1.624<br>(1.252)   |
| Population density, 1960           | −0.263<br>(1.000)         | 0.518<br>(4.200)  | −0.185<br>(1.080)  | −1.347<br>(3.644)  |
| Manufacturing size, 1960           | −0.015<br>(0.010)         | −0.062<br>(0.055) | −0.006<br>(0.016)  | −0.073<br>(0.085)  |
| Agriculture size, 1960             | −0.014<br>(0.013)         | −0.117<br>(0.085) | −0.014<br>(0.017)  | −0.072<br>(0.064)  |
| Mining size, 1950                  | 0.006<br>(0.013)          | 0.025<br>(0.064)  | 0.007<br>(0.017)   | 0.005<br>(0.074)   |
| Agricultural intensity, 1960       | −0.015<br>(0.020)         | −0.002<br>(0.101) | −0.036<br>(0.023)  | −0.203*<br>(0.094) |
| Unemployment rate, 1960            | 0.006<br>(0.070)          | −0.514<br>(0.364) | 0.033<br>(0.088)   | −0.112<br>(0.349)  |
| Share of families in poverty, 1960 | −0.006<br>(0.044)         | 0.138<br>(0.245)  | −0.004<br>(0.047)  | −0.033<br>(0.189)  |
| Median family income, 1960         | −0.000<br>(0.001)         | −0.000<br>(0.003) | −0.000<br>(0.001)  | −0.001<br>(0.003)  |
| Birth rate, 1960                   | −0.002<br>(0.021)         | −0.016<br>(0.087) | −0.022<br>(0.031)  | −0.117<br>(0.102)  |
| Household members, 1960            | −0.695<br>(0.527)         | −5.129<br>(2.973) | −0.975<br>(0.708)  | −7.225*<br>(3.708) |
| Size of farms, 1959                | −0.005<br>(0.004)         | −0.028<br>(0.031) | −0.004<br>(0.006)  | −0.039<br>(0.033)  |
| Non-White households, 1950         | −0.035*<br>(0.019)        | −0.117<br>(0.084) | −0.033<br>(0.023)  | −0.108<br>(0.079)  |
| Farms w. electricity, 1954         | −0.030<br>(0.031)         | −0.282<br>(0.209) | 0.006<br>(0.029)   | 0.059<br>(0.090)   |
| Households w. tv, 1960             | 0.024<br>(0.014)          | 0.251<br>(0.143)  | 0.013<br>(0.016)   | 0.068<br>(0.089)   |

(Continues)

TABLE C2 (Continued)

|                                      | All race conflicts |                    | Race riots         |                     |
|--------------------------------------|--------------------|--------------------|--------------------|---------------------|
|                                      | Frequency          | Intensity          | Frequency          | Intensity           |
|                                      | (1)                | (2)                | (3)                | (4)                 |
| Households w. two or more cars, 1960 | 0.030<br>(0.017)   | 0.157*<br>(0.083)  | 0.048<br>(0.027)   | 0.134<br>(0.125)    |
| Older than 65 years, 1960            | −0.098<br>(0.092)  | −0.754<br>(0.465)  | −0.126<br>(0.109)  | −0.918<br>(0.559)   |
| Expenditure on highways, 1962        | −0.097<br>(0.062)  | −0.494<br>(0.586)  | −0.073<br>(0.092)  | 0.200<br>(0.689)    |
| Median school years, 1960            | 0.097<br>(0.132)   | −0.092<br>(0.795)  | 0.067<br>(0.253)   | −0.721<br>(0.969)   |
| Enrolled in school, 1950             | −0.004<br>(0.003)  | −0.022*<br>(0.011) | −0.005<br>(0.003)  | −0.013<br>(0.011)   |
| Lynchings of Afr. Am., 1902–1964     | −1.284<br>(0.828)  | −6.838<br>(4.725)  | −1.765<br>(0.986)  | −7.938*<br>(4.042)  |
| Anti-black activism, 1960–1964       | 0.113*<br>(0.058)  | 0.183<br>(0.336)   | −0.001<br>(0.054)  | −0.164<br>(0.199)   |
| NAACP branches, 1957–1964            | −0.372*<br>(0.198) | −1.747*<br>(0.803) | −0.468*<br>(0.226) | −2.012**<br>(0.877) |
| KKK Klaverns, 1925–1940              | 0.747**<br>(0.243) | 3.484**<br>(1.219) | 0.710**<br>(0.254) | 4.341**<br>(1.746)  |
| State fixed effects                  | Yes                | Yes                | Yes                | Yes                 |
| Topographic controls                 | Yes                | Yes                | Yes                | Yes                 |
| Mean dep. var.                       | 0.088              | 0.438              | 0.088              | 0.438               |
| $R^2$                                | 0.62               | 0.42               | 0.48               | 0.50                |
| $N$                                  | 1022               | 1022               | 1022               | 1022                |

Note: Robust standard errors in parenthesis are adjusted for clustering at the state-level. All regressions include state fixed effects and topographic variables.

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5% and 10% levels, respectively.

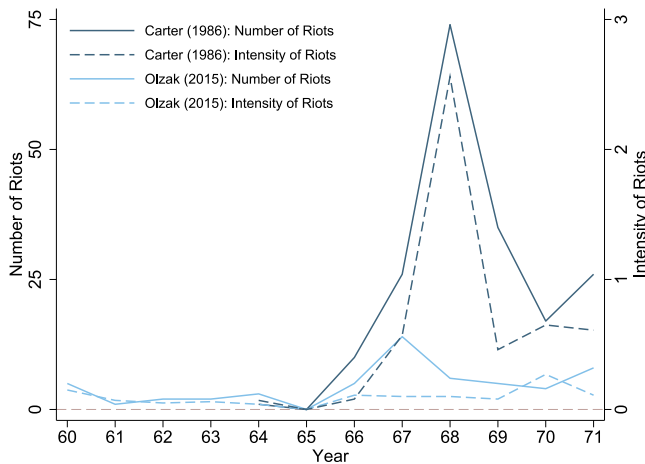


FIGURE C1 Alternative data sets on race riots [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/erpe.12213)]

## APPENDIX D: QUALITY OF THE IRREGULAR TERRAIN MODEL

The Irregular Terrain Model (ITM) is usually used in the propagation of Frequency Modulation (FM) radio signals, rather than the Amplitude Modulation (AM) signals that are considered in this study.<sup>31</sup> Besides the IV results (Section 4.3), a second assessment of the quality of the ITM considers the visual correspondence between the ITM and what Black-appeal radio stations were reporting to be their actual coverage. That is, the predicted coverage obtained from this physical model of electromagnetic signal propagation is directly compared to the historical records of coverage reported by eight Black-appeal radio stations. Comparing these maps shows that the ITM delivers a reasonable and reliable approximation of the true signal. The estimates present in these historical documents, often carried out by third-party radio consulting engineers, were then used by the radio stations to seek advertisements from private companies. The coverage reported by these Black-appeal radio stations is often shown as two contours, one for the reception of a strong signal (ranging from  $0.5MV/M$  to  $2MV/M$ ), and one allowing for a weaker signal (from  $0.1MV/M$  to  $0.5MV/M$ ). From the ITM, I have constructed similar measures to allow for the reception of both strong and weak signals. And although there is substantial variation in the definition used by each station on what constitutes a strong and a weak signal, the areas obtained from the ITM closely overlap the contours obtained from these historical sources.

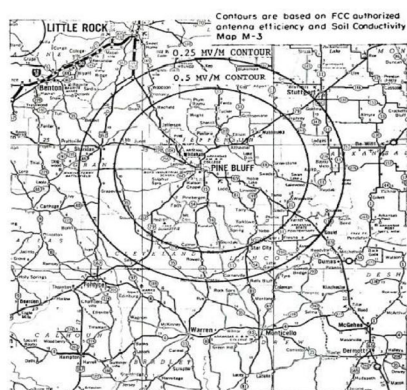
### Construction of the radio signal variable

For each station in the data set, the location, frequency and strength of each radio tower (there are 200 of them in 1964 and a further 157 in 1968), have been used to construct the predicted spatial propagation of the radio signal. To predict coverage, the ITM is considered in conjunction with publicly available Shuttle Radar Topography Mission (SRTM) terrain data. To make the estimated coverage from ITM and SRTM operational for this study, three geographic information system (GIS) applications (Google Earth, ArcGIS, and QGIS) have all been used. In particular, these applications have been exploited to geocode and georeference both the signal and the free-space signal of each radio station with southern counties.

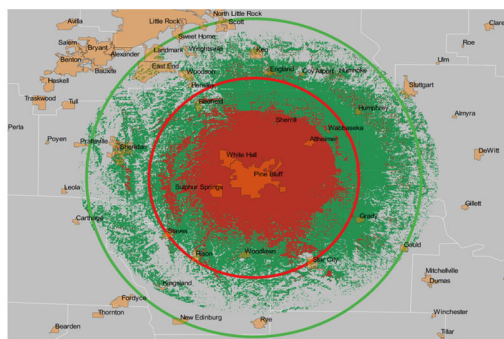
Based on both the ITM and the SRTM, the tool provided by Nautel, a manufacturer in radio broadcasting, is used to obtain the predicted coverage. The latitude and the longitude

considered are those of the city center of the municipality in which the radio station was located. The height of the radio antenna is set at 61 m (200 ft) for all the radio stations: this is the average height found in the set of applications made to the FCC during those years. Then, having further set the frequency and the strength of the radio antenna, the tool provides a *.zip* file containing the information on coverage. Each *.zip* file is opened into Google Earth Pro, which allows to save it as a *.kml* file. Doing so creates two files: (i) the square containing the coverage map in *.kml* format, and (ii) the *.png* file with the coverage map. To georeference the *.png* map to its *.kml* contour, QGIS is considered. In particular, using vector layers for each *.kml* file and raster layers for each *.png* file, the georeferencer tool is used to obtain *.tif* files with the georeferenced maps. Then, QGIS is employed to first pull together all the individual radio stations' *.tif* files, and then converting—from a raster to a vector polygon, using the polygonize tool—the resulting map as a shapefile in *.shp*. Lastly, ArcGIS is used to, first, aggregate all the shapefiles of the individual states and, second, calculate the share of each county that is covered by the signal by considering the overlay between the counties' shapefile and the coverage maps.

### Arkansas: KOTN-AM Radio Station in Pinebluff

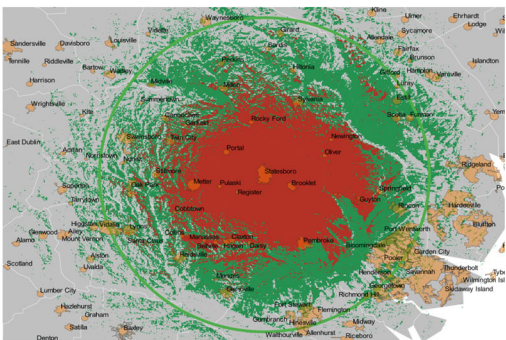
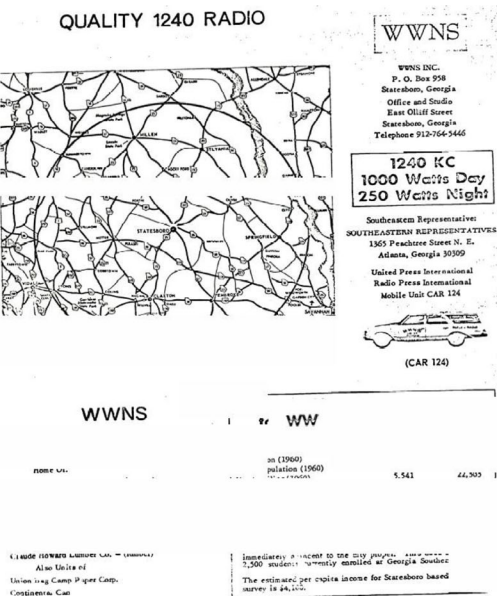


COVERAGE MAP FOR RADIO STATION KOTN  
AT PINE BLUFF, ARKANSAS OPERATING ON  
1490KCS WITH A POWER OF 1,000 WATTS  
RALPH J. RITZER, CONSULTING RADIO ENGINEER, 812 OLIVE ST., ST. LOUIS, MO.

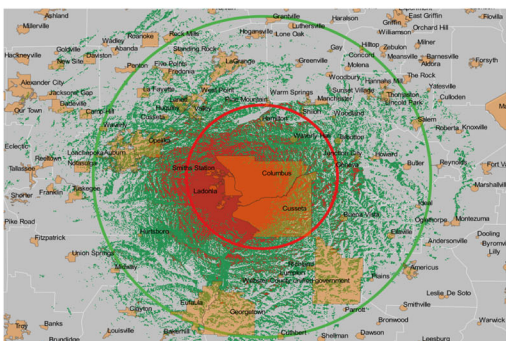
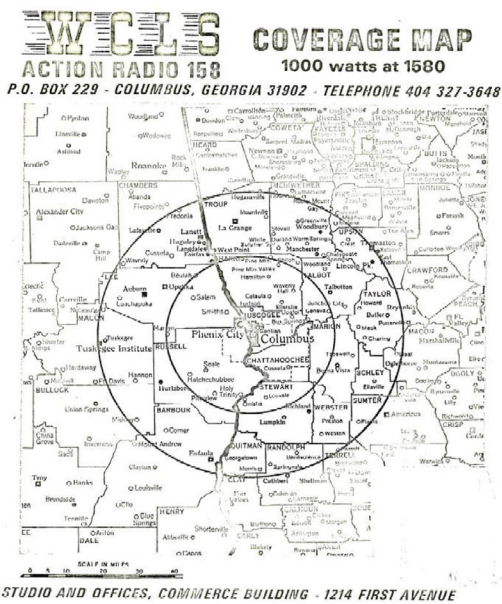




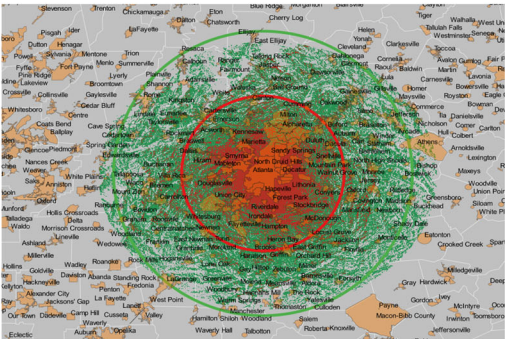
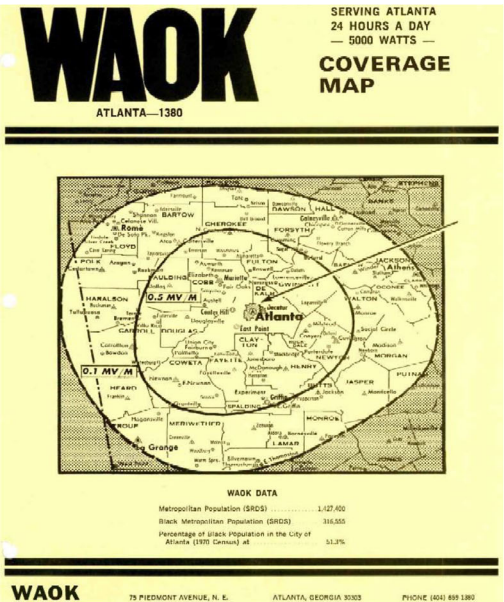
Georgia: WWNS-AM Radio Station in Statesboro



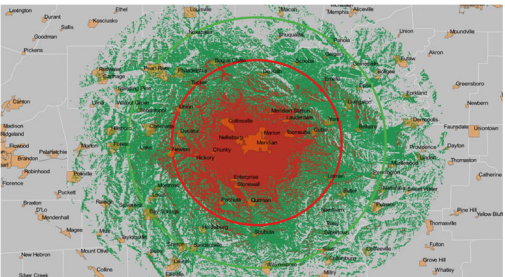
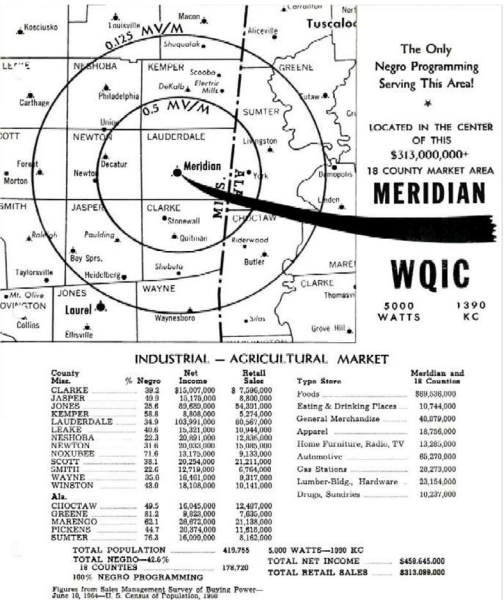
Georgia: WCLS-AM Radio Station in Columbus



Georgia: WAOK-AM Radio Station in Atlanta

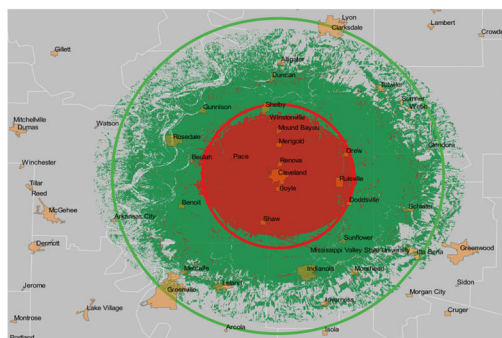
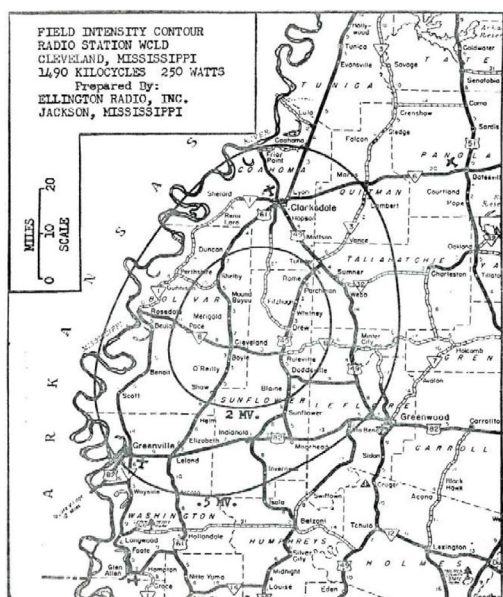


Mississippi: WQIC-AM Radio Station in Meridian

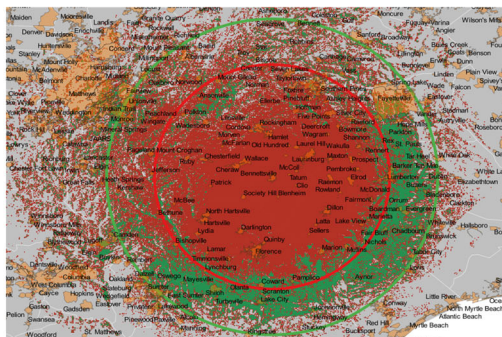
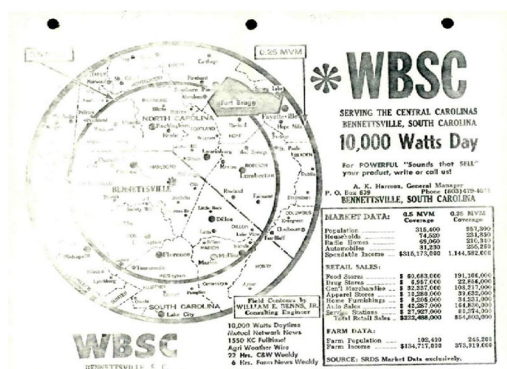




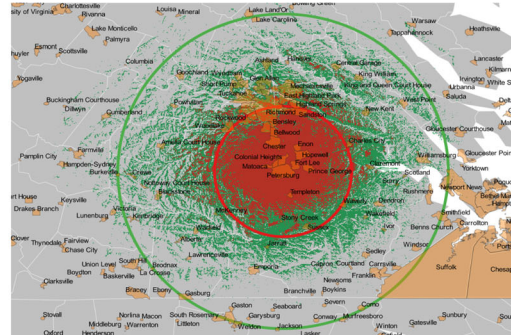
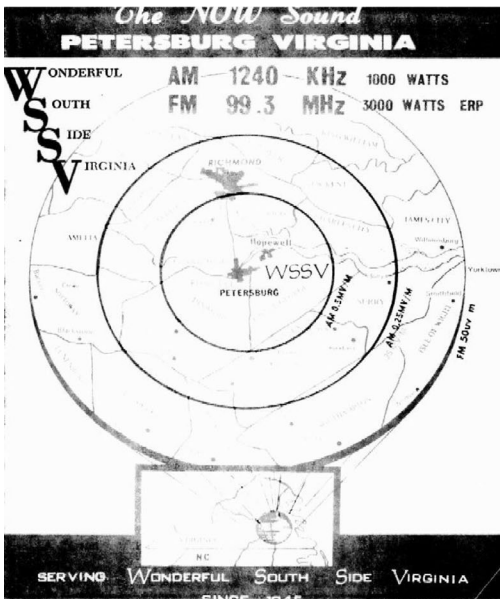
## Mississippi: WCLD-AM Radio Station in Cleveland



## South Carolina: WBSC-AM Radio Station in Bennettsville



## Virginia: WSSV-AM Radio Station in Petersburg



## APPENDIX E: SURVEY AND ANECDOTAL EVIDENCE ON RADIO STATIONS

Evidence based on surveys and anecdotes indicates that, during the 1960s: (i) African Americans relied on radio as the leading source of information and entertainment; (ii) preference leaned toward Black-appeal radio stations; and (iii) these stations influenced the behavior of its audience.

First of all, during the period under investigation, radio remained the preferred mass medium among African Americans. From a survey conducted in 1961 and 1962 across twenty cities in the U.S. South, it emerged that 78.2% of African Americans did listen to the radio regularly, while a substantial share did not read any newspapers or magazines (31.0% and 54.6%, respectively).<sup>32</sup> This same survey was further taken by 264 African American students with the proportion of those not reading any newspapers or magazines falling to 8.0% and 6.5%, respectively, while those frequently listening to the radio increasing to 83.0%. The survey also asked 694 white adults about their behavior in how they access the media: 58.4% claimed that they listen to the radio regularly, about 20 (25) percentage points less than the sample of African American adults (students). White adults also read more newspapers and magazines, with only 13.0% and 33.1% not reading any. A nation-wide study conducted by the Opinion Research Corporation found that, while 71% of African Americans listened to the radio, only 57% of whites did so, with the former group also watching less television and reading fewer daily newspapers and magazines. Lastly, a Harvard Business Review study further agreed that African Americans spent most of their media time listening to the radio.<sup>33</sup>

Having established that radio was the most relevant source of information and entertainment for African American communities, it is important to demonstrate that African Americans preferred to listen to Black-appeal radio stations and that their thoughts and beliefs

were significantly shaped by these stations. A 1963 study carried out by KZEY-AM, a Black-appeal radio station located in Beaumont, Texas, showed that 90% of African Americans who responded to the survey had a working radio in the household, and that 78% had listened to it on that given day (Sponsor, 1964). Of these, 78% said that the station they listened to was a Black-appeal one, 13% a general-market one, while 9% could not recall the type of radio station that they listened to. Furthermore, 80% of the respondents said that they would most likely buy products or services if they were advertised over a Black-appeal radio station, with only 20% doing so if they were aired on television. In fact, advertising aired on Black-appeal radio stations was able to drive twice as many purchases among African Americans compared to general-market radio stations, with the latter having the same effect on persuading either a white or an African American listener.<sup>34</sup> African Americans were also able to recall more commercials when aired by Black-oriented radio stations compared to general-market radio stations, while whites could recall significantly fewer ads.

Besides surveys, there is also a significant amount of anecdotal evidence supporting the view that African Americans were more responsive to the information conveyed by Black-appeal radio stations, compared to either general-market ones or the television. Interviewed by Sponsor (1964), Bob Dore, who owned a company representing the interests of more than three dozen Black-appeal radio stations in the U.S. South, stated that “when a Negro hears a commercial in general-market radio, he's not sure it's meant for him. When he hears one on a Negro station, he knows it's meant for him. Sure, there may come a day when there's no need for ‘Negro radio’ as we know it now. But that day, despite all the progress that has been made by U.S. Negroes and all the progress they will make in the near future, is still a long way off.” Interviewed by the *New York Times* in 1964, Graeme Zimmer of Continental Broadcasting, a division of Rollins Broadcasting, Inc., which operated five Black-appeal radio stations, said that “Negro-programmed radio is the only media that reaches the Negro every day with what he wants to hear and know.” Similarly, Harry Novik, general manager of the Black-appeal radio station WLIB-AM in Harlem, said that “the Negro-oriented station has a personal relationship with local Negro communities that is unknown in general radio.”

## APPENDIX F: DATA SOURCES AND DEFINITIONS

### *Race riots of the 1960s*

*Frequency of riots*: the share of all the riots that occurred in a county, standardized by the total number of riots across southern counties. When considering the period 1964–1971, the denominator refers to the total number of riots that occurred in the U.S. South during 1964–1971. In this case, the data set is based on the information collected by Carter (1986). When considering the longer period 1960–1971, the denominator refers to the total number of riots that occurred in the U.S. South during 1960–1971. The data set is based on the information collected by Carter (1986) for 1964–1971 and by Olzak (2015) for 1960–1963.

*Intensity of riots*: it is constructed as the severity index proposed by Collins and Margo (2004) and Collins and Margo (2007). When considering the period 1964–1971, the five indicators of severity that are used to construct this index are: length of the riot, number of deaths, injuries, arrests and episodes of arson. When considering the longer period 1960–1971, the indicator measuring episodes of arson is inevitably omitted. This is to ensure consistency between Carter (1986) and Olzak (2015).

### *Black-appeal radio stations*

*Black-appeal radio stations in 1964*: it includes the list of 200 radio stations that aired a minimum of 12 h of Black-appeal programming a week. The data set is based on the

information collected by Sponsor (1964). In case of missing information, other sources used are: (i) previous publications of Sponsor; (ii) the 1964 edition of the Broadcasting Yearbook, a yearly directory published by the magazine Broadcasting; and (iii) the 1964 edition of the North American Radio-TV Station Guide.

*Black-appeal radio stations in 1968*: it includes the list of 157 radio stations that aired a minimum of 12 h of Black-appeal programming a week. It has been obtained from Spot Radio Rates and Data (1968).

#### *County characteristics*

*County area*: the total area of the county, in squared miles, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Length of rivers*: the total length of the county that is covered by rivers, in miles. The raster file has been obtained from Natural Earth, and ArcGIS has then been used.

*Area of lakes*: the total area of the county that is covered by lakes, in squared miles. The raster file has been obtained from Natural Earth, and ArcGIS has then been used.

*National Parks*: an indicator equal to one if there is at least one National Park in the county. The raster file has been obtained from Natural Earth, and ArcGIS has then been used.

*Mountains above 800m*: the height of all the mountains above 800m, in meters. The raster file has been obtained from Natural Earth, and ArcGIS has then been used.

*Coastal county*: an indicator equal to one for the set of counties along the coast has been obtained from the U.S. Census.

*Share of the African American population, 1960*: the share of the African American population in the total population in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*VRA coverage, 1965*: an indicator equal to one for the counties covered by the VRA, and equal to zero otherwise. The counties of six states (Alabama, Georgia, Louisiana, Mississippi, South Carolina, and Virginia) were fully covered. Arkansas, Florida, Tennessee and Texas were not covered. Of the 100 counties in North Carolina, 39 counties were subject to the VRA.<sup>35</sup>

*Total population, 1960*: the total population in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Population density, 1960*: the population density in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Size of manufacturing, 1960*: the share of the manufacturing sector in the total production system in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Size of agriculture, 1960*: the share of the agricultural sector in the total production system in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Size of mining, 1960*: the share of the mining sector in the total production system in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Agricultural intensity*: the maximum potential cotton yield, expressed as a cotton suitability index, at the county-level, has been obtained from Hornbeck and Naidu (2014).

*Unemployment rate, 1960*: the unemployment rate in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Households below the poverty line, 1960*: the share of households with an income lower than 3000 USD in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).



*Median family income, 1960:* the median income per household in 1960, at the county-level, using 1960 USD, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Birth rate, 1960:* the birth rate in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Members of the households, 1960:* the average number of members in each household in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Size of farms, 1959:* the share of the land used for farming in 1959, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Non-White households, 1950:* the share of households that are non-White in 1950, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Farms with electricity, 1954:* the share of farms with electricity in 1954, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Households with televisions, 1960:* the share of households with at least one television set in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Households with two or more cars, 1960:* the share of households with at least two cars in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Population above 65 years, 1960:* the share of the population with at least 65 years in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Expenditure on highways, 1962:* the per capita expenditure on highways by the local government in 1962, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*Median school years, 1960:* the median years of schooling of the population with at least 25 years in 1960, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

*School enrollment, 1950:* the share of the population between 14 and 17 years of age that is enrolled in schooling in 1950, at the county-level, has been obtained from the Inter-university Consortium for Political and Social Research (2012).

#### *Indicators of race relations*

*Lynching of African Americans, 1902–1964:* episodes of African American lynching that occurred in each county from 1902 until 1964, standardized by the African American population in the county in 1960. Information on each episode of lynching has been obtained from the project Monroe Work Today. It provides information on the name, race, sex, location, alleged crime and original source. The choice to start from 1902 is driven by two considerations: (i) in 1901, anti-lynching measures were presented to Congress for the first time (since then, about 240 anti-lynching bills have been proposed); (ii) in May 1902, during a speech at Arlington, Virginia, President Theodore Roosevelt openly condemned the act of lynching: this was the first time that a President ever made a statement against it.

*Anti-African American activism, 1960–1964:* the counts of anti-African American events that occurred between 1960 and 1964, as reported by the Dynamics of Collective Action Data set by States and Cities.



*NAACP branches, 1957–1964:* the average number of local branches of the National Association for the Advancement of Colored People (NAACP) active between 1957 and 1964. Information on the location of local branches of the NAACP has been obtained from the University of Washington's project Mapping American Social Movements Through the 20th Century.

*KKK Klaverns, 1925–1940:* the average number of Ku Klux Klan groups, known as Klaverns, active between 1925 and 1940. Information on the location of each Klavern has been obtained from the Virginia Commonwealth University's project Mapping the Second Ku Klux Klan.

*Instrumental variable*

*HBCUs enrollment, 1976:* the list of historically Black colleges and universities (HBCUs) active in 1960 has been obtained from HBCU Lifestyle. For this list, the enrollment data refer to 1976 and it is available from the U.S. Department of Education and National Center for Education Statistics (2004). It has been standardized by the African American population in the county in 1980.